8476802

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

April 09, 2024

THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE RECORDS OF THIS OFFICE OF THE FILE WRAPPER AND CONTENTS OF:

APPLICATION NUMBER: *15/471,722*
FILING DATE: *March 28, 2017*
PATENT NUMBER: *11087272*
ISSUE DATE: *August 10, 2021*

UNITED STATES PATENT AND TRADEMARK OFFICE · DEPARTMENT OF COMMERCE

Certified by

Performing the Functions and Duties of the
Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	
Filing Date	03/28/2017
First Named Inventor	Sarjoun Skaff
Title	System and Method for Locating, Identifying and Counting Items
Art Unit	
Examiner Name	
Attorney Docket Number	BOSS-01001

SIGNATURE of Applicant or Patent Practitioner

Signature	/David R. Stevens/	Date (Optional)	03/28/2017
Name	David R. Stevens	Registration Number	38626
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 34051

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☐ The address associated with the above-mentioned Customer Number

OR

☑ The address associated with Customer Number: 34051

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Bossa Nova Robotics IP, Inc.

☐ Inventor or Joint Inventor (title not required below)

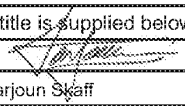
☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Sarjoun Skaff		
Title	CTO		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

System and Method for Locating, Identifying and Counting Items

CROSS -REFERENCE TO RELATED PATENT APPLICATION

[0001] The present disclosure is part of a non-provisional patent application claiming the priority benefit of U.S. Patent Application No. 62/314,785, "System and Method for Locating, Identifying and Counting Products on Shelves", filed 3/29/2016; and U.S. Patent Application No. 62/427,509, "System and Method for Locating, Identifying and Counting Items", filed 11/29/2016.

TECHNICAL FIELD

[0002] The present disclosure relates generally to a multiple camera sensor suite capable of accurately monitoring retail or warehouse product inventory without needing an initial planogram. In certain embodiments, the multiple camera sensor suite can be mounted on an autonomous robot and include onboard processing to provide near real time product tracking.

BACKGROUND

[0003] Retail stores or warehouses can have thousands of distinct products that are often sold, removed, added, or repositioned. Even with frequent restocking schedules, products assumed to be in stock may be out of stock, decreasing both sales and customer satisfaction. Point of sales data can be used to roughly estimate product availability, but does not help with identifying misplaced, stolen, or damaged products, all of which can reduce product availability. However, manually monitoring product inventory and tracking product position is expensive and time consuming.

[0004] One solution for tracking product inventory relies on planograms (lists or diagrams that show how and where specific products should be placed on shelves or displays) in combination with machine vision technology. Given a planogram, machine vision can be used to assist in shelf space compliance. For example, large numbers of fixed position cameras can be used throughout a store to monitor aisles, with large gaps in shelf space being checkable against the planogram or shelf labels, and flagged as “out of stock” if necessary. Alternatively, a smaller number of movable cameras can be used to scan a store aisle. Even with such systems, human intervention is generally required to build an initial planogram that includes detailed information relative to a bounding box that can include product identification, placement, and count. Substantial human intervention can also be required to update the planogram, as well as search for misplaced product inventory.

SUMMARY

[0005] A low cost, accurate, and scalable camera system for product or other inventory monitoring can include a movable base. Multiple cameras supported by the movable base are directable toward shelves or other systems for holding products or inventory. A processing module is connected to the multiple cameras and able to construct from the camera derived images an updateable map of product or inventory position.

[0006] In some embodiments, the described camera system for inventory monitoring can be used for detecting shelf labels; optionally comparing shelf labels to a depth map; defining a product bounding box; associating the bounding box to a shelf label to build a training data set; and using the training data set to train a product classifier.

[0007] In other embodiments, a system for building a product library can include an image capture unit operated to provide images of items. The system also includes a shelf label detector (which can be a high resolution zoomable camera) and optionally depth map creation unit (which can be provided by laser scanning, time-of-flight range sensing, or stereo imaging), a processing module to optionally compare detected shelf labels to a depth map, define a product bounding box, and associate the bounding box with a shelf label to build a training data set or learn image descriptors. Both the image capture unit and processing module can be mounted on an autonomous robot.

[0008] Because it represents reality on the shelf, an inventory map such as disclosed herein can be known as a “realogram” to distinguish from conventional “planograms” that take the form of 3D models, cartoons, diagrams or lists that show how and where specific retail products and signage should be placed on shelves or displays. Realograms can be locally stored with a data storage module connected to the processing module. A

communication module can be connected to the processing module to transfer realogram data to remote locations, including store servers or other supported camera systems, and additionally receive inventory information including planograms to aid in realogram construction. In addition to realogram mapping, this system can be used to detect out of stock products, estimate depleted products, estimate amount of products including in stacked piles, estimate products heights, lengths and widths, build 3D models of products, determine products' positions and orientations, determine whether one or more products are in disorganized on-shelf presentation that requires corrective action such as facing or zoning operations, estimate freshness of products such as produce, estimate quality of products including packaging integrity, locate products, including at home locations, secondary locations, top stock, bottom stock, and in the backroom, detect a misplaced product event (also known as a plug), identify misplaced products, estimate or count the number of product facings, compare the number of product facings to the planogram, locate labels, determine sequence of labels, detect label type, read label content, including product name, barcode, UPC code and pricing, detect missing labels, compare label locations to the planogram, compare product locations to the planogram, determine the expiration date of products, determine freshness of products including produce, measure shelf height, shelf depth, shelf width and section width, recognize signage, detect promotional material, including displays, signage, and features and measure their bring up and down times, detect and recognize seasonal and promotional products and displays such as product islands and features, capture images of individual products and groups of products and fixtures such as entire aisles, shelf sections, specific products on an aisle, and product displays and islands, capture 360-deg and spherical views of the environment to be visualized in a virtual tour application allowing for virtual walk throughs, capture 3D images of the environment to be viewed in augmented or virtual reality, capture environmental conditions including ambient light levels, capture information

about the environment including measuring space compliance with disability and safety standards and determining if light bulbs are off, provide a real-time video feed of the space to remote monitors, provide on-demand images and videos of specific locations, including in live or scheduled settings, and build a library of product images.

[0009] In one embodiment, the movable base can be a manually pushed or guidable cart. Alternatively, the movable base can be a tele-operated robot, or in preferred embodiments, an autonomous robot capable of guiding itself through a store or warehouse. Depending on size of the store or warehouse, multiple autonomous robots can be used. Aisles can be regularly inspected to identify out of stocks or create realograms, with aisles having high product movement being inspected more often.

[0010] In another embodiment, an inventory monitoring method includes the steps of allowing an autonomous robot to move along an aisle that is lined with shelves capable of holding inventory or products, with the autonomous robot acting as a movable base for multiple cameras. Multiple cameras are directed toward inventory on the shelf lined aisle, with data derived at least in part from these cameras being used to construct a realogram of inventory or a panoramic image using a processing module contained in the autonomous robot. Realogram data or panoramic images created by the processing module can be transferred to remote locations using a communication module, and inventory information received via the communication module can be used to aid in realogram construction.

[0011] In yet another embodiment, an inventory monitoring method, includes the steps of allowing an autonomous robot to move along a shelf lined aisle holding inventory, with the autonomous robot acting as a movable base for multiple cameras. The autonomous robot can maintain a substantially constant or tightly controlled distance from the shelf lined aisle holding

inventory while moving in a forward or reverse direction. Using the multiple cameras directed toward inventory on the shelf lined aisle, at least part of a realogram of inventory positioned along a shelf lined aisle holding inventory can be constructed. Typically, the realogram is created and updated with a locally sited data storage and a processing module contained in the autonomous robot. To ensure complete or near complete camera coverage of shelf lined aisles, the autonomous robot can pause, reverse, or mark for further multiple camera inspection if data capture for a portion of the shelf lined aisle is incomplete.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is an illustration of a camera system mounted on a movable base to track product changes in aisle shelves or other suitable targets;

[0013] FIG. 2 is a cartoon illustrating two autonomous robots inspecting opposite shelves in an aisle;

[0014] FIG. 3 is an illustration of various systems and electronic modules connected to inventory cameras;

[0015] FIG. 4 is an illustration of steps in one embodiment of operation;

[0016] FIG. 5A and B are respectively examples in side view and cross section of an autonomous robot capable of acting as a mobile base for a camera system; and

[0017] FIG. 6 is a flowchart 600 illustrating in more detail how a product space for a realogram can be created without requiring an initial planogram; and

[0018] FIG. 7 is a flow chart 700 illustrating additional process details for managing aspects of the disclosed system.

[0019]

DETAILED DESCRIPTION

[0020] FIG. 1 is an illustration of an inventory monitoring camera system 100 mounted on a movable base 110 (with drive wheels 114) to track product changes in aisle shelves or other targets 102 without requiring an initial planogram.

[0021] The movable base 110 can be an autonomous robot having a navigation and object sensing suite 130 that is capable of independently navigating and moving throughout a building. The autonomous robot has multiple cameras 140 attached to movable base 110 by a vertically extending camera support 140. Lights 150 are positioned to direct light toward target 102. The object sensing suite includes forward (133), side (134 and 135), top (132) and/or rear (not shown) image and depth sensors to aid in object detection, localization, and navigation. Additional sensors such as laser ranging units 136 and 138 (and respective laser scanning beams 137 and 139) also form a part of the sensor suite that is useful for accurate distance determination. In certain embodiments, image sensors can be depth sensors that infer depth from stereo images, project an infrared mesh overlay that allows rough determination of object distance in an image, or that infer depth from the time of flight of light reflecting off the target. In other embodiments, simple cameras and various image processing algorithms for identifying object position and location can be used. For selected applications, ultrasonic sensors, radar systems, magnetometers or the like can be used to aid in navigation. In still other embodiments, sensors capable of detecting electromagnetic, light, or other location beacons can be useful for precise positioning of the autonomous robot.

[0022] As seen in FIG. 1, various representative camera types useful for constructing an updatable realogram are shown. As previously noted, a realogram can use camera derived images to produce an updateable map of

product or inventory position. Typically, one or more shelf units (e.g. target 102) would be imaged by a diverse set of camera types, including downwardly (142 and 144) or upwardly (143 and 148) fixed focal length cameras that cover a defined field less than the whole of a target shelf unit; a variable focus camera that adapts its focus to the distance from the imaged target; a wide field camera 145 to provide greater photographic coverage than the fixed focal length cameras; and a narrow field, zoomable telephoto 146 to capture bar codes, product identification numbers, and shelf labels. Alternatively, a high resolution, tilt controllable, height adjustable camera can be used to identify shelf labels. These camera 140 derived images can be stitched together, with products in the images identified, and position determined.

[0023] To simplify image processing and provide accurate results, the multiple cameras are typically positioned a set distance from the shelves during the inspection process. The shelves can be illuminated with LED or other directable lights 150 positioned on or near the cameras. The multiple cameras can be linearly mounted in vertical, horizontal, or other suitable orientation on a camera support. In some embodiments, to reduce costs, multiple cameras are fixedly mounted on a camera support. Such cameras can be arranged to point upward, downward, or level with respect to the camera support and the shelves. This advantageously permits a reduction in glare from products having highly reflective surfaces, since multiple cameras pointed in slightly different directions can result in at least one image with little or no glare.

[0024] Electronic control unit 120 contains an autonomous robot sensing and navigation control module 124 that manages robot responses. Robot position localization may utilize external markers and fiducials, or rely solely on localization information provided by robot-mounted sensors. Sensors for position determination include previously noted imaging, optical, ultrasonic

sonar, radar, Lidar, Time of Flight, structured light, or other means of measuring distance between the robot and the environment, or incremental distance traveled by the mobile base, using techniques that include but are not limited to triangulation, visual flow, visual odometry and wheel odometry.

[0025] Electronic control unit 120 also provides image processing using a camera control and data processing module 122. Autonomous robot sensing and navigation control module 124 manages robot responses, and communication module 126 manages data input and output. The camera control and data processing module 122 can include a separate data storage module 123 (e.g. solid state hard drives) connected to a processing module 125. The communication module 126 is connected to the processing module 125 to transfer realogram data or panoramic images to remote locations, including store servers or other supported camera systems, and additionally receive inventory information to aid in realogram construction. In certain embodiments, realogram data is primarily stored and images are processed within the autonomous robot. Advantageously, this reduces data transfer requirements, and permits operation even when local or cloud servers are not available.

[0026] FIG. 2 is a cartoon 200 illustrating two autonomous robots 230 and 232, similar to that discussed with respect to FIG. 1, inspecting opposite shelves 202 in an aisle. As shown each robot follows path 205 along the length of an aisle, with multiple cameras capturing images of the shelves 202.

[0027] In some embodiments, the robots 230 and 232 support at least one range finding sensor to measure distance between the multiple cameras and the shelves and products on shelves, with an accuracy of less than 5cm, and with a typical accuracy range between about 5 cm and 1mm. As will be appreciated, LIDAR or other range sensing instruments with similar accuracy can also be used in selected applications. Using absolute location sensors,

relative distance measurements to the shelves, triangulation to a known landmark, conventional simultaneous localization and mapping (SLAM) methodologies, or relying on beacons positioned at known locations in a blueprint or a previously built map, the robots 230 and 232 can move along a path generally parallel to shelves 202. As the robots move, vertically positioned cameras are synchronized to simultaneously capture images of the shelves 202. In certain embodiments, a depth map of the shelves and products is created by measuring distances from the shelf cameras to the shelves and products over the length of the shelving unit using image depth sensors and or laser ranging instrumentation. The depth map is registered onto the images captured by the shelf cameras, so as the location of each pixel on target can be estimated in 3D. Using available information, consecutive images can be stitched together to create panoramic images that spans an entire shelving unit. The consecutive images can be first stitched vertically among all the cameras, and then horizontally and incrementally stitched with each new consecutive set of vertical images as the robots 230 and 232 move along an aisle.

[0028] FIG. 3 is an illustration of various systems and electronic modules 300 supported by an autonomous robot having robot navigation and sensing 310. Inventory cameras 340 are moved into a desired position with the aid of robot navigation and sensing module 310. Lights 350 are directed toward product inventory and inventory camera control and image reconstruction 312 takes a series of inventory photos (and optional depth measurements) that can be stitched together to help form or update a realogram. Panoramic images, realogram data, or other inventory related information is handled by an inventory data and local update module 314, which can transmit or receive relevant information via communication system 316. Data can be communicated to a server local to the store, or transmitted by suitable internet or networking devices to remote servers or cloud accessible data sites.

[0029] Inventory cameras 340 can include one or more movable cameras, zoom cameras, focusable cameras, wide-field cameras, infrared cameras, ultra-violet cameras, or other specialty cameras to aid in product identification or image construction. For example, a wide-field camera can be used to create an image organizing template into which data from higher resolution cameras with a narrow field of view are mapped or registered. As another example, a tilt controllable, high resolution camera positioned on the camera support roughly at a height of a shelf lip can be used to read shelf attached bar codes, identifying numbers, or labels. In certain embodiments, conventional RGB CMOS or CCD sensors can be used, alone or in combination with spectral filters that may include narrowband, wideband, or polarization filters. Embodiments can also include sensors capable of detecting infrared, ultraviolet, or other wavelengths to allow for hyperspectral image processing. This can allow, for example, monitoring and tracking of markers, labels or guides that are not visible to people, or using flashing light in the invisible spectrum that do not induce discomfort of health risk while reducing energy consumption and motion blur.

[0030] Lights can be mounted along with, or separately from, the sensors, and can include monochromatic or near monochromatic light sources such as lasers, light emitting diodes (LEDs), or organic light emitting diodes (OLEDs). Broadband light sources may be provided by multiple LEDs of varying wavelength (including infrared or ultraviolet LEDs), halogen lamps or other suitable conventional light source. Various spectral filters that may include narrowband, wideband, or polarization filters and light shields, lenses, mirrors, reflective surfaces, diffusers, concentrators, or other optics can provide wide light beams for area illumination or tightly focused beams for improved local illumination intensity.

[0031] According to some embodiments, both cameras 340 and lights 350 can be

movably mounted. For example, hinged, rail, electromagnetic piston, or other suitable actuating mechanisms used to programmatically rotate, elevate, depress, oscillate, or laterally or vertically reposition cameras or lights.

[0032] In still other embodiments, one or more of the cameras can be mounted in such a way as to take advantage of the rolling shutter effects and direction of travel of the autonomous robot. Aligning a camera in such a way as to take advantage of the "rasterized" delay of the rolling shutter can reduce artifacts (elongation/shortening) that can occur while the robot is traveling in its path.

[0033] Inventory data 314 can include but is not limited to an inventory database capable of storing data on a plurality of products, each product associated with a product type, product dimensions, a product 3D model, a product image and a current product price, shelf location, shelf inventory count and number of facings. Realograms captured and created at different times can be stored, and data analysis used to improve estimates of product availability. In certain embodiments, frequency of realogram creation can be increased or reduced.

[0034] The communication system 316 can include connections to either a wired or wireless connect subsystem for interaction with devices such as servers, desktop computers, laptops, tablets, or smart phones. Data and control signals can be received, generated, or transported between varieties of external data sources, including wireless networks, personal area networks, cellular networks, the Internet, or cloud mediated data sources. In addition, sources of local data (e.g. a hard drive, solid state drive, flash memory, or any other suitable memory, including dynamic memory, such as SRAM or DRAM) that can allow for local data storage of user-specified preferences or protocols. In one particular embodiment, multiple communication systems can be provided. For example, a direct Wi-Fi connection (802.11b/g/n) can be used as well as a separate 4G cellular connection.

[0035] Remote server 318 can include, but is not limited to servers, desktop computers, laptops, tablets, or smart phones. Remote server embodiments may also be implemented in cloud computing environments. Cloud computing may be defined as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned via virtualization and released with minimal management effort or service provider interaction, and then scaled accordingly. A cloud model can be composed of various characteristics (e.g., on-demand self-service, broad network access, resource pooling, rapid elasticity, measured service, etc.), service models (e.g., Software as a Service ("SaaS"), Platform as a Service ("PaaS"), Infrastructure as a Service ("IaaS"), and deployment models (e.g., private cloud, community cloud, public cloud, hybrid cloud, etc.).

[0036] FIG. 4 is an illustration of realogram or panorama updating steps in one embodiment of operation. As seen in flow chart 400, a robot moves to an identified position and proceeds along an aisle path at a predetermined distance (step 410). If the path is blocked by people or objects, the robot can wait till the path is unobstructed, begin movement and slow down, wait as it nears the obstruction, move along the path until required to divert around the object before reacquiring the path, or simply select an alternative aisle.

[0037] In step 412, multiple images are captured and stitched together to define an image panorama. Optionally, in certain embodiments a panoramic or widefield camera can capture a single large image. These images, along with optional depth information created by a laser ranging system, an infrared depth sensor, or similar system capable of distinguishing depth at a decimeter or less scale, are used to create either panorama or a realogram (step 414). This information is communicated to a cloud or remote server

(step 416) to create, change, or update a panorama and/or realogram with data derived from shelf labels, bar codes, and product identification databases to identify products. A realogram is created using panorama images and data, and can be used by, for example, store managers, stocking employees, or customer assistant representatives to localize product and label placement, estimate product count, count the number of product facings, or even identify or locate missing products. Additionally, in some embodiments, realogram or other information received from other robots, from updated product databases, or from other stores can be used to update or assist in the creation of subsequent realograms (step 418).

[0038] FIG. 5A and B are respectively examples in side view and cross section of an autonomous robot 500 capable of acting as a mobile base for a camera system in accordance with this disclosure. The robot navigation and sensing unit includes a top mount sensor module 510 with a number of forward, side, rear, and top mounted cameras. A vertically aligned array of lights 520 is sited next to a vertically arranged line of cameras 530, and both are supported by a drive base 540 that includes control electronics, power, and docking interconnects. Mobility is provided by drive wheels 560, and stability is improved by caster wheels 550.

[0039] Inventory monitoring can rely on use of autonomous robot camera system images. Typically, multiple images are processed, combined, and segmented for further analysis. Segmented images can assist in defining a product bounding box that putatively identifies a product facing. This information is often necessary to develop a product library. A segmented image can include multiple product bounding boxes, typically ranging from dozens to hundreds of outlined or distinct image areas. The bounding boxes can surround either product facings, groups of products, or gaps between products. Products within product bounding boxes can be manually identified, identified using crowd source or paid reviewer image identification

systems, identified with or without the aid of an initial planogram, or automatically identified using various image classifiers discussed herein. Gaps between products are useful for identifying shelf spacings, product separation, or missing/absent inventory.

[0040] Automatic identification can be performed using an autonomous robot, alone or in combination with an external image classifier system. In certain embodiments, a product bounding box can be defined as the horizontal space on the shelf occupied by one or more copies (facings) of the same product, along with the vertical space spanning the distance between a current shelf and the shelf above it. When the current shelf is the top shelf, the vertical space is a number generally corresponding to the distance to top of the fixture. The vertical space can alternatively be top of the product as sensed by depth sensors.

[0041] Image segmentation to automatically assist in creation of product bounding boxes and product identification can rely on use of image templates in some embodiments. Typically, each image template is compared with the image captured by a camera system mounted on an autonomous robot. If a match is positive, the matched section of the image is used as the image segmentation for that product

[0042] Segmentation can be improved by training classifiers on annotated training data sets, where bounding boxes are manually drawn around products. Training can be performed with supervised or unsupervised machine learning, deep learning, or hybrid machine and deep learning techniques, including but not limited to convolutional neural networks.

[0043] Some methods include reducing the number of image templates that must be considered by only matching the templates that correspond to the product identifier; or to the product objects who are proximal to the shelf location

being scanned. Product objects can include but are not limited to:

[0044] -a product identifier

[0045] One or more sets of descriptors

[0046] Confidence levels for each set of descriptors

[0047] One or more shelf position metric estimates

[0048] Confidence levels for each shelf position metric estimate

[0049] One or more shelf position topological estimates

[0050] Count number for each shelf position topological estimate

[0051] One or more image templates of the product

[0052] Dimensions of the product

[0053] Product objects can be updated, manually or automatically revised, augmented, or corrected, and changed to match changing product specifications.

[0054] Some methods further detect if a product is oriented differently than the externally sourced image. If a template match cannot be found, but the product descriptor does find a high-likelihood match, this is indicative of a product orientation that is different from that of the image sourced externally to the mobile base system. If the externally sourced image is known to be a front view of the product, then this method identifies products that are improperly oriented on the shelf. The angular deviation of the improperly oriented product can be estimated and an affine transformation between the set of descriptors of the externally sourced image and the segmented portion of the image computed.

[0055] For situations where template matching is successful, the product segmentation in the image can be considered accurate, and the real dimensions of the product are compared to the apparent dimensions of the product in the image to extract a distance estimate between the imaging sensor and the product. Additionally, the apparent position of the product in the image combined with the distance estimate enable the computation of

the three-dimensional position and orientation between the imaging sensor and the product.

[0056] Some methods extract topological shelf positions for each product from the planogram. These methods further increase the scope of the product object identified through segmentation and redefine it as containing:

[0057] One product identifier

[0058] One or more sets of descriptors

[0059] Confidence levels for each set of descriptors

[0060] One or more shelf position metric estimates

[0061] Confidence levels for each shelf position metric estimate

[0062] One or more shelf position topological estimates

[0063] Count number for each shelf position topological estimate

[0064] One or more image templates of the product

[0065] Dimensions of the product

[0066] One or more topological shelf positions from planogram

[0067] In other embodiments, RFID tags, wireless beacons, locators, or trackers can be used alone or in combination to assist in defining a product bounding box. For example, in some embodiments, an autonomous robot can be additionally equipped with one or more RFID readers. Performing an inventory count of products equipped with RFID tags can proceed in one embodiment as follows:

[0068] The total number of tags for each product is communicated by an inventory management software to an RFID reader mounted on or associated with an autonomous robot;

[0069] The RFID reader collects RFID tags while the autonomous robot is either stationary or moving;

[0070] If the RFID reader does not collect all the tags for a given product, and:

[0071] If the autonomous robot is moving, then the autonomous robot stops in an attempt to collect the remaining tags, or

[0072] If the autonomous robot is stopped, move the autonomous robot in a predetermined search path in an attempt to collect the remaining tags.

[0073] With suitable changes, Bluetooth, Near Field Communication, or other conventional wireless system can be used in place of RFID systems.

[0074] In some embodiments, visual images based on numeric, alphabetic, one or two-dimensional bar codes, or similar image based shelf or product labels can be used alone or in combination with various image features to segment images and assist in defining a product bounding box. Each shelf image can be analyzed and segmented to detect individual price tags or product labels on the shelf. Alternatively, or in addition, each image can be used to detect identifying indicia of individual products and product packages. Segmentation can use techniques that include but are not limited to:

[0075] -Edge detection;

[0076] -Depth estimation using depth estimation techniques that include but are not limited to:

[0077] Stereo camera

[0078] Structure from motion

[0079] Structure from focus

[0080] Depth camera using time of flight

[0081] Depth camera using triangulation

[0082] Planar or 3D laser/lidar scanner

[0083] Color segmentation;

[0084] Product features including but not limited to product shapes, colors, texts, and aspect ratios;

[0085] Product shapes identified and learned using machine learning techniques such as convolutional neural networks and deep learning

[0086] Association of individual product images to identifiers based on a location heuristic. The heuristic may locate the identifier below a product image or in another proximal location.

[0087] The heuristic may be informed from the planogram by correlating the planned location of labels to the measured location of labels, and the number of facings for each facing group with the measured distance between consecutive labels divided by the width of the product corresponding to the left label. These correlations can be optimized, for example by using graph theory approaches, to generate a maximum likelihood correspondence between a facing group and a label.

[0088] Association may also be informed by mapping the left most label on a shelf with the left most group of self-similar facings, the right most label on the same shelf with the right most label facing group, and working inward until every facing group has an associated label.

[0089] Further, association may be informed by classifiers trained on hand-annotated associations from training data sets and using heuristics similar to the ones described above. Some methods further include inferring the position of each identifier on the shelf by comparing the location of the identifier to the location of the beginning or end of the shelf on which the identifier is placed. Alternatively, methods can be based on inferring the position of each product on the shelf by comparing the location of the product to the location of the beginning or end of the shelf on which the product is placed.

[0090] In some methods, an identifier's shelf location and/or product location are expressed in metric terms, i.e. measured distance from the beginning or end of a specific shelf. In other methods, an identifier's shelf location and/or product location are expressed topologically, e.g. as a sequence of identifiers from the start or the end of a specific shelf, and from the bottom of a shelf to the top, or from top to bottom. For example, a specific identifier may be third from the start of the fourth shelf.

[0091] If a product library is created or made available, the library can be searched for products objects with a large number of similar features to assist in developing a product bounding box. For each potential product object match, the geometric consistency of the feature locations in the library can be compared with the features in a shelf image. Some methods further include indexing the sets of descriptor within the library for improved searching performance and/or reduced storage requirements. Indexing methods include but are not limited to: hashing techniques, tree representations, and bag-of-words encodings. Alternatively, planogram information or product location information from the product library can be used to reduce the number of products that must be searched to just those products contained within the imaged shelf. In still other variations, identified products can be verified by segmenting and decoding the price tag or product label located proximally to each identified product and comparing it to the product object identifier.

[0092] FIG. 6 is a flowchart 600 illustrating in more detail one example of how a product bounding box such as previously discussed can be created from information captured by sensor and camera system supported by an autonomous robot. Turning to FIG. 6, in a first step 610, shelf labels are detected either in individual shelf images, or in a stitched panorama. Classification algorithms such as convolution neural networks or other deep learning methods, template matching or HAAR cascades can be used to aid in detection of each shelf label. Each shelf label is analyzed to obtain one or more product identifiers. Analysis may include but is not limited to optical character recognition, bar code scanning, QR code scanning, AR code scanning, or hologram code scanning. Product identifiers may be UPC code, the product name, or a coded collection of letters, numbers, or other symbols. If more than one identifier is available, a preferred identifier such as the UPC code can be selected. In certain embodiments, infrared or

ultraviolet detectable product identifiers embedded on product packaging or shelf labels can be used, as well as any other suitable tag, marker, or detectable identifying indicia such as a visible UPC code or serial number on the product packaging.

[0093] In optional step 612, an image location of the shelf label is registered or compared to a depth map to recover its 3D location in space. The depth map can be created by use of one or more depth sensors that infer depth from stereo images, project an infrared mesh overlay that allows rough determination of object distance in an image, infer depth from the time of flight of scanning lasers or LEDs reflecting off the target, or any other suitable method for building a depth map typically having sub-millimeter to sub-centimeter resolution.

[0094] In step 614 a bounding box is defined as a perimeter enclosing one or multiple facings of the same product, or any space on the shelf including but not limited a gap between products. The bounding box can be manually defined, or automatically defined using training classifiers, deep learning, image segmentation, or any other suitable technique or combination of techniques. A bounding box can be created with reference to labels grouped by height, with a horizontal distance between adjacent labels used to define the width of the bounding box for single facing products. For multiple facing products, the bounding box width is subdivided in sections equal to the product width.

[0095] The height of the bounding box can be derived from the detection of shelf heights. Shelf heights can be detected by analyzing the depth map to identify horizontal indentations corresponding to the distance between the bottom of a shelf and products stacked below it. These horizontal indentations correspond to shelf lips and measure shelf height.

[0096] Alternatively, label groups can be filtered by horizontal span (defined as the horizontal distance between the first and last label of the group) according the following criteria:

[0097] A label group passes the filter if its horizontal span overlaps with the current label group span.

[0098] A label group passes the filter if its horizontal span is distant from the current label group span by no more than a number representing a bay width. Generally, bay widths are standard three or four-foot-wide shelves used throughout a store.

[0099] Order filtered label groups by height and select the label group that is next highest after the current label group.

[00100] Alternatively, shelf heights can also be detected by deep learning classifiers trained on manually annotated color and depth images (if available) of the shelves.

[00101] The height of the bounding box can be fully defined once the height difference between the selected label group and the current label group is determined.

[00102] For vertically stacked products, the height of the bounding box is subdivided in sections equal to the height of the product.

[00103] In certain embodiments, the previous method for determining the bounding box can be probabilistically combined through estimating a confidence measure for each method and adding their results.

[00104] Next, in step 616, each bounding box is consistently associated with an identifier based on a label location heuristic. The identifier can be selected to originate from either the left or the right shelf label. The association of bounding boxes and identifier can further be refined through

optimization across an entire shelf section or aisle. The bounding box, with identifiers, can be registered to a simple or panoramic stitched image of the shelf, and image descriptors extracted for the portion of the image contained in the bounding box. Methods for generating image descriptors include but are not limited to: image templates, Histogram of Gradients, Histogram of Colors, the Scale Invariant Feature Transform, Binary Robust Independent Elementary Features, Maximally Stable Extremal Regions, Binary Robust Invariant Scalable Keypoints, Fast Retina Keypoints, Kaze features, and variations thereof.

[00105] An alternative to extracting product descriptors is to use the bounding boxes as labeled categories and train classifiers on the images contained in the bounding boxes. Classifiers may include those based on deep structured learning, hierarchical learning, deep machine learning, or other suitable deep learning algorithms associated with convolutional, feedforward, recurrent, or other suitable neural network. A deep learning based classifier can automatically learn image descriptors based on an annotated training data. For example, deep learning based image descriptors can be hierarchical, corresponding to multiple layers in deep convolutional neural networks. The final layer of a convolutional layer network outputs the confidence values of the product being in one of the designated image categories. The image descriptor generator part and the classification part get integrated in a convolutional neural network and these two parts are trained together using a training set.

[00106] Alternatively, or in addition, embodiments that use both deep learning based image descriptors and conventional image descriptors can be combined in a hybrid system.

[00107] In step 618, the image descriptors can be classified and labelled with the identifier. Classification algorithms that can include but are not limited to

support vector machine. This process can be repeated for every image of the bounding box associated to the same identifier, whether the image is captured in the same store at different times, or in different stores. In time, this allows automatically building a product library (i.e. the "Library of Products"), without requiring an initial planogram or storage of specific product databases.

[00108] For those embodiments utilizing deep learning based image descriptors, the neural network classifier can be part of the same trained convolutional neural network. The automatically learned features, which are extracted from different layers of the convolutional neural network, can be used in a larger product recognition system. These features can be used in conjunction with other classifiers or with conventional image descriptors in a hybrid system.

[00109] FIG. 7 is a flow chart 700 illustrating additional process details for managing one embodiment of a library of products. The library of products can be stored in a single autonomous robot such as described herein, distributed between two or more autonomous robots, or stored in a local, remote, or cloud server, in whole or in part. In one embodiment, step 710 requires extraction of one set of descriptors from each product image associated to an identifier. One or more sets of descriptors can be developed, confidence levels for each set of descriptors set; dates at which each set of descriptors was generated recorded; one or more shelf position metric estimates made; confidence levels for each shelf position metric estimated; one or more shelf position topological estimated; or a count number for each shelf position topological estimated. In other embodiments, one or more image templates of the product or dimensions of the product can be used to determine product object scope.

[00110] In step 714, each identifier and set of product descriptors is stored in

a database or library of product objects as follows:

[00111] If the identifier does not match an existing identifier in the library, create a new object containing the identifier, the set of product descriptors, an entry confidence level for the set of product descriptors, and the date. The entry confidence level is unique.

[00112] If the product's identifier matches an existing identifier in the library, compute a score for each existing set of descriptors that describes the likelihood that the new and existing sets of descriptors were extracted from the same object.

[00113] If the highest likelihood score exceeds a heuristic value for a positive match: combine the new set of descriptors with the highest likelihood feature set; and increase the confidence level of this set of descriptors relative to the other sets of descriptors in the object; and append the date to that of the existing set of descriptors.

[00114] If the highest likelihood score does not exceed a heuristic value for a positive match: add the set of descriptors to the object; set the confidence to the entry level; and add the date.

[00115] For those embodiments utilizing deep learning based image recognition, the input image is classified belonging to one of the product categories using convolutional neural network which outputs the confidence level. This confidence level is then used to store the image descriptors in the library in the same fashion as above.

[00116] In step 716, the descriptor sets within the library can be used for improved searching performance and/or reduced storage requirements. Indexing methods include but are not limited to: hashing techniques, tree representations, and bag-of-words encodings.

[00117] In step 718, the product library can optionally be pruned to reduce errors and database size. Pruning of sets of descriptors and metric or

topological shelf positions can occur as follows:

[00118] Sets of descriptors: delete all sets whose confidence level is below a heuristic value, along with their confidence level and date entries, except if they originate from images sourced externally to the mobile base system.

[00119] Metric shelf positions: delete all metric positions whose confidence level is below a heuristic value except if their date of entry is the last date on record, along with their confidence level and date entries

[00120] Topological shelf positions: delete all topological positions whose count number is below a heuristic value except if their date of entry is the last date on record, along with their count number and date entries

[00121] Alternatively, pruning can involve:

[00122] iv) Sets of descriptors: delete all sets except for the set with the highest confidence level, along with their confidence level and date entries, except if they originate from images sourced externally to the mobile base system.

[00123] v) Metric shelf positions: delete all metric positions along with their confidence level and date entries, except the latest date, if its associated confidence level is higher than a heuristic value. Otherwise, keep the data from last two dates or more, until a confidence level above the heuristic value is found.

[00124] vi) Topological shelf positions: delete all topological positions along with their counter number and date entries, except the latest date, if its associated count number is higher than a heuristic value. Otherwise, keep the data from last two dates or more, until a count number above the heuristic value is found.

[00125] In some embodiments, modifying the product library can utilize external image data sources to aid in product identification. These images can be acquired from one or more of the following sources:

[00126] Retailer carrying the product, where the image corresponds to the product identifier

[00127] Manufacturer of the product, after matching the product identifier with the manufacturer's nomenclature and image

[00128] Third-party photography of the product

[00129] Online databases, image search engines, or data from online retailers of product listings, or other Internet databases. Searches are conducted preferably using the manufacturer's nomenclature that corresponds to the product identifier. In some methods, this search is performed automatically and the one or more images inserted without human intervention.

[00130] The one or more externally derived images can include at least one front view of the product, and optionally additional views, such as back, sides, top and bottom, or different packaging appearances of the product that correspond to the same identifier. If a product is oriented differently than the externally sourced image, the product descriptor can attempt to find a high-likelihood match. In some embodiments, the angular deviation between a likely product and a differently oriented product can be determined by computing an affine transformation between the set of descriptors of the externally sourced image and the available product image.

[00131] For situations where template matching is successful, and the product segmentation in the image is accurate, the real dimensions of the product can be compared to the apparent dimensions of the product in the image to extract a distance estimate between the imaging sensor and the product. Additionally, the apparent position of the product in the image combined with the distance estimate enable the computation of the three-dimensional position and orientation between the imaging sensor and the product.

[00132] In the deep learning based alternative embodiments, the product segmentation can be performed by a convolutional neural network which classifies pixels as belonging to product interior and product background. The product dimensions are inferred from the segmentation.

[00133] Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is understood that the invention is not to be limited to the specific embodiments disclosed, and that modifications and embodiments are intended to be included within the scope of the appended claims. It is also understood that other embodiments of this invention may be practiced in the absence of an element/step not specifically disclosed herein.

IN THE CLAIMS

1. A inventory monitoring method, comprising the steps of:

detecting and reading shelf labels on at least one shelf;

defining one or more bounding boxes around potential inventory in an image taken with at least one camera; and

associating the bounding boxes in the image to shelf labels to build at least one of a product classifier or a product library.

2. The inventory monitoring method of claim 1, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of autonomously reading shelf labels and defining multiple bounding boxes.

3. The inventory monitoring method of claim 1, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base having multiple cameras and a LIDAR range sensing system.

4. The inventory monitoring method of claim 1, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to capture a depth map of shelves and products positioned on shelves.

5. The inventory monitoring method of claim 1, further comprising the step of building a product library with a product scope containing at least one or more of the following: one product identifier; one or more sets of descriptors; confidence levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a

count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product.

6. The inventory monitoring method of claim 1, further comprising the step of using manual input to identify potential inventory designated in the multiple bounding boxes in the image taken with at least one camera

7. The inventory monitoring method of claim 1, wherein bounding boxes around both potential inventory and gaps between potential inventory are automatically defined.

8. The inventory monitoring method of claim 1, wherein bounding boxes are manually associated with at least one of a shelf label or an on-product marker.

9. The inventory monitoring method of claim 1, wherein bounding boxes are automatically associated with at least one of a shelf label or an on-product marker.

10. The inventory monitoring method of claim 1, further comprising the step of building the product library without use of an initial planogram.

11. A system for building a product classifier, comprising:
an image capture unit;
a shelf label detector and reader to capture shelf label data;
a processing module to define multiple bounding boxes, and
a trainable image classifier to associate images within the bounding boxes with the shelf label data, the images being provided by the image capture unit.

12. The system of claim 11, wherein the image capture unit is mounted on an autonomous robot and is connected to the shelf label detector and reader.

13. The system of claim 11, wherein the trainable image classifier is trained using

machine learning.

14. The system of claim 11, wherein the trainable image classifier is trained using a deep learning system.

15. A inventory monitoring method, comprising the steps of:

detecting and reading shelf labels;

detecting distance from at least one camera to at least one shelf;

defining bounding boxes around potential inventory in an image taken with at least one camera; and

associating selected bounding boxes in the image to selected shelf labels to build at least one of a product classifier or a product library.

16. The inventory monitoring method of claim 15, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of detecting distance, reading shelf labels, and defining bounding boxes.

17. The inventory monitoring method of claim 15, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base having multiple cameras and at least one of a LIDAR range sensing system or a depth camera.

18. The inventory monitoring method of claim 15, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to capture a depth map of shelves and of products positioned on shelves.

19. The inventory monitoring method of claim 15, further comprising the step of building a product library with a product scope containing at least one or more of the following: one product identifier; one or more sets of descriptors; confidence

levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product.

20. The inventory monitoring method of claim 15, further comprising the step of building a product library using manual input to identify potential inventory designated in the multiple bounding boxes in the image taken with at least one camera

21. The inventory monitoring method of claim 15, wherein the bounding boxes can surround gaps between potential inventory.

22. The inventory monitoring method of claim 15, further comprising the step of building the product library without use of an initial planogram.

ABSTRACT

A system for building a product library without requiring a planogram includes an image capture unit operated to provide images of items. Taking data from a shelf label detector and depth map creation unit, a processing module can be used to compare detected shelf labels to a depth map, define a product bounding box, and associate the bounding box with an image provided by the image capture unit to build image descriptors. The system can include one or more autonomous robots for supporting and moving the image capture unit and other components.

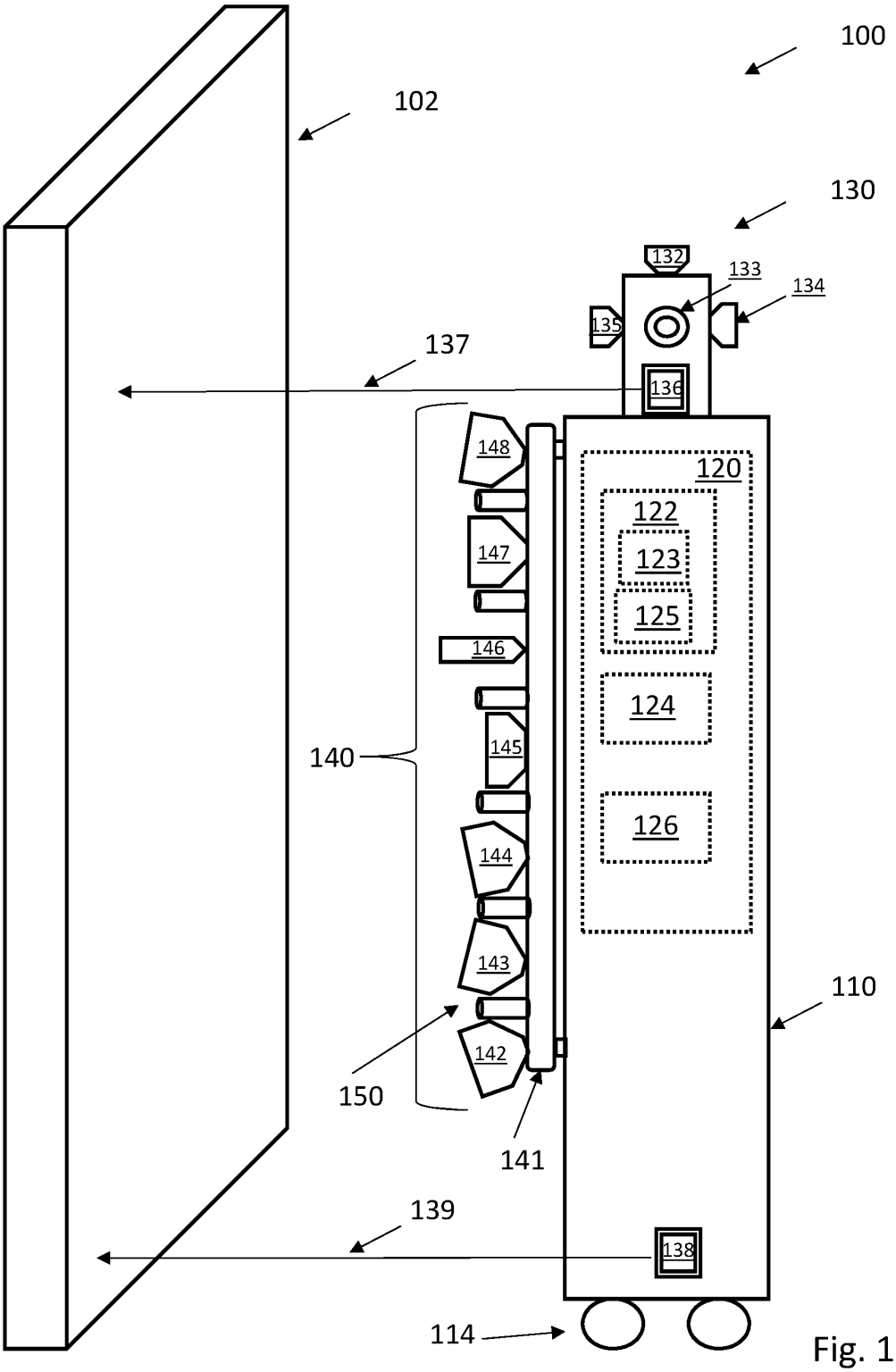

100
102
130
132
133
134
135
137
136
148
120
122
147
123
125
146
124
140
145
126
144
143
110
142
150
141
139
138
114

Fig. 1

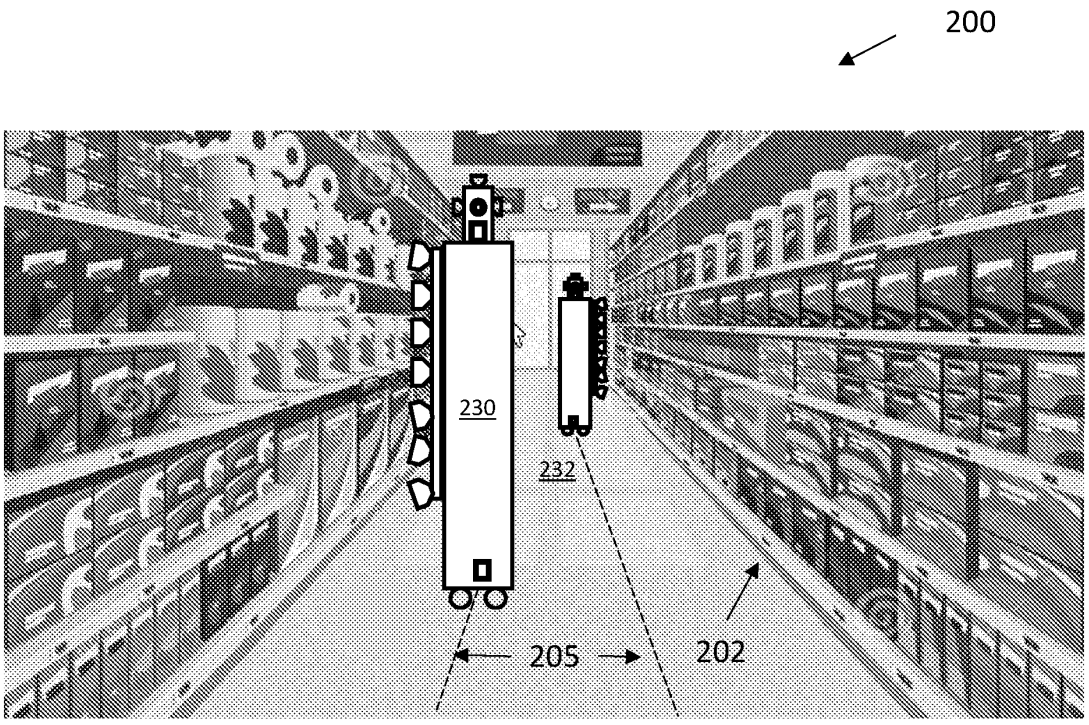


Fig. 2

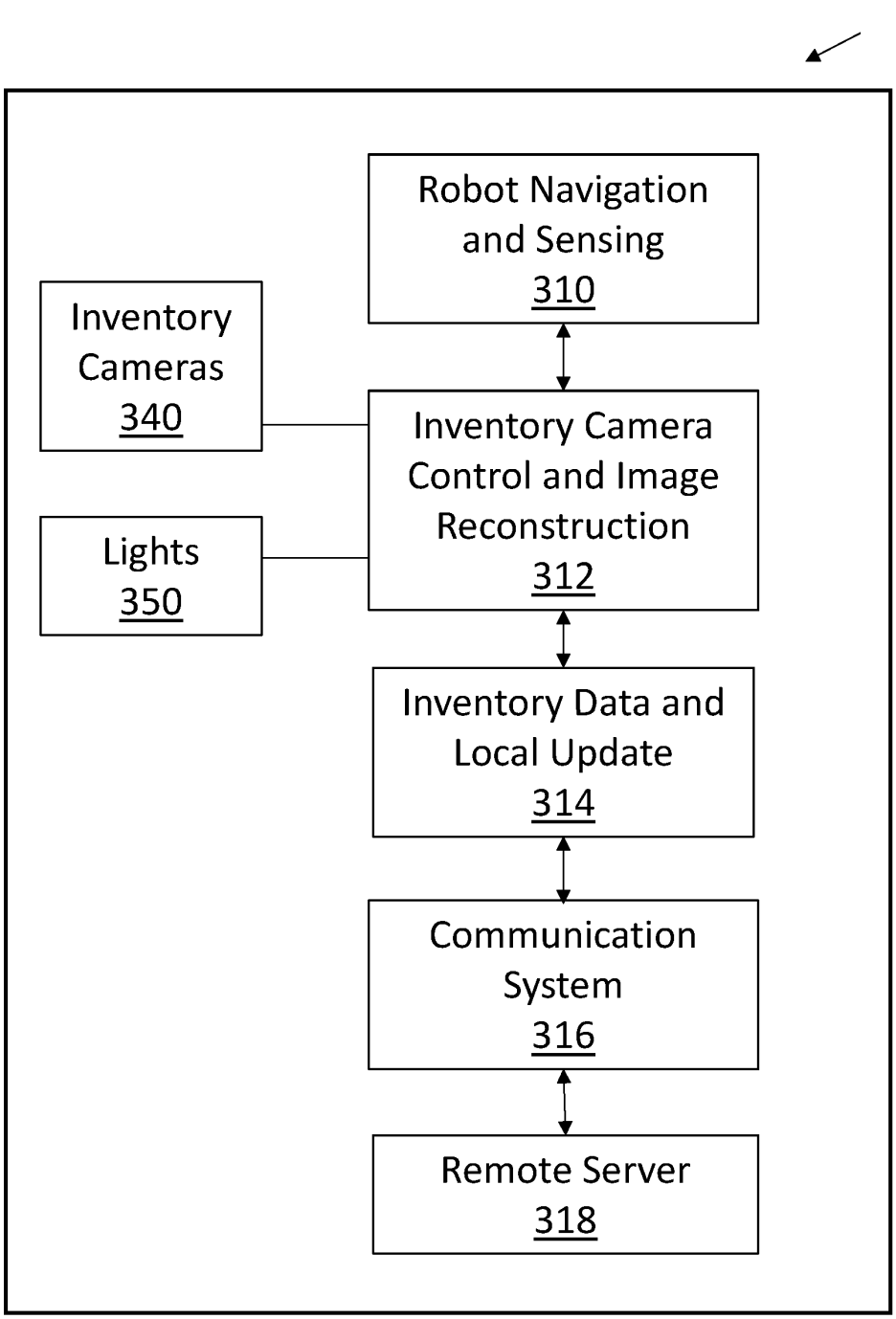

300
Robot Navigation and Sensing 310
Inventory Cameras 340
Inventory Camera Control and Image Reconstruction 312
Lights 350
Inventory Data and Local Update 314
Communication System 316
Remote Server 318

Fig. 3

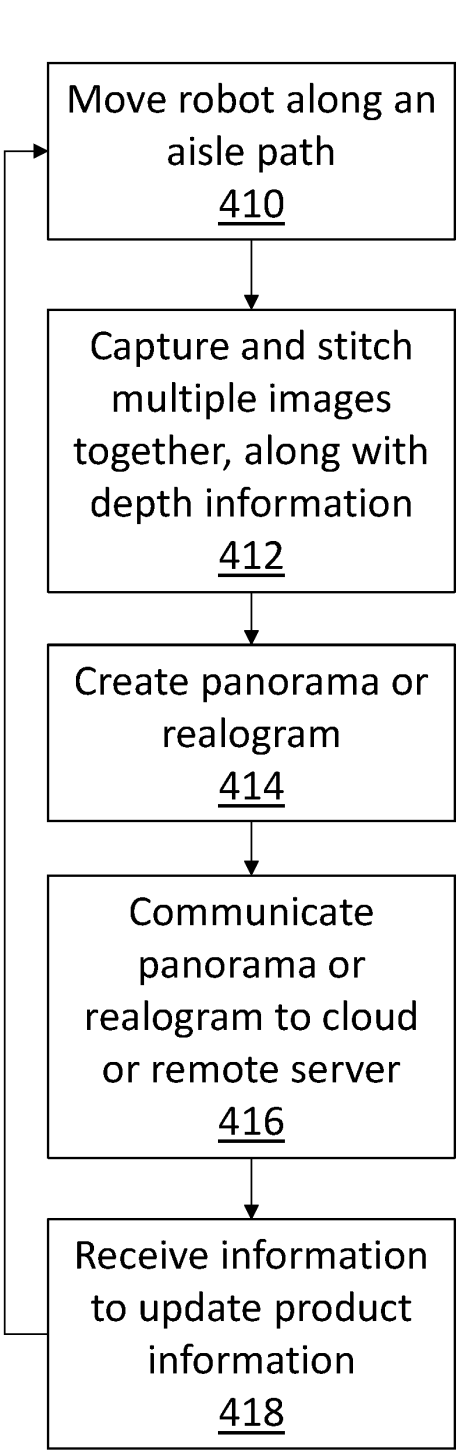

400
Move robot along an aisle path
410
Capture and stitch multiple images together, along with depth information
412
Create panorama or realogram
414
Communicate panorama or realogram to cloud or remote server
416
Receive information to update product information
418

Fig. 4

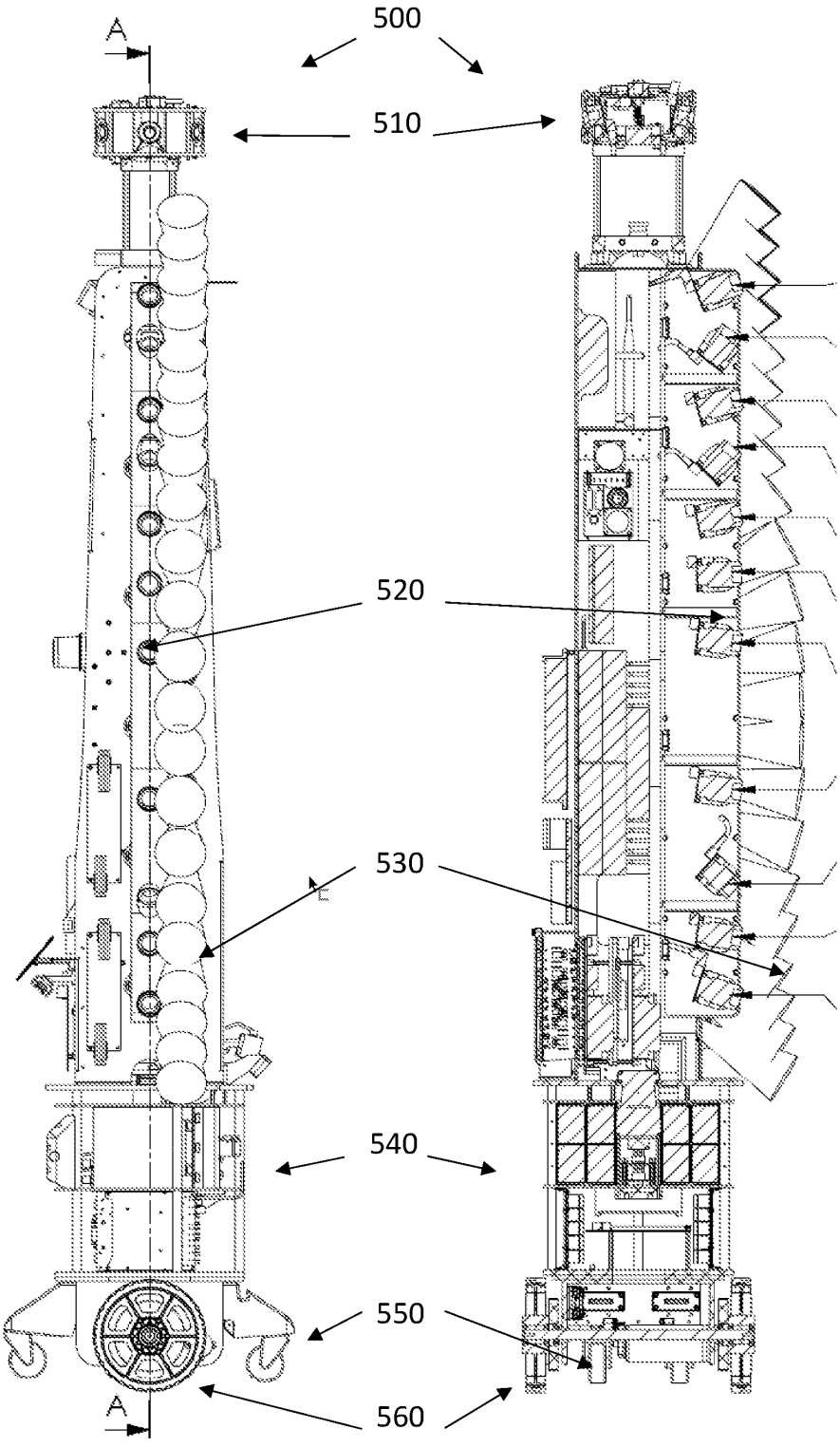


Fig. 5A

Fig. 5B

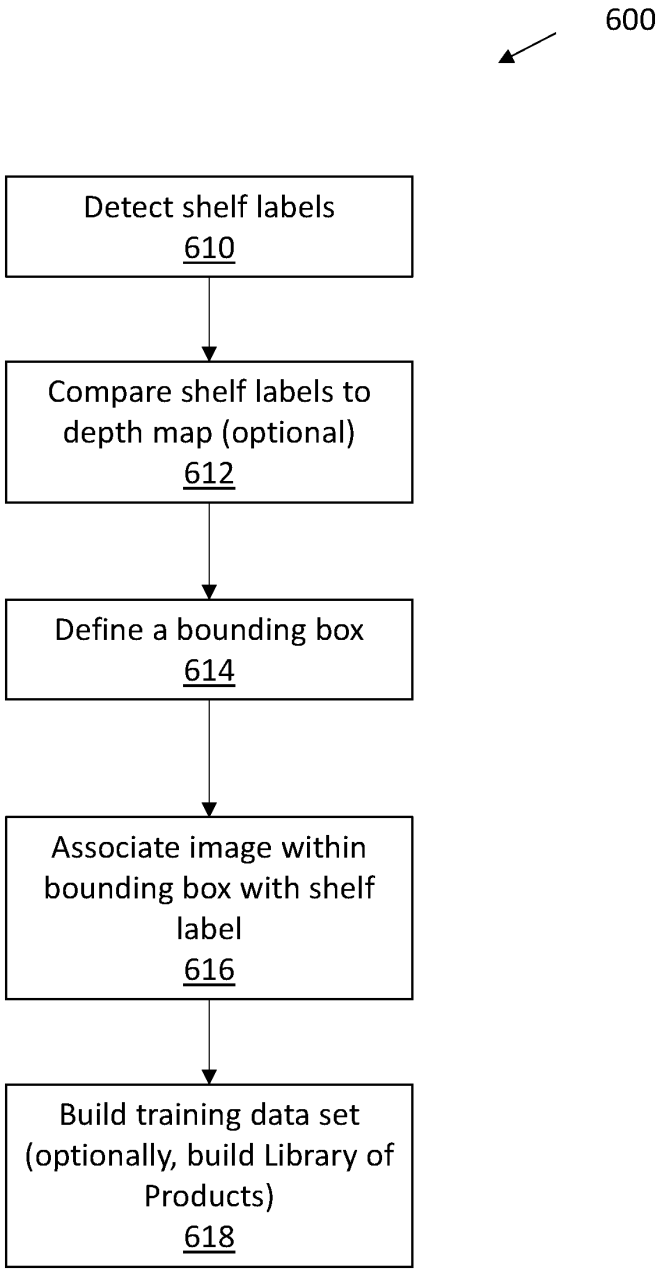

600
Detect shelf labels
610
Compare shelf labels to depth map (optional)
612
Define a bounding box
614
Associate image within bounding box with shelf label
616
Build training data set (optionally, build Library of Products)
618

Fig. 6

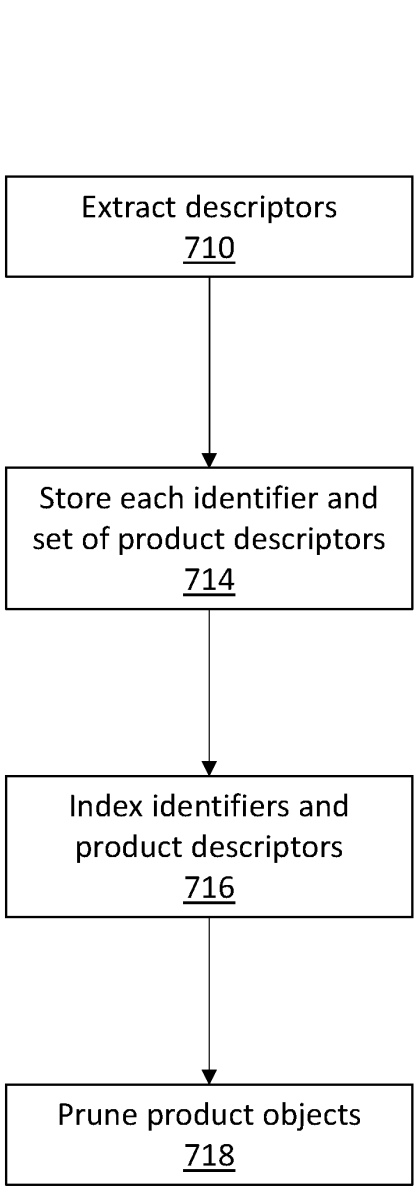

700
Extract descriptors
710
Store each identifier and set of product descriptors
714
Index identifiers and product descriptors
716
Prune product objects
718

Fig. 7

Application Data Sheet 37 CFR 1.76

Secrecy Order 37 CFR 5.2

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)	No

Inventor Information

Given Name::	Sarjoun
Middle Name::	
Family Name::	Skaff
Residence Information::	US Residency
City of Residence::	Pittsburgh
State/Province of Residence::	PA
Country of Residence::	US
Street of Mailing Address::	2740 Smallman St, Suite 400
City of Mailing Address::	Pittsburgh
State/Province of Mailing Address::	PA
Postal Code of Mailing Address::	15222
Country of Mailing Address::	US

Given Name::	Jonathan
Middle Name::	Davis
Family Name::	Taylor
Residence Information::	US Residency
City of Residence::	Pittsburgh
State/Province of Residence::	PA
Country of Residence::	US
Street of Mailing Address::	2740 Smallman St, Suite 400
City of Mailing Address::	Pittsburgh
State/Province of Mailing Address::	PA
Postal Code of Mailing Address::	15222
Country of Mailing Address::	US

Given Name::	Stephen
Middle Name::	Vincent
Family Name::	Williams

Residence Information::	US Residency
City of Residence::	Pittsburgh
State/Province of Residence::	PA
Country of Residence::	US
Street of Mailing Address::	2740 Smallman St, Suite 400
City of Mailing Address::	Pittsburgh
State/Province of Mailing Address::	PA
Postal Code of Mailing Address::	15222
Country of Mailing Address::	US

Given Name::	Simant
Middle Name::	
Family Name::	Dube
Residence Information::	US Residency
City of Residence::	Berkeley
State/Province of Residence::	CA
Country of Residence::	US
Street of Mailing Address::	2740 Smallman St, Suite 400
City of Mailing Address::	Pittsburgh
State/Province of Mailing Address::	PA
Postal Code of Mailing Address::	15222
Country of Mailing Address::	US

Correspondence Information

Customer Number::	34051
Email Address::	uspto@stevenslawgroup.com

Application Information

Title of the Invention::	System and Method for Locating, Identifying and Counting Items
Attorney Docket Number::	BOSS-01001
Small Entity Status Claimed::	Yes
Application Type::	Nonprovisional
Subject Matter::	Utility
Total Number of Drawing Sheets::	7
Suggested Figure for Publication::	6

Publication Information

Request Early Publication:: No

Request Not to Publish:: No

Representative Information

Customer Number:: 34051

Domestic Benefit/National Stage Information

Prior Application Status::	Application Number::	Continuity Type::	Prior Application Number::	Filing Date (YYYY-MM-DD)::
Pending	This application	Non provisional of	62/314,785	2016-03-29
Pending	This application	Non provisional of	62/427,509	2016-11-29

Statement under 37 CFR 1.55 or 1.78 for AIA Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. No

Authorization or Opt-Out of Authorization to Permit Access

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h) (1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A

above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Applicant Information

Applicant Type::	Assignee
Applicant is an Organization::	Yes
Organization Name::	Bossa Nova Robotics IP, Inc.
Street of Mailing Address::	2740 Smallman St, Suite 400
City of Mailing Address::	Pittsburgh
State/Province of Mailing Address::	PA
Postal Code of Mailing Address::	15222
Country of Mailing Address::	US

Signature

Signature::	/David R. Stevens/
Date (YYYY-MM-DD):	2017-03-28
First Name::	David R.
Last Name::	Stevens
Registration Number::	38626

Electronic Patent Application Fee Transmittal	
Application Number:	
Filing Date:	
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Filer:	David R. Stevens/Analynn Dang
Attorney Docket Number:	BOSS-01001
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**730**

Electronic Acknowledgement Receipt	
EFS ID:	28762379
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/Analynn Dang
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	28-MAR-2017
Filing Date:	
Time Stamp:	16:16:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$730
RAM confirmation Number	032917INTEFSW00003345502421
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA_Executed.pdf	212209 42d2656fa98d8219adde2670b9c649e4b9e8cdca	no	2
Warnings:					
Information:					
2		Specification_Final.pdf	192506 1aeb9542fcd2a12230706d5c957a69e6ff1bf8f1	yes	34

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	29
Claims	30	33
Abstract	34	34

Warnings:					
Information:					
3	Drawings-other than black and white line drawings	Drawings_Final.pdf	229991 f24e14522a14deae16debca653487b0317ec94de	no	7
Warnings:					
Information:					
4	Application Data Sheet	Application_Data_Sheet.pdf	83772 e4041c9b62c57db378cc59554033d8192e9d4cbb	no	4
Warnings:					
Information:					

This is not an USPTO supplied ADS fillable form

5	Fee Worksheet (SB06)	fee-info.pdf	35034 c9ba5d26654574aea05c49544ceca2cbe19efd44	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	753512	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

DocCode – SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 15471722 Document Date: 03/28/2017

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

At the time of document entry (noted above):

- USPTO employees may access SCORE content via eDAN using the Supplemental Content tab, or via the SCORE web page.
- External customers may access SCORE content via PAIR using the Supplemental Content tab.

Form Revision Date: August 26, 2013

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT4340994

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
SARJOUN SKAFF	11/29/2016
JONATHAN DAVIS TAYLOR	11/29/2016
STEPHEN VINCENT WILLIAMS	11/29/2016
SIMANT DUBE	12/01/2016

RECEIVING PARTY DATA

Name:	BOSSA NOVA ROBOTICS IP, INC.
Street Address:	2740 SMALLMAN ST, SUITE 400
City:	PITTSBURGH
State/Country:	PENNSYLVANIA
Postal Code:	15222

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	15471722

CORRESPONDENCE DATA

Fax Number: (408)288-7542

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 408-288-7588
Email: uspto@stevenslawgroup.com
Correspondent Name: STEVENS LAW GROUP
Address Line 1: 1754 TECHNOLOGY DRIVE
Address Line 2: SUITE #226
Address Line 4: SAN JOSE, CALIFORNIA 95110

ATTORNEY DOCKET NUMBER:	BOSS-01001
NAME OF SUBMITTER:	DAVID R. STEVENS
SIGNATURE:	/David R. Stevens/
DATE SIGNED:	03/28/2017
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 5

source=Assignment_Executed#page1.tif
source=Assignment_Executed#page2.tif
source=Assignment_Executed#page3.tif
source=Assignment_Executed#page4.tif
source=Assignment_Executed#page5.tif

ASSIGNMENT-STATEMENT

WHEREAS, Sarjoun Skaff, Jonathan Davis Taylor, Stephen Vincent Williams, Simant Dube made certain inventions or discoveries (or both) set forth in an Application for Letters Patent of the United States of America, bearing U.S. application serial number 62/427,509, entitled System and Method for Locating, Identifying and Counting Items, filed 11/29/2016.

WHEREAS, Bossa Nova Robotics IP, Inc., 2740 Smallman St, Suite 400, Pittsburgh, PA 15222 US, together with its successors and assigns is hereinafter called "Assignee", is desirous of acquiring the entire right, title and interest together with the benefits and privileges hereinafter recited

NOW, THEREFORE, for valuable consideration furnished by Assignee to us, receipt and sufficiency of which I hereby acknowledge, on behalf of Assignor, I hereby, without reservation;

1. Assign, transfer and convey to Assignee any right, title and interest together with the benefits and privileges in and to said inventions and discoveries, said Application for Letters Patent or similar forms of protection of the United States of America, and all other applications for Letters Patent on said inventions and discoveries in whatsoever countries, including all conversions of provisional to non-provisional, divisional, renewal, substitute, continuation and convention applications based in whole or in part upon said inventions or discoveries, or upon said application, and any and all Letters Patent, reissues and extensions of Letters Patent or similar forms of protection granted for said inventions and discoveries or upon said applications, and every priority right that is or may be predicated upon or arise from said inventions, said discoveries, said applications and said Letters Patent;

2. Authorize Assignee to file patent applications in any or all countries or groups of countries on any or all of said inventions and discoveries in our name or in the name of Assignee or otherwise as Assignee may deem advisable, under the International Convention or any other relevant convention or treaty or otherwise;

3. Authorize and request the Commissioner of Patents and Trademarks of the United States of America and the empowered officials of all other governments to issue or transfer all said Letters Patent to Assignee, as assignee of the entire right, title and interest therein, or otherwise as Assignee may direct;

4. Warrant that we have not knowingly conveyed to others any rights in said inventions, discoveries, applications or patents or any license to use the same or to make, use or sell anything embodying or utilizing any of said inventions or discoveries; and that we have good right to assign the same to Assignee without encumbrance;

5. Bind our heirs, legal representatives and assigns, as well as ourselves, to do, upon Assignee's request and at Assignee's expense, but without additional consideration to us or them, all acts reasonable serving to assure that said inventions and discoveries, said patent applications and said Letters Patent shall be held and enjoyed by Assignee as fully and entirely as the same could have been held and enjoyed by us, our heirs, legal representatives and assigns if this assignment had not been made; and particularly to execute and deliver to Assignee all lawful application documents including petitions, specifications, and oaths, and all assignments, disclaimers, and lawful affidavits in form and substance as may be requested by Assignee; to communicate to Assignee all facts known to us relating to said inventions and discoveries or the history thereof; and to furnish Assignee with any and all documents, photographs, models, samples and other physical exhibits in our control or in the control of our heirs, legal representatives or assigns which may be useful for establishing any facts of our conceptions, disclosures, and reduction to practice of said inventions or discoveries.

Title of Invention: System and Method for Locating, Identifying and Counting Items

As the below named inventor, I hereby declare that:

This declaration is directed to the above-identified United States application number, filed on the above-identified date.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Sarjoun Skaff

19 Nov. 2016
Date

Title of Invention: System and Method for Locating, Identifying and Counting Items

As the below named inventor, I hereby declare that:

This declaration is directed to the above-identified United States application number, filed on the above-identified date.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

JD Taylor

Jonathan Davis Taylor

Nov. 29, 2016

Date

Title of Invention: System and Method for Locating, Identifying and Counting Items

As the below named inventor, I hereby declare that:

This declaration is directed to the above-identified United States application number, filed on the above-identified date.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Stephen Vincent Williams

11/29/2016
Date

Title of Invention: System and Method for Locating, Identifying and Counting Items

As the below named inventor, I hereby declare that:

This declaration is directed to the above-identified United States application number, filed on the above-identified date.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

S. Dube

Simant Dube

Dec 11 2016

Date

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/471,722

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2	x 40 =	80	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	810		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/471,722	03/28/2017	3631	730	BOSS-01001	22	3

CONFIRMATION NO. 7664

34051
Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

FILING RECEIPT

OC000000090424540

Date Mailed: 04/07/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Sarjoun Skaff, Pittsburgh, PA;
Jonathan Davis Taylor, Pittsburgh, PA;
Stephen Vincent Williams, Pittsburgh, PA;
Simant Dube, Berkeley, CA;

Applicant(s)

Bossa Nova Robotics IP, Inc., Pittsburgh, PA;

Power of Attorney: The patent practitioners associated with Customer Number 34051

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/314,785 03/29/2016
and claims benefit of 62/427,509 11/29/2016

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 04/05/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/471,722**

Projected Publication Date: 10/05/2017

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

System and Method for Locating, Identifying and Counting Items

Preliminary Class

211

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001

CONFIRMATION NO. 7664

34051
Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

FORMALITIES LETTER

OC000000090424541

Date Mailed: 04/07/2017

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing.

Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- Additional claim fees of $ **80** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- $ **80** for **2** total claims over 20.
- $(**0**) previous unapplied payment amount.
- $ **80** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dmnguyen/

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Apr 07, 2017 04:00:47 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	APP.FILE.REC	04/07/2017	BOSS-01001
	NTC.MISS.PRT	04/07/2017	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

Electronic Patent Application Fee Transmittal

Application Number:	15471722
Filing Date:	28-Mar-2017
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Filer:	David R. Stevens/Analynn Dang
Attorney Docket Number:	BOSS-01001

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	2	40	80
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**80**

Electronic Acknowledgement Receipt	
EFS ID:	28884100
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/Analynn Dang
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	10-APR-2017
Filing Date:	28-MAR-2017
Time Stamp:	17:27:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$80
RAM confirmation Number	041117INTEFSW00004851502421
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	30208 a51a0103bcb554b35bba324cb1da7e0d6ddc4283	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	30208		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/471,722	03/28/2017	3631	810	BOSS-01001	22	3

CONFIRMATION NO. 7664

UPDATED FILING RECEIPT

34051
Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

OC000000091293678

Date Mailed: 05/12/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Sarjoun Skaff, Pittsburgh, PA;
Jonathan Davis Taylor, Pittsburgh, PA;
Stephen Vincent Williams, Pittsburgh, PA;
Simant Dube, Berkeley, CA;

Applicant(s)

Bossa Nova Robotics IP, Inc., Pittsburgh, PA;

Power of Attorney: The patent practitioners associated with Customer Number 34051

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/314,785 03/29/2016
and claims benefit of 62/427,509 11/29/2016

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 04/05/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/471,722**

Projected Publication Date: 10/05/2017

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

System and Method for Locating, Identifying and Counting Items

Preliminary Class

211

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/471,722

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2	x 40 =	80	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	810		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

May 12, 2017 03:34:16 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	APP.FILE.REC	05/12/2017	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001

CONFIRMATION NO. 7664

34051
Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

PUBLICATION NOTICE



Title: System and Method for Locating, Identifying and Counting Items

Publication No.US-2017-0286901-A1
Publication Date:10/05/2017

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Oct 06, 2017 03:37:09 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	NTC.PUB	10/05/2017	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

34051 7590 02/07/2019

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

EXAMINER	
DELIGI, VANESSA LIMA	

ART UNIT	PAPER NUMBER
3627	

NOTIFICATION DATE	DELIVERY MODE
02/07/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@stevenslawgroup.com

Office Action Summary	**Application No.** 15/471,722	**Applicant(s)** Skaff et al.	
	Examiner VANESSA DELIGI	**Art Unit** 3627	**AIA Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 03/28/2017.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-22 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☐ Claim(s) _____ is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-22 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 03/28/2017 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Election/Restriction

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

This application contains claims directed to the following patentably distinct species of **trainable image classifier (e.g., para. 42 machine learning)**, and **trainable image classifier (e.g., para. 42 deep learning)**.

In addition, this application contains claims directed to the following patentably distinct species of **bounding boxes (e.g., para. 94 manually defined)**, and **bounding boxes (e.g., para. 94 automatically defined).**

The species are independent or distinct because the claims to the different species recite the mutually exclusive characteristics of such species, specifically:

trainable image classifier is directed to trainable image classifier using machine learning, and trainable image classifier is directed to trainable image classifier using deep learning;

bounding box is directed to a bounding box manually defined with a shelf label, and bounding box is directed to a bounding box automatically defined with a shelf label;

In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, **claims 1** and **11** are generic.

There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply:

- the species or groupings of patentably indistinct species have acquired a separate status in the art in view of their different classification
- the species or groupings of patentably indistinct species have acquired a separate status in the art due to their recognized divergent subject matter
- the species or groupings of patentably indistinct species require a different field of search (e.g., searching different classes/subclasses or electronic resources, or employing different search strategies or search queries).

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species or grouping of patentably indistinct species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered

timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing them to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be corrected in compliance with 37 CFR 1.48(a) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. A request to correct inventorship under 37 CFR 1.48(a) must be accompanied by an application data sheet in accordance with 37 CFR 1.76 that identifies each inventor by his or her legal name and by the processing fee required under 37 CFR 1.17(i).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VANESSA DELIGI whose telephone number is (571)272-0503. The examiner can normally be reached on Monday-Friday 07:30AM-5PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Florian (Ryan) Zeender can be reached on (571) 272-6790. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VANESSA DELIGI/
Examiner, Art Unit 3627

/FLORIAN M ZEENDER/
Supervisory Patent Examiner, Art Unit 3627

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Feb 07, 2019 05:04:24 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	CTRS	02/07/2019	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

Electronic Acknowledgement Receipt	
EFS ID:	35640962
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/TRAM RICHARDS
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	05-APR-2019
Filing Date:	28-MAR-2017
Time Stamp:	13:35:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response to Election / Restriction Filed	Response.pdf	115128 1d6cb9c25334a522fd22a62d589f372b45fd7ca0	no	7
Warnings:					

Information:	
Total Files Size (in bytes):	115128

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Via EFS Attorney Docket No. BOSS-01001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Sarjoun Skaff	Art Unit:	3627
Serial No:	15/471,722	Examiner:	Vanessa Lima Deligi
Filed:	3/28/2017		
Title:	System and Method for Locating, Identifying, and Counting Items		

RESPONSE TO RESTRICTION REQUIREMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Restriction Requirement mailed February 7, 2019 (paper no. 20190125), please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A inventory monitoring method, comprising the steps of:

detecting and reading shelf labels on at least one shelf;

defining one or more bounding boxes around potential inventory in an image taken with at least one camera; and

associating the bounding boxes in the image to shelf labels to build at least one of a product classifier or a product library.

2. (Original)The inventory monitoring method of claim 1, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of autonomously reading shelf labels and defining multiple bounding boxes.

3. (Original) The inventory monitoring method of claim 1, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base having multiple cameras and a LIDAR range sensing system.

4. (Original) The inventory monitoring method of claim 1, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to capture a depth map of shelves and products positioned on shelves.

5. (Original) The inventory monitoring method of claim 1, further comprising the step of building a product library with a product scope containing at least one or more of the following: one product identifier; one or more sets of descriptors; confidence levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one

or more image templates of the product; and dimensions of the product.

6. (Original) The inventory monitoring method of claim 1, further comprising the step of using manual input to identify potential inventory designated in the multiple bounding boxes in the image taken with at least one camera.

7. (Original) The inventory monitoring method of claim 1, wherein bounding boxes around both potential inventory and gaps between potential inventory are automatically defined.

8. (Original) The inventory monitoring method of claim 1, wherein bounding boxes are manually associated with at least one of a shelf label or an on-product marker.

9. (Original) The inventory monitoring method of claim 1, wherein bounding boxes are automatically associated with at least one of a shelf label or an on-product marker.

10. (Original) The inventory monitoring method of claim 1, further comprising the step of building the product library without use of an initial planogram.

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Canceled)

15. (Original) A inventory monitoring method, comprising the steps of:

detecting and reading shelf labels;

detecting distance from at least one camera to at least one shelf;

defining bounding boxes around potential inventory in an image taken with at least one camera; and

associating selected bounding boxes in the image to selected shelf labels to build at least one of a product classifier or a product library.

16. (Original) The inventory monitoring method of claim 15, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of detecting distance, reading shelf labels, and defining bounding boxes.

17. (Original) The inventory monitoring method of claim 15, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base having multiple cameras and at least one of a LIDAR range sensing system or a depth camera.

18. (Original) The inventory monitoring method of claim 15, further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to capture a depth map of shelves and of products positioned on shelves.

19. (Original) The inventory monitoring method of claim 15, further comprising the step of building a product library with a product scope containing at least one or more of the following: one product identifier; one or more sets of descriptors; confidence levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product.

20. (Original) The inventory monitoring method of claim 15, further comprising the step of building a product library using manual input to identify potential inventory designated in the multiple bounding boxes in the image taken with at least one camera.

21. (Original) The inventory monitoring method of claim 15, wherein the bounding

boxes can surround gaps between potential inventory.

22. (Original) The inventory monitoring method of claim 15, further comprising the step of building the product library without use of an initial planogram.

23. (New) A computer system, the computer system comprising:

a processor;

system memory coupled to the processor and storing instructions configured to cause the processor to:

detect and read shelf labels on at least one shelf;

define one or more bounding boxes around potential inventory in an image taken with at least one camera; and

associate the bounding boxes in the image to shelf labels to build at least one of: a product classifier or a product library.

24. (New) The computer system of claim 23, further comprising instructions configured to allow an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of autonomously reading shelf labels and defining multiple bounding boxes.

25. (New) The computer system of claim 23, further comprising instructions configured to allow an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base having multiple cameras and a LIDAR range sensing system.

26. (New) The computer system of claim 23, further comprising instructions configured to allow an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to capture a depth map of shelves and products positioned on shelves.

REMARKS

The Restriction Requirement mailed February 7, 2019 subjected claims 1-22 to a restriction and/or election requirement.

Accordingly, the Restriction Requirement the application contains claims directed to the following patentably distinct species:

(I) Trainable image classifier

(II) Bounding boxes

The species are independent or distinct because the claims to the different species receive the mutually exclusive characteristics of such species.

Although not expressly identified. Applicant believes group (I) incudes claims 1-10 and 15-22 and group (II) includes claims 11-14. If Applicant has misinterpreted the claim groupings, Examiner is encouraged to contact the undersigned by phone. Applicant elects to pursue claims group (I) claims 1-10 and 15-22 *without traverse*. Although this election is made without traverse, Applicant strongly disagrees that a restriction requirement is necessary. Each independent claim defines both bounding boxes and classifiers. Applicant fails to see how the pending claims place a search burden or an examination burden on the Examiner.

By this amendment, claims 11-14 are canceled and claims 23-26 are new. Claim 23 is a system claim corresponding to the method of claim 1. Claims 24-26 are dependent system claims corresponding to dependent method claims 2-4 respectively. Thus, applicant submits that claims 23-26 are included in group (I). Support for the claim amendments is found at least at paragraphs [0022], [0027], [0034], [0035], and [0037] of the originally filed specification. Applicant submits that no new matter is added.

CONCLUSION

Accordingly, Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

The Commissioner is authorized to charge any additional fees to process this Amendment, or credit any over-payments that may apply, to our Deposit Account No. 50-2421.

Respectfully submitted,

Dated: April 5, 2019

/David R. Stevens/
David R. Stevens
Reg. No. 38,626

Stevens Law Group
1754 Technology Dr., Ste. 226
San Jose, CA 95110
Tel (408) 288-7588
Fax (408) 288-7542

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/471,722	Filing Date 03/28/2017	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $40 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $210 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/05/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 22	Minus	** 22	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	HSLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/LELAND WATKINS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

34051 7590 07/29/2019

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

EXAMINER	
DELIGI, VANESSA LIMA	

ART UNIT	PAPER NUMBER
3627	

NOTIFICATION DATE	DELIVERY MODE
07/29/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@stevenslawgroup.com

Office Action Summary	**Application No.** 15/471,722	**Applicant(s)** Skaff et al.	
	Examiner VANESSA DELIGI	**Art Unit** 3627	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 04/05/2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-10 and 15-26 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-10 and 15-26 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 03/28/2017 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Election/Restrictions

Applicant's election without traverse of **claims 1-10 and 15-22** in the reply filed on **04/05/2019** is acknowledged.

Status of Claims

This communication is a first office action non-final rejection on the merits. **Claim(s) 1-10**, and **15-26** as filed on **04/05/2019**, are currently pending and have been fully considered below. In addition, **claims 11-14** are canceled.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-10, and **15-26** are rejected under 35 U.S.C. § 101 because the claimed invention is directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more and thus do not satisfy the criteria for subject matter eligibility.

Step 1

Claim 1 is drawn to a method, **claim 15** is drawn to a method, and **claim 23** is drawn to a system. These are machine, process, and manufacture categories, which are statutory categories of invention. Thus, claim(s) fall(s) in two of the four statutory categories of invention.

Step 2A Prong One: Yes

Independent **claims 1, 15, and 23** substantially recites the limitations:

Claims 1: *"A inventory monitoring method, comprising the steps of: detecting and reading shelf labels on at least one shelf, defining one or more bounding boxes around potential inventory in an image* ~~***taken with at least one camera***~~*; and associating the bounding boxes in the image to shelf labels to build at least one of a product classifier or a product library.".*

Claim 15: *"A inventory monitoring method, comprising the steps of: detecting and reading shelf labels; detecting distance from at least one camera to at least one shelf; defining bounding boxes around potential inventory in an image* ~~***taken with at least one camera***~~*; and associating selected bounding boxes in the image to selected shelf labels to build at least one of a product classifier or a product library.".*

Claim 23: *"*~~***A computer***~~ *system,* ~~***the computer system comprising: a processor; system memory coupled to the processor and storing instructions configured to cause the processor to:***~~ *detect and read shelf labels on at least one shelf; define one or more bounding boxes around potential inventory in an image* ~~***taken with at least one camera***~~*; and associate the bounding boxes in the image to shelf labels to build at least one of: a product classifier or a product library.".*

The 2019 PEG indicates that claims that recite matter that falls within the following enumerated groupings of abstract ideas should be treated as reciting abstract ideas (emphasis added):

(a) **Mathematical concepts**—mathematical relationships, mathematical formulas or equations, mathematical calculations;

(b) **Certain methods of organizing human activity**—fundamental economic principles or practices (including hedging, insurance, mitigating risk); commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations); managing personal behavior or relationships or interactions between people (including social activities, teaching, and following rules or instructions); and

(c) **Mental processes**—concepts performed in the human mind (including an observation, evaluation, judgment, opinion).

The step of *"detecting and reading shelf labels"* as drafted in **claims 1, 15, and 23**, is a **process** that under its broadest reasonable interpretation, covers performance of the limitations in the human mind or by a human using a pen and a paper **(e.g., "a Mental Processes")** but for the recitation of generic computer components. That is, other than reciting ***"a processor", and "a memory", "a camera",*** nothing in the claim elements preclude the step from practically being performed in the human mind or a human using a pen and paper. For example, the limitation *"detecting and reading shelf labels"* in this context allow a person to visually **(e.g., mentally or manually)** find a label in a shelf and read the label **(e.g., a label located in a shelf)**.

Accordingly, **claims 1-10, 15-26** recite an abstract idea.

Step 2A Prong Two: No

The *2019 PEG* explains in its Summary that "a patent claim or patent application claim that recites a judicial exception is not "directed to" the judicial exception if the judicial exception is integrated into a practical application of the judicial exception."

According to the *2019 PEG* (footnotes removed):

"Examiners evaluate integration into a practical application by: (a) Identifying whether there are any additional elements recited in the claim beyond the judicial exception(s); and (b) evaluating those additional elements individually and in combination to determine whether they integrate the exception into a practical application, using one or more of the considerations laid out by the Supreme Court and the Federal Circuit, for example those listed below"

- an additional element reflects an improvement in the functioning of a computer, or an improvement to other technology or technical field;
- an additional element implements a judicial exception with, or uses a judicial exception in conjunction with, a particular machine or manufacture that is integral to the claim;
- an additional element effects a transformation or reduction of a particular article to a different state or thing; and
- an additional element applies or uses the judicial exception in some other meaningful way beyond generally linking the use of the judicial exception to a particular technological environment, such that the claim as a whole is more than a drafting effort designed to monopolize the exception.

This is not an exclusive list, and there may be other examples of integrating the exception into a practical application.

The courts have also identified examples in which a judicial exception has not been integrated into a practical application:

- an additional element merely recites the words "apply it" (or an equivalent) with the judicial exception, or merely includes instructions to implement an abstract idea on a computer, or merely uses a computer as a tool to perform an abstract idea;
- an additional element adds insignificant extra-solution activity to the judicial exception; and
- an additional element does no more than generally link the use of a judicial exception to a particular technological environment or field of use."

Regarding claims 1-6, the additional elements recited in the claims beyond the judicial exception appear to be:

Claim 23: ***"a processor"***;

Claim 23: ***"a memory"***;

Claim 1, 15, and 23: ***"a camera"***;

Instead, the above identified additional elements **(e.g., *"a processor", "a memory", "a camera"*)** add insignificant extra-solution activity to the judicial exception (e.g., Mere Data Gathering, Selecting a particular data source or type of data to be manipulated), see MPEP 2106.05(g).

Additionally, the above identified additional elements **(e.g., *"a processor", "a memory", "a camera"*)** merely recites the words "apply it" (or an equivalent) with the judicial exception, or merely includes instructions to implement an abstract idea on a computer, or merely uses a computer as a tool to perform an abstract idea, see MPEP 2106.05(f).

Further, the above identified additional elements **(e.g., *"a processor", "a memory", "a camera"*)** does no more than generally link the use of a judicial exception to a particular technological environment or field of use, see MPEP 2106.05(e)

In view of the above, under Step 2A (prong 2), **claims 1, 15, and 23** does not integrate the identified abstract idea above into a practical application, do not impose any meaningful limits on practicing the abstract idea, therefore, the claims are thus directed to an abstract idea.

Therefore, regarding **claims 1-10, and 15-26**, the abstract idea is not integrated into a practical application and thus **claims 1-10, and 15-26** are "directed to" a judicial exception.

Step 2B: No

The additional elements **(e.g., *"a processor", "a memory", "a camera"*)** are recognized by the courts as performing well-understood, routine, and conventional functions, **see MPEP 2106.05(f)**, "Other examples where the courts have found the additional elements to be mere instructions to apply an exception, because they do no more than merely invoke computers or machinery as a tool to perform an existing process include: i. A commonplace business method or mathematical algorithm being applied on a general purpose computer, Alice Corp. Pty. Ltd. V. CLS Bank Int'l, 134 S. Ct. 2347, 1357, 110 USPQ2d 1976, 1983 (2014); Gottschalk v. Benson, 409 U.S. 63, 64, 175 USPQ 673, 674 (1972); Versata Dev. Group, Inc. v. SAP Am., Inc., 793 F.3d 1306, 1334, 115 USPQ2d 1681, 1701 (Fed. Cir. 2015); **see MPEP 2106.05(d)**, "i. Receiving or transmitting data over a network, e.g., using the Internet to gather data, Symantec, 838 F.3d at 1321, 120 USPQ2d at 1362 (utilizing an intermediary computer to forward information); TLI Communications LLC v. AV Auto. LLC, 823 F.3d 607, 610, 118 USPQ2d 1744, 1745 (Fed. Cir. 2016) (using a telephone for image transmission); OIP Techs., Inc., v. Amazon.com, Inc., 788 F.3d 1359, 1363, 115 USPQ2d 1090, 1093 (Fed. Cir. 2015) (sending messages over a network); buySAFE, Inc. v. Google, Inc., 765 F.3d 1350, 1355, 112 USPQ2d 1093, 1096 (Fed. Cir. 2014) (computer receives and sends information over a network); but see DDR Holdings, LLC v. Hotels.com, L.P., 773 F.3d 1245, 1258, 113 USPQ2d 1097, 1106

(Fed. Cir. 2014) ("Unlike the claims in Ultramercial, the claims at issue here specify how interactions with the Internet are manipulated to yield a desired result--a result that overrides the routine and conventional sequence of events ordinarily triggered by the click of a hyperlink." (emphasis added));"

Looking at the limitations as an ordered combination adds nothing that is not already present when looking at the elements taken individually. There is no indication that the combination of elements improves the functioning of a computer or improves any other technology, and thus, no indication that the claims include inventive concept.

Dependent **claims 2-10, and 16-22, and 24-26** do not add "significantly more" to the eligibility of **claims 1**, **15, 23** and recite a more complex abstraction executed on a generic computer using well-understood, routine, and conventional activity. Even when considered as an ordered combination, these dependent claims do not add significantly more than when considered individually.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim(s) 1-5, 9, 10, 15-19, 22-26 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman (U.S. 20080077511 A1), in view of Zhu (U.S. 9097800 B1).

Regarding claim 1, Zimmerman discloses:

a inventory monitoring method, comprising the steps of:

detecting and reading shelf labels on at least one shelf, **("The imaging device 30 captures a shelf image (step 610). The product barcode decoder 210 decodes a product barcode from the captured image (step 615)** *[detect and reading]***", see at least ¶83 and figure 10)**

[segmenting] ~~*defining one or more bounding boxes around*~~ *potential inventory in an image taken with at least one camera; and* **("The product image segmentation module 205 segments the captured image to identify a shelf image of the product** *[a shelf with product are potential inventory]* **(step 630)", see at least ¶83 and figure 10)**

associating the ***[segmented]*** ~~*bounding boxes in the*~~ *image to shelf labels to build at least one of a product classifier or a product library.* **("The product database 225 comprises product visual descriptor (e.g. images of items taken from multiple views, size, color, texture of items, bar code on product), barcodes for items, and locations of items in the store used for comparison and analysis by the product bar decoder 210,", "One or more product visual descriptors are extracted from the segmented image of the product (step 1020). The product visual descriptors are placed in the product database 225 (step 1030)", see at least see at least ¶¶58,83 and figure 10)**

Zimmerman substantially discloses the claimed invention, however, does not explicitly disclose *"defining one or more bounding boxes around* ***[objects]****", "bounding boxes in the image".*

However, Zhu discloses:

defining one or more bounding boxes around [objects] **("the object detector can define a bounding box encompassing the object", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

bounding boxes in the image **("the object detector can define a bounding box encompassing the object", see at least 14:60-67, 15:1-67, and 16:10-55)**

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Zhu,** in order to generate a product classifier or a product library without human interaction.

Regarding claim 2, the combination discloses:

further comprising the step of allowing an ~~autonomous~~ robot to move beside the at least one shelf, with the ~~autonomous~~ robot acting as a movable base capable of autonomously reading shelf labels and ~~defining multiple bounding boxes~~. **(Zimmerman discloses "the mobile inventory robot 20 is manually controlled, requiring navigation by an operator at the inventory control system 15 while the mobile inventory robot 20 is capturing images of items on shelves", "The product barcode decoder 210 decodes a product barcode from the captured image (step 615)", see at least ¶¶40, 58-61,** and **Zhu discloses** *"defining multiple bounding boxes"* **"the object detector can define a bounding box encompassing the object…For each captured point cloud, positions of perceived objects and their corresponding boundary definitions are associated with a frame number or frame time", see at least 14:60-67, 15:1-67, and 16:10-55,** and *"an autonomous **[vehicle]**":* **"autonomous vehicle such as a driverless automobile", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

Regarding claims 3, the combination discloses:

further comprising the step of allowing an ~~autonomous~~ robot to move beside the at least one shelf, with the ~~autonomous~~ robot acting as a movable base having multiple cameras ~~and a LIDAR range sensing system~~. **(Zimmerman discloses: "the mobile inventory robot 20 is manually controlled, requiring navigation by an operator at the inventory control system 15 while the mobile inventory robot 20 is capturing images of items on shelves", "The mobile inventory robot 20 comprises one or more imaging device(s) 30", see at least ¶¶40, 47 58-61, 83** and **Zhu discloses:** *"a LIDAR range sensing system"* **"The method can include scanning a light detection and ranging (LIDAR) device associated with an autonomous vehicle through a scanning zone while emitting light pulses", see at least 1:9:40, 14:60-67, 15:1-67, 16:10-55**, *and "an autonomous **[vehicle]**":* **"autonomous vehicle such as a driverless automobile", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

Regarding claim 4, the combination discloses:

*further comprising the step of allowing an ~~autonomous~~ robot to move beside the at least one shelf, with the ~~autonomous~~ robot acting as a movable base **[having multiple cameras]** ~~to~~ capture ~~a depth map of~~ shelves and products positioned on shelves.* **(Zimmerman discloses "the mobile inventory robot 20 is manually controlled, requiring navigation by an operator at the inventory control system 15 while the mobile inventory robot 20 is capturing images of items on shelves", "The mobile inventory robot 20 comprises one or more imaging device(s) 30", see at least ¶¶40, 47 58-61, 83** and **Zhu discloses** *"capture a depth map of **[objects]**":* **"The method can include scanning a light detection and ranging (LIDAR) device associated with an autonomous vehicle through a scanning zone while emitting light pulses", see at least 4:20-55, 14: 60-67, 15:1-67, and 16:10-55 and figures 4A-4D** and *"an*

*autonomous **[vehicle]**":* **"autonomous vehicle such as a driverless automobile", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

Regarding claim 5, the combination discloses:

further comprising the step of building a product library with a product scope containing at least one or more of the following: one product identifier; one or more sets of descriptors; confidence levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product. **(see at least ¶¶47, 54, 63, and 69, product identification)**

Regarding claim 9, the combination discloses:

*wherein **[segmenting]** ~~bounding boxes~~* are automatically associated with at least one of a shelf label or an on-product marker. (**Zimmerman discloses see at least ¶¶58, 83, figures 10**, and **Zhu discloses** *"bounding boxes":* **"the object detector can define a bounding box encompassing the object", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55**)

Regarding claim 10, the combination discloses:

further comprising the step of building the product library without use of an initial planogram. **(Zimmerman discloses see at least ¶¶82-83)**

Regarding claim 15, this claim recites substantially similar limitations as claim 1, and is rejected using the same art and rationale as above.

In addition, regarding claim 15 Zimmerman discloses

[captures] ~~*detecting distance from*~~ *at least one camera to at least one shelf;* **("The imaging device 30 captures a shelf image (step 610)", see at least ¶83)**

Zimmerman substantially discloses the claimed invention, however, does not explicitly disclose *"detecting distance from at least* **[a number of points]".**

However, Zhu discloses:

detecting distance from at least **[a number of points] ("the camera 210 can include, for example, a range detector configured to generate a two-dimensional image indicating distance from the camera 210 to a number of points in the environment", Zhu 12:30-67**)

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Zhu,** in order to generate a product classifier or a product library without human interaction**.**

Regarding claims 16 and 24, these claims recite substantially similar limitations as claim 2, and is rejected using the same art and rationale as above.

In addition, regarding claim 16 Zimmerman discloses *"capable of detecting distance"* **(Zhu: distance from the camera 210 to a number of points, Zhu 12:30-67)**

Regarding claims 17 and 25, these claims recite substantially similar limitations as claim 3, and is rejected using the same art and rationale as above.

Regarding claim 18 and 26, these claims recite substantially similar limitations as claim 4, and is rejected using the same art and rationale as above.

Regarding claim 19, this claim recites substantially similar limitations as claim 5, and is rejected using the same art and rationale as above.

Regarding claim 22, this claim recites substantially similar limitations as claim 10, and is rejected using the same art and rationale as above.

Regarding claim 23, this claim recites substantially similar limitations as claims 1 and 15, and is rejected using the same art and rationale as above.

In addition, regarding claim 15 Zimmerman discloses *"A computer system, the computer system comprising: a processor; system memory coupled to the processor and storing instructions configured to cause the processor to:",* **(see at least ¶¶40-46, figures 1-4)**

Claim(s) 6, 8 and 20 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman and Zhu combination as applied to claims 1-4, and further in view of Nakamura (U.S. 20100065634 A1).

Regarding claim 6, the combination discloses:

~~*further comprising the step of using manual input to identify potential inventory designated in*~~ *the multiple bounding boxes* ~~*in the image taken with at least one camera*~~. **(Zhu discloses: "the object detector can define a bounding box encompassing the object…For each captured point cloud, positions of perceived objects and their corresponding boundary definitions are associated with a frame number or frame time", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

The combination substantially discloses the claimed invention, however, does not explicitly disclose *"using manual input to identify potential inventory designated in the image taken with at least one camera".*

However, Nakamura discloses:

using manual input to identify potential inventory designated in the image taken with at least one camera **("when a worker having the handy scanner 7 desires to perform the similar associating process…the associating process can be performed with the electronic shelf label 5 being attached to the shelf 60 so that errors occurring when attaching the electronic shelf label 5 can be reduced, compared to a case in which the electronic shelf label 5 is attached after the associating process.", see at least ¶¶59, 72, 82-83, and 111)**

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Nakamura,** in order reduce errors occurring when attaching a shelf label, **(see, Nakamura, ¶111)**.

Regarding claim 8, the combination discloses:

~~*wherein*~~ *bounding boxes* ~~*are manually associated with at least one of a shelf label or an on-product marker*~~. (**Zhu discloses: "the object detector can define a bounding box encompassing the object…For each captured point cloud, positions of perceived objects and their corresponding boundary definitions are associated with a frame number or frame time", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55**)

The combination substantially discloses the claimed invention, however, does not explicitly disclose *image **[is]** manually associated with at least one of a shelf label or an on-product marker.*

However, Nakamura discloses:

*image **[is]** manually associated with at least one of a shelf label or an on-product marker* **("when a worker having the handy scanner 7 desires to perform the similar associating process…the associating process can be performed with the electronic shelf label 5 being attached to the shelf 60 so that errors occurring when attaching the electronic shelf label 5 can be reduced, compared to a case in which the electronic shelf label 5 is attached after the associating process.", see at least ¶¶59, 72, 82-83, and 110-111**)

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by

Nakamura, in order reduce errors occurring when attaching a shelf label, **(see, Nakamura, ¶111)**.

Regarding claim 20, the combination discloses:

~~*further comprising the step of building a product library using manual input to identify potential inventory designated in the*~~ *multiple bounding* ~~*boxes in the image taken with at least one camera*~~. **(Zhu discloses: "the object detector can define a bounding box encompassing the object…For each captured point cloud, positions of perceived objects and their corresponding boundary definitions are associated with a frame number or frame time", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

The combination substantially discloses the claimed invention, however, does not explicitly disclose *"building a product library using manual input to identify potential inventory designated in the image taken with at least one camera."*

However, Nakamura discloses:

building a product library using manual input to identify potential inventory designated in the image taken with at least one camera **("when a worker having the handy scanner 7 desires to perform the similar associating process…the associating process can be performed with the electronic shelf label 5 being attached to the shelf 60 so that errors occurring when attaching the electronic shelf label 5 can be reduced, compared to a case in which the electronic shelf label 5 is attached after the associating process.", see at least ¶¶59, 72, 82-83, and 110-111)**

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by

Nakamura, in order reduce errors occurring when attaching a shelf label, **(see, Nakamura, ¶111)**.

Claim(s) 7 and 21 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman and Zhu combination as applied to claims 1 and 15, and further in view of Wicks et al. (U.S. 20150352721 A1, hereinafter Wicks).

Regarding claim 7, the combination discloses:

~~*wherein bounding boxes around both*~~ ***[segmenting]*** *potential inventory* ~~*and gaps between potential inventory are*~~ ***[is]*** *automatically defined.* **(Zimmerman discloses: the image devices for imaging shelfs and items on shelves in a stored, "Using this captured image, system 10 can segment the captured image to detect which product is in the set of items 770", see at least ¶¶47, 74, 83, and figure 7B, Zhu discloses** *"bounding boxes around* ***[objects]****":* **"the object detector can define a bounding box encompassing the object…For each captured point cloud, positions of perceived objects and their corresponding boundary definitions are associated with a frame number or frame time", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

The combination substantially discloses the claimed invention, however, does not explicitly disclose *"****[boxes]*** *around both* ***[objects]*** *and gaps between* ***[the objects]****".*

However, Wicks discloses:

[boxes] *around both* ***[objects]*** *and gaps between* ***[the objects]*** **(Figure 6E)**

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Wicks,** in order to easily identify when products are in the shelf, when products are not in the shelf.

Regarding claim 21, the combination discloses:

wherein the bounding boxes can surround ***[objects]*** ~~*can surround gaps between potential inventory*~~. **(Zhu discloses "the object detector can define a bounding box encompassing the object…For each captured point cloud, positions of perceived objects and their corresponding boundary definitions are associated with a frame number or frame time", see at least 4:10-20, 14:60-67, 15:1-67, 16:10-55)**

The combination substantially discloses the claimed invention, however, does not explicitly disclose *"****[boxes]*** *can surround gaps between* ***[objects]****".*

However, Wicks discloses:

[boxes] *can surround gaps between* ***[objects].*** **(Figure 6E)**

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Wicks,** in order to easily identify when products are in the shelf, when products are not in the shelf.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure can be found on the attached PTO-892 form.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VANESSA DELIGI whose telephone number is (571)272-0503. The examiner can normally be reached on Monday-Friday 07:30AM-5PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is

encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Florian (Ryan) Zeender can be reached on (571) 272-6790. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VANESSA DELIGI/
Examiner, Art Unit 3627

/FLORIAN M ZEENDER/
Supervisory Patent Examiner, Art Unit 3627

Notice of References Cited	Application/Control No. 15/471,722	Applicant(s)/Patent Under Reexamination Skaff et al.	
	Examiner VANESSA DELIGI	Art Unit 3627	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20080077511-A1	03-2008	Zimmerman; Thomas Guthrie	G06Q10/00	705/28
*	B	US-9097800-B1	08-2015	Zhu; Jiajun	G01S13/865	1/1
*	C	US-20100065634-A1	03-2010	Nakamura; Kazutomo	G06Q30/0603	235/385
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	**Art Unit**
	VANESSA DELIGI	3627

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	07/16/2019								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	-								
	12	-								
	13	-								
	14	-								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								
	21	✓								
	22	✓								
	23	✓								
	24	✓								
	25	✓								
	26	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06Q10/087, G06Q10/00	07/16/2019	VD
G05D1/0261, G05D1/0274, G05D1/0246	07/16/2019	VD
G05D2201/0216	07/16/2019	VD
G06Q30/02, G06Q30/0603	07/16/2019	VD
G07G1/12	07/16/2019	VD

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
EAST text search	07/16/2019	VD
Inventor name search	07/16/2019	VD
Assignee name search	07/16/2019	VD

/VANESSA DELIGI/ Examiner, Art Unit 3627	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G06Q	10/087, 10/00 , 30/02, 30/0603	07/16/2019	VD
G05D	1/0261, 1/0274, 1/0246, 2201/0216	07/16/2019	VD
G07G	1/12	07/16/2019	VD

/VANESSA DELIGI/ Examiner, Art Unit 3627	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L8	43904	((shelf$3 or rack$3 or storage location) NEAR4 (label or idenitif$4 or ID or tag "510" or barcode or code)).clm.	USPAT	OR	ON	2019/07/16 14:25
S8	2	((("BOSSA") near3 ("NOVA") near3 ("ROBOTICS") near3 ("IP") near3 ("INC"))).AS,AANM.	USPAT	OR	ON	2019/07/14 10:28
S9	3615	((("SKAFF") near3 ("Sarjoun")) OR (("TAYLOR") near3 ("Jonathan")) OR (("WILLIAMS") near3 ("Stephen")) OR (("DUBE") near3 ("Simant"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/07/14 10:28
S10	538270	(G06Q10/087 OR G05D1/0261 OR G05D1/0274 OR G05D1/0246 OR G06Q10/00 OR G05D2201/0216 OR G06Q30/02 OR G07G1/12 OR G06Q30/0603)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/14 10:30
S11	2	S8 and S9	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2019/07/14 10:30
S12	2	((("BOSSA") near3 ("NOVA") near3 ("ROBOTICS"))).AS,AANM.	USPAT	OR	ON	2019/07/14 10:32
S13	2	(BOSSA near3 NOVA near3 ROBOTIC).AS,AANM.	USPAT	OR	ON	2019/07/14 10:32
S14	10	(BOSSA near3 NOVA).AS,AANM.	USPAT	OR	ON	2019/07/14 10:32
S16	1001880	((inventory or stock$3 or warehouse or ware$1house or warehousing or housing) and (shelf or rack$3 or shelves or storage location))	USPAT	OR	ON	2019/07/14 10:34
S17	230719	((shelf$3 or rack$3 or storage location) NEAR4 (label or idenitif$4 or ID or tag "510" or barcode or code))	USPAT	OR	ON	2019/07/14 10:35
S18	1076089	(imag$3or picture$3 or camera or photogra$5)	USPAT	OR	ON	2019/07/14 10:35
S19	47428	((product or products or item or goods or merchandise or inventory) NEAR4 (class$5 or library$4))	USPAT	OR	ON	2019/07/14 10:36
S20	10633	S10 and S16	USPAT	OR	ON	2019/07/14 10:36
S21	3389	S20 and S17	USPAT	OR	ON	2019/07/14 10:37
S22	1982	S21 and S18	USPAT	OR	ON	2019/07/14 10:37

S23	1589690	((bounding NEAR2 box) or encircle or circle or box or highlight or box or rectangle or (boundary NEAR2 line or (framing near2 box) or (framing)) NEAR4 (product or products or item or goods or merchandise or inventory))	USPAT	OR	ON	2019/07/14 10:38
S24	1446	S22 and S23	USPAT	OR	ON	2019/07/14 10:38
S25	2308	((inventory or stock$3 or warehouse or ware house or warehousing) near5 (robot or autonomous))	USPAT	OR	ON	2019/07/14 10:39
S26	93	S24 and S25	USPAT	OR	ON	2019/07/14 10:39
S28	52	(inventory) and (robot NEAR10 camera) and (robot NEAR10 LIDAR)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/14 11:07
S33	37	(inventory) AND (bounding NEAR3 box$3) AND (LIDAR) AND (depth near2 (mapping or map)) AND (space or gap)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/15 16:44
S34	7491	((generat$3 or defin$3) NEAR4 "bounding boxes")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/15 17:09
S38	339	(inventory) and ((generat$3 or defin$3) NEAR4 "bounding boxes")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/15 18:15

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	68880	(G06Q10/087 OR G05D1/0261 OR G05D1/0274 OR G05D1/0246 OR G06Q10/00 OR G05D2201/0216 OR G06Q30/02 OR G07G1/12 OR G06Q30/0603)	US-PGPUB; USPAT	OR	ON	2019/07/16 14:23
L7	176106	((inventory or stock$3 or warehouse or ware$1house or warehousing or housing) and (shelf or rack$3 or shelves or storage location)).clm.	US-PGPUB; USPAT	OR	ON	2019/07/16 14:24
L9	91217	((shelf$3 or rack$3 or storage location) NEAR4 (label or idenitif$4 or ID or tag "510" or barcode or code)).clm.	US-PGPUB; USPAT	OR	ON	2019/07/16 14:25
L11	465	L6 and L7 and L9	US-PGPUB; USPAT	OR	ON	2019/07/16 14:25
L12	8558	((product or products or item or goods or merchandise or inventory) NEAR4 (class$5	US-PGPUB;	OR	ON	2019/07/16 14:26

		or library$4)).clm.	USPAT			
L13	15	L11 and L12	US-PGPUB; USPAT	OR	ON	2019/07/16 14:27

7/16/2019 5:28:47 PM
C:\Users\vdeligi\Documents\EAST\Workspaces\15471722.wsp

Bibliographic Data

Application No: 15/471,722

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /VANESSA DELIGI/ Examiner's Signature | Initials

Title: System and Method for Locating, Identifying and Counting Items

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
03/28/2017	705	3627	BOSS-01001
RULE			

APPLICANTS

Bossa Nova Robotics IP, Inc., Pittsburgh, PA, UNITED STATES

INVENTORS

Sarjoun Skaff Pittsburgh, PA, UNITED STATES

Jonathan Davis Taylor Pittsburgh, PA, UNITED STATES

Stephen Vincent Williams Pittsburgh, PA, UNITED STATES

Simant Dube Berkeley, CA, UNITED STATES

CONTINUING DATA

This application has PRO of 62427509 11/29/2016

This application has PRO of 62314785 03/29/2016

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

04/05/2017

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

FILING FEE RECEIVED

$730

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Jul 29, 2019 03:29:13 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	CTNF	07/29/2019	BOSS-01001
	892	07/29/2019	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

Via EFS Attorney Docket No. BOSS-01001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Sarjoun Skaff	Art Unit:	3627
Serial No:	15/471,722	Examiner:	Vanessa Lima Deligi
Filed:	3/28/2017		
Title:	System and Method for Locating, Identifying, and Counting Items		

AMENDMENT AND RESPONSE AFTER NON-FINAL OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Non-Final Office Action mailed July 29, 2019 (paper no. 20190714), please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

Electronic Patent Application Fee Transmittal	
Application Number:	15471722
Filing Date:	28-Mar-2017
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Filer:	David R. Stevens/TRAM RICHARDS
Attorney Docket Number:	BOSS-01001
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 2 months with $0 paid	2252	1	300	300
Miscellaneous:				
		Total in USD ($)		**300**

Electronic Acknowledgement Receipt	
EFS ID:	38046566
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/TRAM RICHARDS
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	16-DEC-2019
Filing Date:	28-MAR-2017
Time Stamp:	18:36:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$300
RAM confirmation Number	E2019BFI36263729
Deposit Account	502421
Authorized User	TRAM RICHARDS
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response.pdf	111272 27caf97901c8426677d78cbffb4ad2e9b30ec729	yes	11

Multipart Description/PDF files in .zip description

Document Description	Start	End
Applicant Arguments/Remarks Made in an Amendment	8	11
Claims	2	7
Amendment/Req. Reconsideration-After Non-Final Reject	1	1

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30544 231ec5b994a646b53394eea2555f42fd5fc81308	no	2

Warnings:

Information:

Total Files Size (in bytes):	141816

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

REMARKS

The Non-Final Office Action mailed July 29, 2019 considered and rejected claims 1-10 and 15-26. Claims 1-10 and 15-26 are rejected under 35 USC 101 as being directed to a judicial exception (an abstract idea) without significantly more. Claims 1-5, 9, 10, 15-19, and 22-26 are rejected under 35 USC 103 as being unpatentable over Zimmerman (2008/0077511) in view of Zhu (9,097,800). Claims 6, 8, and 20 are rejected under 35 USC 103 as being unpatentable over Zimmerman and Zhu and further in view of Nakamura (2010/0065634). Claims 7 and 21 are rejected under 35 USC 103 as being unpatentable over Zimmerman and Zhu and further in view of Wicks (2015/0352721).

By this amendment, claims 1-10 and 15-26 are amended. Accordingly, claims 1-10 and 15-26 are pending, of which claims 1, 15, and 23 are the independent claims. Support for the claim amendments is found throughout U.S. Pat. Appl. Pub. No. 2017/0286901 including paragraphs [0006], [0007], [0021], [0026], [0028], [0029], [0036], [0038]-[0041], [0088], and [0092] and Figures 1, 2, 5A, and 5B.

Subject Matter Rejections

1-10 and 15-26 are rejected under 35 USC 101 because the claimed invention is directed to a judicial exception (an abstract idea) without significantly more. Independent claims 1, 15, and 23 are to at least define a "moving a robot along a shelf that contains inventory, the robot acting as a movable base for a plurality of attached cameras", "moving the robot to another location", and "using the product classifier to participate in inventory management activities with the robot at the other location". Claim 15 includes even further definitions of hardware component activities. Applicant submits that the indicated definitions integrate into a practical application of monitoring inventory. Applicant further submits that the combination of limitations does provide significantly more than the abstract idea. Accordingly, Applicant respectfully requests that the 35 USC 101 rejections be withdrawn.

Substantive Rejections

Zimmerman describes system and method for performing inventory using a mobile inventory robot. Zimmerman includes a mobile inventory robot with imaging devices. (Zimmerman, Figure 1). In one aspect, inventory is performed by navigating through a store via

an inventory map. Shelf images are captured, and product bar codes are decoded from captured shelf images. Decoded barcodes are used to retrieve product visual descriptions from a product database. It is determined whether the detected images match the retrieved product visual description and, if not, setting an out of stock flag for an item corresponding to the decoded bar code. (Zimmerman, para. [0016]).

Images of individual products can be isolated. A bar code decoder can extract bar codes from images of bar code tags places on shelves below items. The extracted shelf barcode indicates which item is expected to be on the shelf. An inventory control system can use an image corresponding to the extracted bar code as a product visual descriptor. The image can be compared to the image of the item on the shelf to determine if the item on the shelf matches the bar code. (Zimmerman, para. [0054]). The comparison can be used to indicate misplaced, out of stock, etc. (Zimmerman, para. [0055]-[0057]).

Zhu is cited for teaching bounding boxes around objects and in an image.

However, Zimmerman and Zhu fail to teach or suggest defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the images. Zimmerman and Zhu also fail to teach or suggest associating a shelf label with the one or more product facing bounding boxes. Zimmerman and Zhu further fail to teach or suggest building a training data set based on the association of the shelf label with the one or more product facing bounding boxes. Zimmerman and Zhu additionally fail to teach or suggest performing at least one of: training a product classifier with the training data or forming a product library with the training data.

The other art of record fails to compensate for the deficiencies of Zimmerman and Zhu.

Accordingly, the cited art fails to teach or suggest, either singly or in combination:

using a movable robot positioned at one location along a shelf, the robot acting as a movable base for a plurality of attached cameras facing the shelf;

utilizing at least one of the cameras to capture images of the shelf;

detecting and reading a shelf label on the shelf from content of the images;

defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the images;

associating the shelf label with the one or more product facing bounding boxes;

building a training data set based on the association of the shelf label with the one or more product facing bounding boxes;

performing at least one of: training a product classifier with the training data or forming a product library with the training data;

moving the robot to another location; and

using the product classifier or the product library to participate in inventory management related activities with the robot.

as recited in claim 1. For at least this reason, claim 1 patentably defines over the art of record. For at least the same reason, dependent claims 2-10 also patentably define over the art of record.

Many of the dependent claims independently distinguish over the art of record. For example, the cited art fails to teach or suggest:

using a movable robot acting as a movable base for a wider field camera and a narrower field camera;

using the wider field camera to capture a wider field image of the shelf and using the narrower field camera to capture a narrower field image of the shelf;

detecting and reading the shelf label from the narrower field image; and

defining the one or more product facing bounding boxes from the content of the wider field image.

as recited in claim 2. For at least this further reason, claim 2 patentably defines over the art of record.

The cited art also fails to teach or suggest:

capturing a depth map of shelves and products positioned on shelves;

registering the depth map onto the narrower field image and onto the wider field image; and

comparing the shelf label to the depth map to recover the 3D location of the shelf label; and

associating the one or more product facing bounding boxes with the 3D location.

as recited in claim 4. For at least this further reason, claim 4 patentably defines over the art of record.

Claim 15 is a method claim similar in scope to claim 4. As such, claim 15 patentably defines over the art of record for reasons similar to claim 4. For at least the same reason, claims 16-22 also patentably define over the art of record.

Claim 23 is a system claim similar in scope to claim 1. As such, claim 23 patentably defines over the art of record for reasons similar to claim 1. For at least the same reason, claims 24-26 also patentably define over the art of record.

CONCLUSION

Accordingly, Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

The Commissioner is authorized to charge any additional fees to process this Amendment, or credit any over-payments that may apply, to our Deposit Account No. 50-2421.

Respectfully submitted,

Dated: December 16, 2019

/David R. Stevens/
David R. Stevens
Reg. No. 38,626

Stevens Law Group
1754 Technology Dr., Ste. 226
San Jose, CA 95110
Tel (408) 288-7588
Fax (408) 288-7542

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A inventory monitoring method, comprising ~~the steps of~~:

using a movable robot positioned at one location along a shelf, the robot acting as a movable base for a plurality of attached cameras facing the shelf;

utilizing at least one of the cameras to capture images of the shelf;

detecting and reading a shelf label[[s]] on the ~~at least one~~ shelf from content of the images;

defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the ~~in an~~ images ~~taken with at least one camera~~; [[and]]

associating the shelf label with the one or more product facing bounding boxes ~~in the image to shelf labels to~~;

building a training data set based on the association of the shelf label with the one or more product facing bounding boxes;

~~build~~ performing at least one of: training a product classifier with the training data or forming a product library with the training data;

moving the robot to another location; and

using the product classifier or product library to participate in inventory management related activities with the robot.

2. (Currently Amended)The inventory monitoring method of claim 1, ~~further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of autonomously reading shelf labels and defining multiple bounding boxes~~ wherein using a movable robot comprises using a movable robot acting as a movable base for a wider field camera and a narrower field camera;

wherein utilizing at least one of the cameras to capture images of the shelf comprises using the wider field camera to capture a wider field image of the shelf and using the narrower field camera to capture a narrower field image of the shelf;

wherein detecting and reading a shelf label on the shelf from content of the images comprises detecting and reading the shelf label from the narrower field image; and

wherein defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the images comprises defining the one or more product facing bounding boxes from the content of the wider field image.

3. (Currently Amended) The inventory monitoring method of claim 1, further comprising the ~~step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous~~ robot acting as a movable base ~~having multiple cameras and~~ for an attached LIDAR range sensing system.

4. (Currently Amended) The inventory monitoring method of claim [[1]]2, further comprising: ~~the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to capture a depth map of shelves and products positioned on shelves~~.

capturing a depth map of shelves and products positioned on shelves;

registering the depth map onto the narrower field image and onto the wider field image; and

comparing the shelf label to the depth map to recover the 3D location of the shelf label; and

wherein building a training data set comprises associating the one or more product facing bounding boxes with the 3D location.

5. (Currently Amended) The inventory monitoring method of claim 1, further comprising ~~the step of building~~ [[a]] forming the product library with a product scope containing at least one or more of ~~the following~~: one product identifier; one or more sets of descriptors; confidence levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product.

6. (Currently Amended) The inventory monitoring method of claim 1, further comprising ~~the step of~~ using manual input to identify potential inventory designated in the ~~multiple~~ one or more product facing bounding boxes ~~in the image taken with at least one camera~~.

7. (Currently Amended) The inventory monitoring method of claim 1, wherein the one or more product facing bounding boxes ~~around~~ include both potential inventory and gaps between potential inventory ~~are automatically defined~~.

8. (Currently Amended) The inventory monitoring method of claim 1, wherein the one or more product facing bounding boxes are manually associated with at least one of a shelf label or an on-product marker.

9. (Currently Amended) The inventory monitoring method of claim 1, wherein the one or more product facing bounding boxes are automatically associated with at least one of a shelf label or an on-product marker.

10. (Currently Amended) The inventory monitoring method of claim 1, further comprising ~~the step of building~~ forming the product library without use of an initial planogram.

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Canceled)

15. (Currently Amended) A inventory monitoring method, comprising ~~the steps of~~:

moving a robot along a shelf that contains inventory, the robot acting as a movable base for a plurality of attached cameras, including a wider field camera and a narrower field camera;

utilizing the wider field camera to capture an image of the inventory;

utilizing the narrower field camera to capture another image detecting and reading shelf labels;

detecting distance from ~~at least one~~ a camera, among the plurality of attached cameras, to ~~at least one~~ the shelf;

registering a depth map based on the detected distance onto the image and onto the other image;

comparing the shelf labels to the depth map to recover the 3D locations of the shelf labels;

defining bounding boxes around ~~potential~~ the inventory in [[an]]the image~~ taken with at least one camera~~; and

associating ~~selected~~ bounding boxes in the image to ~~selected~~ shelf labels and corresponding 3D locations to build a training data set;

training at least one of a product classifier or a product library with the training data set;

moving the robot to another location; and

participating in inventory management activities with the robot at the other location.

16. (Currently Amended) The inventory monitoring method of claim 15, ~~further comprising the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of detecting distance,~~ wherein utilizing the narrower field camera to capture another image comprises the robot autonomously reading shelf labels~~, and defining bounding boxes~~.

17. (Currently Amended) The inventory monitoring method of claim 15, further comprising the ~~step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous~~ robot acting as a movable base ~~having multiple cameras and at least one of~~ for an attached LIDAR range sensing system or a depth camera.

18. (Currently Amended) The inventory monitoring method of claim 15, further

comprising ~~the step of allowing an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to capture a~~ capturing the depth map ~~of shelves and of products positioned on shelves~~.

19. (Currently Amended) The inventory monitoring method of claim 15, further comprising ~~the step of~~ building [[a]]the product library with a product scope containing ~~at least~~ one or more of ~~the following~~: one product identifier; one or more sets of descriptors; confidence levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product.

20. (Currently Amended) The inventory monitoring method of claim 15, further comprising ~~the step of~~ building [[a]]the product library using manual input to identify potential inventory designated in the ~~multiple~~ bounding boxes ~~in the image taken with at least one camera~~.

21. (Currently Amended) The inventory monitoring method of claim 15, wherein the bounding boxes ~~can~~ surround gaps between potential inventory.

22. (Currently Amended) The inventory monitoring method of claim 15, further comprising ~~the step of~~ building the product library without use of an initial planogram.

23. (Currently Amended) A computer system, the computer system comprising:

a processor;

system memory coupled to the processor and storing instructions configured to cause the processor to:

use a moveable robot positioned at one location along a shelf, the robot acting as a movable base for a plurality of attached cameras facing the shelf;

detect and read a shelf label[[s]] on ~~at least one~~ the shelf from content of the images;

define one or more product facing bounding boxes around potential

inventory on the shelf from the content of at least one of ~~in an~~ the images ~~taken with at least one camera~~; [[and]]

associate the shelf label with the one or more product facing bounding boxes ~~in the image to shelf labels to build~~;

build a training data set based on the association of the shelf label with the one or more product facing bounding boxes;

perform at least one of: training a product classifier with the training data set or forming a product library with the training data set;

move the robot to another location; and

use the product classifier or the product library to participate in inventory management activities with the robot.

24. (Currently Amended) The computer system of claim 23, ~~further comprising instructions configured to allow an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base capable of~~ wherein instructions configured to detect and read a shelf label comprise instructions configured to, at the robot, autonomously read[[ing]] the shelf labels ~~and defining multiple bounding boxes~~.

25. (Currently Amended) The computer system of claim 23, further comprising ~~instructions configured to allow an autonomous robot to move beside the at least one shelf, with~~ the ~~autonomous~~ robot acting as a movable base ~~having multiple cameras and~~ for an attached LIDAR range sensing system.

26. (Currently Amended) The computer system of claim 23, further comprising instructions configured to ~~allow an autonomous robot to move beside the at least one shelf, with the autonomous robot acting as a movable base to~~ capture a depth map of shelves and products positioned on shelves.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/471,722	Filing Date 03/28/2017	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $40 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $210 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/16/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 22	Minus	** 22	= 0		x $0 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $0 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/Theresa OKON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	3/28/2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

U.S. PATENTS					
Examiner Initials	Cite No.	Patent Number	Issue Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
		9097800 B2	2015-08-04	Zhu	

U.S. PATENT APPLICATION PUBLICATIONS					
Examiner Initials	Cite No.	Publication Number	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
		20150363758 A1	2015-12-17	Wu et al.	
		20080077511 A1	2008-03-27	Zimmerman	
		20150139536 A1	2015-05-21	Jin et al.	
		20130182114 A1	2013-04-18	Zhang et al.	
		20160180533 A1	2016-03-23	Pavani et al.	
		20090094140 A1	2009-04-09	Kwan	
		20090059270 A1	2009-03-05	Opalach et al.	
		20100065634 A1	2010-03-18	Nakamura	
		20140003727 A1	2014-01-02	Lortz et al.	
		20140003655 A1	2014-01-02	Gopalakrishnan et al.	
		20090063307 A1	2009-03-05	Groenovelt et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	3/28/2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Document Number	Country Code	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant

NON-PATENT LITERATURE DOCUMENTS		
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	3/28/2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

CERTIFICATION STATEMENT	
	That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).
OR	That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).
	See attached certification statement.
	The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
X	A certification statement is not submitted herewith.

SIGNATURE			
Signature	/David R. Stevens/	Date (YYYY-MM-DD)	2019-12-19
Name/Print	David R. Stevens	Registration Number	38626

Electronic Patent Application Fee Transmittal	
Application Number:	15471722
Filing Date:	28-Mar-2017
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Filer:	David R. Stevens/KIM VAN-DINH
Attorney Docket Number:	BOSS-01001
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
		Total in USD ($)		**120**

Electronic Acknowledgement Receipt	
EFS ID:	38086776
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/KIM VAN-DINH
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	19-DEC-2019
Filing Date:	28-MAR-2017
Time Stamp:	13:45:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$120
RAM confirmation Number	E2019BID46468346
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	124739 0e00630c8082f496a622b1c5ba38a025fbf255cd	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Fee Worksheet (SB06)	fee-info.pdf	30397 aa45346877347bbec018f0e0c827c617f1840f77	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	155136		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

34051 7590 03/11/2020

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

EXAMINER	
DELIGI, VANESSA LIMA	

ART UNIT	PAPER NUMBER
3627	

NOTIFICATION DATE	DELIVERY MODE
03/11/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@stevenslawgroup.com

Office Action Summary	**Application No.** 15/471,722	**Applicant(s)** Skaff et al.	
	Examiner VANESSA DELIGI	**Art Unit** 3627	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 12/16/2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-10 and 15-26 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-10 and 15-26 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 12/19/2019.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Response to Amendment

Applicant's "Response to Amendment and Reconsideration" filed on **12/16/2019** has been considered.

Applicant's response by virtue of amendment to **claims 1-10, 15-26** has overcome the Examiner's rejection under 35 USC § 101.

Claims 1-10 and **15-26** are amended.

Claims 1-10 and **15-26** are pending in this application and an action on the merits follows.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on **12/19/2019** has been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

> The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-10 and **15-26** are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the

subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Claim 1 is directed to a server. The current amended claim includes language directed to further describing the robot in combination with the server. However, the current claim language is unclear because it describes the server using the robot, utilizing the cameras, moving the robot. The application specification **figure 3 and para. 36 describes** *a robot that communicates with the server* - [a robot captures] "multiple images and stitched together to define an image panorama…This information is communicated to a cloud or remote server (step 416) to create, change, or update a panorama and/or realogram with data derived from shelf labels, bar codes, and product identification databases to identify products". Examiner is unclear how the server is using the robot, utilizing the cameras, moving the robot if the specification describes an autonomous robot communicates information to the server, see figure 3 and para. 36. Is the server instructing the robot?, etc, **Claim 15, 2, 4, 23** are unclear for the same reasons.

Additionally regarding **claims 1, 15, and 23**, it is unclear how the server is participating in inventory management activities with the robot? Participating how?

Regarding claim 2 and 4, the current claim language is further narrowing the robot, and at the same time is further narrowing the server. Examiner is not sure which of the steps are been performed by the robot, and which of the steps are been performed by the server. For example, who is registering the depth map, and who is comparing the label to the depth map, the server or the robot, what is the difference between registering and comparing step (see specification para. 93). etc. Further, Examiner is unclear if applicant is changing the focus of the invention from the server to the robot, or if applicant is trying to not positively recite the robot as the source of information of the server. The same applies to **claim 15**.

Regarding claims 6 and 20 recite *"using manual input"*. It is unclear how the server is using manual input, is the robot manually inputting information, how?

Regarding claim 7 recites *"bounding boxes manually associated"*. How the server is manually associating the bounding boxes?

The depend **claims 2-10, 16-22, and 24-26** do not cure the deficiencies above.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim(s) 1, 5, 7, 9, 10, 23-24 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman (U.S. 20080077511 A1), in view of Schwartz (U.S. 20160171336 A1).

Regarding claim 1, Zimmerman discloses:

using a movable robot positioned at one location along a shelf, the robot acting as a movable base for a plurality of attached cameras facing the shelf; - **¶¶59-60 and figure 3** – movable robot that comprises image device 30 *[multiple cameras, see figure 3]*; The imaging devices **30** are attached to the imaging device positioning and support system **35** at heights that allow each of the imaging devices **30** to capture images of shelves in the store. A set of imaging

devices **30** such as imaging device set **305** is used for each shelf height such that in one pass, the mobile inventory robot **20**A captures images of each shelf on both sides of the mobile inventory robot **20**A *[facing the shelf]*;

utilizing at least one of the cameras to capture images of the shelf; **¶¶59-60, 83 and figures 3 and 10** - captures a shelf image (step 610);

detecting and reading a shelf label on the shelf from content of the images; **¶¶59-60, 83 and figures 3, and 10** - captures a shelf image (step 610)… The product barcode decoder 210 decodes a product barcode from the captured image (step 615);

performing at least one of: training a product classifier with the training data or forming a product library with the training data; **¶83** – discloses the generation of the product database;

moving the robot to another location; and **¶83** - If all the shelves in the store have been processed (step 1050) the generation of the product database 225 is complete (step 1060), otherwise a new shelf image is captured (step 610); further see ¶¶59-60 the robot capture images of shelves in the store;

using the product classifier or product library to participate in inventory management related activities with the robot – **figure 6 - ¶¶59-72** – out-of- stock search;

Zimmerman discloses on figure 10 ¶83 – the method to generate a product database - the product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; however does not explicitly disclose *"associating the shelf label with the one or more product, building a training data set based on the association of the shelf label with the one or more product";* **however, Zimmerman discloses on figure 6 and ¶¶59-72** – decodes a product barcode from the captured image; the method to operate the

system; If at decision step 620 a barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the The inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the indexing of the barcode with the product visual descriptor in the steps of figure 10, specifically because the index is used during the operating time, as taught by **Zimmerman,** in order to use a robot to detect out-of-stock items and report on the appearance and placement of products on the shelves, (see: **Zimmerman ¶14**).

Zimmerman discloses capturing image and image segmentation, see figure 10 and **¶83** *"defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the images;", "product facing bounding boxes";* **however, Schwartz discloses ¶61 and figure 4** - the object recognition module 201 generates an identified region or bounding box for each identified object in the one or more images and outputs a recognition result;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Schwartz,** in order to identify objects, shelf fronts and labels on the shelf fronts, empty space under shelves, areas where unidentified objects may be, and vacant areas in the image, **(see, Schwartz ¶2).**

Regarding claim 5, the Zimmerman discloses:

further comprising forming the product library with a product scope containing at least one or more: one product identifier; one or more sets of descriptors; confidence levels for each

set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product. - **¶¶47, 54, 63, and 69,** product identification;

Regarding claim 7, Zimmerman discloses at least the images - **¶¶59-61, ¶83 and figures 3, 10, however, Schwartz discloses** *wherein the one or more product facing bounding boxes include both potential inventory and gaps between potential inventory.* - **¶61 and figure 4**;

Regarding claim 9, the Zimmerman discloses:

wherein the one or more product facing bounding boxes are manually associated with at least one of a shelf label or an on-product marker - **Zimmerman discloses - figure 6 and ¶¶59-72** – the product visual descriptor from the product database 225, indexed by the found barcode; **however, Schwartz discloses – ¶61 and figure 4** – bounding boxes;

Regarding claim 10, the Zimmerman discloses:

further comprising the step of forming the product library without use of an initial planogram. **¶¶82-83 and figure 10;**

Regarding claim 23, this claim recite substantially similar limitations as claim 1, and is rejected using the same art and rationale as above.

Regarding claim 24, Zimmerman discloses:

wherein instructions configured to detect and read a shelf label comprise instructions configured to, at the robot, autonomously read the shelf label. ¶¶59-61, 83 and figures 3 and figure 10;

Claim(s) 2 is rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman and Schwartz combination as applied to claim 1, and further in view of Wu et al. (US 20150363758 A1, hereinafter Wu).

Regarding claim 2, the combination discloses:

wherein using a movable robot comprises using a movable robot acting as a movable base for cameras; wherein utilizing at least one of the cameras to capture images of the shelf comprises using cameras; wherein detecting and reading a shelf label on the shelf from content of the images comprises detecting and reading the shelf label from cameras; and **Zimmerman discloses figure 10 and ¶83 -** robot, camera, capture image;

wherein defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the images comprises defining the one or more product facing bounding boxes. **Schwartz discloses ¶61 and figure 4** - the object recognition module 201 generates an identified region or bounding box for each identified object in the one or more images and outputs a recognition result;

The combination substantially disclose the claimed invention; however does not explicitly discloses *"a wider field camera and a narrower field camera", "the wider field camera to capture a wider field image of the shelf and using the narrower field camera to capture a narrower field image of the shelf", "narrower field image", "the wider field image";*

Wu discloses on figure 3 and 4, ¶¶33, 43 – cameras capturing images with narrow and wild field of view.

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Wu,** in order to product location data substantially automatically across its stores, **(see: Wu ¶6).**

Claim(s) 3, 25 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman and Schwartz combination as applied to claim 1, and further in view of Zhu (U.S. 9097800 B1).

Regarding claims 3, the combination discloses:

further comprising the robot acting as a movable base. **Zimmerman discloses - ¶¶59-61, 83 – figures 3 and 10 –** robot;

The combination substantially disclose the claimed invention; however does not explicitly discloses *an attached LIDAR range sensing system;*

Zhu discloses - LIDAR; **see at least 1:9:40, 14:60-67, 15:1-67, 16:10-55;**

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Zhu,** in order to generate a product classifier or a product library without human interaction.

Regarding claim 25, this claim recites substantially similar limitations as claim 3, and is rejected using the same art and rationale as above.

Claim(s) 4 is rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman, Schwartz, and Wu combination as applied to claim 2, and further in view of Ren et al. (U.S. 10169677, hereinafter Ren).

Regarding claim 4, the combination discloses:

capturing a shelves and products positioned on shelves; **Zimmerman discloses – ¶83 and figures 2, 7A-8D, 10 -** capturing image;

registering the map onto the narrower field image and onto the wider field image; and – figures 3 and 4 - **Wu discloses - ¶¶28, 33, 43, 46** - captures images…constructs a store profile 12 (e.g., a 2D map, wherein cameras capturing images with narrow and wild field of view;

wherein building a training data set comprises associating the one or more product facing bounding boxes with the location - **Zimmerman discloses – ¶83, ¶59-72 and figures 2, 6, 7A-8D, 10 –** generating product database visual representation, index, and barcode; **and Schwartz discloses - ¶61 and figure 4** - the images with bounding boxes;

The combination discloses, specifically Zimmerman discloses *comparing the shelf labels to the [image]* **– ¶83, ¶59-72 and figures 2, 6, 7A-8D, 10; however, does not explicitly disclose** *"comparing the shelf label to the map to recover the 3D location of the shelf label", and "the 3D location".*

Ren discloses - 3:15-30 - the camera may generate depth information representing a distance of the object from the camera; The depth information may be utilized to generate a point cloud representative of the image with respect to the inventory location (e.g., the shelf of the inventory location).;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Ren,** in order to track inventory items at their location, **(see, Ren 1:15-22).**

Claim(s) 6, 8 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman and Schwartz combination as applied to claim 1, and further in view of Nakamura (U.S. 20100065634 A1).

Regarding claim 6, the combination discloses, specifically Schwartz discloses ¶61 and figure 4 - *"one or more product facing bounding boxes"*

The combination substantially discloses the claimed invention, however, does not explicitly disclose *"further comprising using manual input to identify potential inventory designated".*

However, Nakamura discloses:

further comprising using manual input to identify potential inventory designated **- ¶¶59, 72, 82-83, and 111 -** "when a worker having the handy scanner 7 desires to perform the similar associating process…the associating process can be performed with the electronic shelf label 5 being attached to the shelf 60 so that errors occurring when attaching the electronic shelf label 5 can be reduced, compared to a case in which the electronic shelf label 5 is attached after the associating process";

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Nakamura,** in order reduce errors occurring when attaching a shelf label, **(see, Nakamura, ¶111**).

Regarding claim 8, the combination discloses, specifically Schwartz discloses ¶61 and figure 4 *"the one or more product facing bounding boxes"*; **however, does not explicitly discloses** *wherein the one or more product facing bounding boxes are manually associated with at least one of a shelf label or an on-product marker.*

explicitly disclose *manually associated with at least one of a shelf label or an on-product marker.*

However, Nakamura discloses:

manually associated with at least one of a shelf label or an on-product marker **("when a worker having the handy scanner 7 desires to perform the similar associating process…the associating process can be performed with the electronic shelf label 5 being attached to the shelf 60 so that errors occurring when attaching the electronic shelf label 5 can be reduced,**

compared to a case in which the electronic shelf label 5 is attached after the associating process.", see at least ¶¶59, 72, 82-83, and 110-111)

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Nakamura,** in order reduce errors occurring when attaching a shelf label, **(see, Nakamura, ¶111)**.

Claim(s) 15-22 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman (U.S. 20080077511 A1), in view of Wu et al. (U.S. 20150363758 A1, herein after Wu), in view of Schwartz (U.S. 20160171336 A1), and further in view of Ren et al. (US10169677, hereinafter Ren).

Regarding claim 15, Zimmerman discloses:

a inventory monitoring method, comprising: moving a robot along a shelf that contains inventory, the robot acting as a movable base for a plurality of attached cameras: **¶¶59-60 and figure 3**

utilizing the camera to capture an image of the inventory; **¶¶59-60, 83 and figures 3 and 10**

utilizing camera to capture another image **¶¶59-60, 83 and figures 3 and 10;**

detecting and reading shelf labels; **¶¶59-61, 83 and figures 3 and 10;**

moving the robot to another location; and **¶¶59-61, 83 and figures 3 and 10;**

participating in inventory management activities with the robot at the other location. **figure 6 - ¶¶59-72** – out-of- stock search;

Zimmerman discloses at least the image**, figure 10 ¶83; however does not explicitly discloses** *"associating the image to shelf labels and locations to build a training data*

set; training at least one of a product classifier or a product library with the training data set;" ;

Zimmerman discloses on figure 6 and ¶¶59-72;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the indexing of the barcode with the product visual descriptor in the steps of figure 10, specifically because the index is used during the operating time, as taught by **Zimmerman,** in order to use a robot to detect out-of-stock items and report on the appearance and placement of products on the shelves, (see: **Zimmerman ¶14**).

Zimmerman discloses the cameras capture images; however does not explicitly discloses *"wider field camera and a narrower field camera", "utilizing the wider field camera", "utilizing the narrower field camera"*; **Wu discloses on figure 3 and 4, ¶¶33, 43** – cameras capturing images with narrow and wild field of view.

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Wu,** in order to product location data substantially automatically across its stores, **(see: Wu ¶6).**

Zimmerman discloses capturing image and image segmentation, see figure 10 and **¶83** *"defining bounding boxes around the inventory in the image, and", "image with bounding boxes";* **however, Schwartz discloses ¶61 and figure 4** - the object recognition module 201 generates an identified region or bounding box for each identified object in the one or more images and outputs a recognition result;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Schwartz,** in order to identify objects, shelf fronts and labels on the shelf fronts, empty space

under shelves, areas where unidentified objects may be, and vacant areas in the image, **(see, Schwartz ¶2).**

Zimmerman discloses comparing the shelf labels to the [image] – **¶83, ¶59-72 and figures 2, 6, 7A-8D, 10 –** The product barcode decoder 210 decodes a product barcode from the captured image; decodes a product barcode from the captured image; the method to operate the system; If at decision step 620 a barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the The inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode; **however, does not explicitly discloses** *"detecting distance from a camera, among the plurality of attached cameras, to the shelf; registering a depth map based on the detected distance onto the image and onto the other image; comparing the shelf labels to the depth map to recover the 3D locations of the shelf labels;", "corresponding 3D location";* **Ren discloses -3:15-30** - the camera may generate depth information representing a distance of the object from the camera; The depth information may be utilized to generate a point cloud representative of the image with respect to the inventory location (e.g., the shelf of the inventory location).;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Ren,** in order to track inventory items at their location, **(see, Ren 1:15-22).**

Regarding claim 16, Zimmerman discloses:

wherein utilizing the narrower field camera to capture another image comprises the robot autonomously reading shelf labels - **¶¶59-60, 83 and figures 3 and 10** - captures a shelf

image; **however, Wu discloses figure 3 and 4, ¶¶33, 43** – cameras capturing images with narrow and wild field of view;

Regarding claim 17, Zimmerman discloses:

further comprising the robot acting as a movable base an attached LIDAR range sensing system or a depth camera. **– ¶83 and figures 2, 7A-8D, 10 -** capturing image; **however, Ren discloses - 3:15-30 -** depth camera;

Regarding claim 18, Zimmerman discloses at least *cameras* **- ¶83 and figures 2, 7A-8D, 10; however, Ren discloses** *further comprising capturing the depth map.* **- 3:15-30;**

Regarding claim 19, Zimmerman discloses *further comprising building the product library with a product scope containing one or more: one product identifier; one or more sets of descriptors; confidence levels for each set of descriptors; dates at which each set of descriptors was generated; one or more shelf position metric estimates; confidence levels for each shelf position metric estimate; one or more shelf position topological estimates; a count number for each shelf position topological estimate; one or more image templates of the product; and dimensions of the product.* **- ¶¶47, 54, 63, and 69,** product identification;

Regarding claim 20, Zimmerman discloses *further comprising building the product library using manual input to identify potential inventory designated* **- ¶83 and figure 10, however, Schwartz discloses** *bounding boxes* **- ¶61 and figure 4;**

Regarding claim 21, Zimmerman discloses the images, **figure 10, ¶¶59-61 and 83, however, Schwartz discloses** *wherein the bounding boxes surround gaps between potential inventory* **- ¶61 and figure 4;**

Regarding claim 22, Zimmerman discloses:

further comprising building the product library without use of an initial planogram.

¶¶82-83;

Claim(s) 26 is rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman, Schwartz combination as applied to claim 23, and further in view of Ren et al. (U.S. 10169677, hereinafter Ren).

Regarding claim 26, the combination discloses:

capturing a shelves and products positioned on shelves; **Zimmerman discloses – ¶83 and figures 2, 7A-8D, 10 -** capturing image;

The combination substantially discloses the claimed invention, however, does not explicitly disclose *"capture a depth map of shelves".*

Ren discloses - 3:15-30 - the camera may generate depth information representing a distance of the object from the camera; The depth information may be utilized to generate a point cloud representative of the image with respect to the inventory location (e.g., the shelf of the inventory location).;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Ren,** in order to track inventory items at their location, **(see, Ren 1:15-22).**

Response to Arguments

Applicant's arguments filed on **12/16/2019** have been fully considered.

USC 101 Rejection

Applicant's arguments made with respect to the rejection set forth under 35 USC 101 have been fully considered.

The claims as amended are considered patent-eligible because the claims as a whole integrate certain methods of organizing human activity into a practical application. Specifically, the additional elements (movable robot, shelf, cameras, memory, processor), recite a specific manner of detect and read a shelf label in an image with contents, define bounding boxes around inventory/product from the images with contents, associate the shelf label with the image containing bounding boxes, and based on the association build a training data and training a product classifier or form a product library with the built training data. Applicant's claims recite a combination of elements that integrate the exception into a practical application. Thus, the 35 USC 101 rejection is also withdrawn.

USC 103 Rejection

Applicant's arguments made with respect to the rejection set forth under 35 USC 103 have been fully considered.

Examiner respectfully disagree with applicants arguments, see Remarks page 8-10.

Zimmerman discloses - *using a movable robot positioned at one location along a shelf, the robot acting as a movable base for a plurality of attached cameras facing the shelf;* - **¶¶59-60 and figure 3** – movable robot that comprises image device 30 *[multiple cameras, see figure 3]*; The imaging devices **30** are attached to the imaging device positioning and support system **35** at heights that allow each of the imaging devices **30** to capture images of shelves in the store. A set of imaging devices **30** such as imaging device set **305** is used for each shelf height such that in one pass, the mobile inventory robot **20**A captures images of each shelf on both sides of the mobile inventory robot **20**A *[facing the shelf]*; *utilizing at least one of the cameras to capture images of the shelf; and claim 15* - **¶¶59-60, 83 and figures 3 and 10** - captures a shelf image (step 610); *detecting and reading a shelf label on the shelf from content of the images;* **¶¶59-60,**

83 and figures 3, and 10 - captures a shelf image (step 610)… The product barcode decoder 210 decodes a product barcode from the captured image (step 615); *performing at least one of: training a product classifier with the training data or forming a product library with the training data;* **¶83** – discloses the generation of the product database; *moving the robot to another location; and* **¶83** - If all the shelves in the store have been processed (step 1050) the generation of the product database 225 is complete (step 1060), otherwise a new shelf image is captured (step 610); further see ¶¶59-60 the robot capture images of shelves in the store; *using the product classifier or product library to participate in inventory management related activities with the robot* – **figure 6 - ¶¶59-72** – out-of- stock search; **Additionally, Zimmerman discloses on figure 10 ¶83** – the method to generate a product database - the product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; however does not explicitly disclose *"associating the shelf label with the one or more product, building a training data set based on the association of the shelf label with the one or more product";* **however, Zimmerman discloses on figure 6 and ¶¶59-72** – decodes a product barcode from the captured image; the method to operate the system; If at decision step 620 a barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the The inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode; and it would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the indexing of the barcode with the product visual descriptor in the steps of figure 10, specifically because the index is used during the operating time, as taught by **Zimmerman,** in order to use a robot to

detect out-of-stock items and report on the appearance and placement of products on the shelves, (see: **Zimmerman ¶14**).

Regarding claim 15, Zimmerman discloses - *a inventory monitoring method, comprising: moving a robot along a shelf that contains inventory, the robot acting as a movable base for a plurality of attached cameras;* **¶¶59-60 and figure 3;** *utilizing the camera to capture an image of the inventory;* **¶¶59-60, 83 and figures 3 and 10;** *utilizing camera to capture another image* **¶¶59-60, 83 and figures 3 and 10;** *detecting and reading shelf labels;* **¶¶59-61, 83 and figures 3 and 10;** *moving the robot to another location; and* **¶¶59-61, 83 and figures 3 and 10;** *participating in inventory management activities with the robot at the other location.* **figure 6 - ¶¶59-72** – out-of- stock search; **further, Zimmerman discloses at least** the image**, figure 10 ¶83; however does not explicitly discloses** *"associating the image to shelf labels and locations to build a training data set; training at least one of a product classifier or a product library with the training data set;"* ; **Zimmerman discloses on figure 6 and ¶¶59-72;** and it would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the indexing of the barcode with the product visual descriptor in the steps of figure 10, specifically because the index is used during the operating time, as taught by **Zimmerman,** in order to use a robot to detect out-of-stock items and report on the appearance and placement of products on the shelves, (see: **Zimmerman ¶14**).

Claim 13 recites substantially similar limitations as **claim 1.**

Applicant's arguments made with respect to the rejection set forth under 35 USC 103 have been fully considered but are moot in view of the new combination of references being used in the current rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure can be found on the attached PTO-892 form.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VANESSA DELIGI whose telephone number is (571)272-0503. The examiner can normally be reached on Monday-Friday 07:30AM-5PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Florian (Ryan) Zeender can be reached on (571) 272-6790. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VANESSA DELIGI/
Examiner, Art Unit 3627

MR

/FLORIAN M ZEENDER/
Supervisory Patent Examiner, Art Unit 3627

Notice of References Cited	Application/Control No. 15/471,722	Applicant(s)/Patent Under Reexamination Skaff et al.	
	Examiner VANESSA DELIGI	Art Unit 3627	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20150363758-A1	12-2015	Wu; Wencheng	G06Q10/087	705/20
*	B	US-20160171336-A1	06-2016	Schwartz; Edward	G06K9/00201	382/173
*	C	US-10169677-B1	01-2019	Ren; Xiaofeng	G06K9/6212	1/1
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	**Art Unit**
	VANESSA DELIGI	3627

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	07/16/2019	02/26/2020							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	-	-							
	12	-	-							
	13	-	-							
	14	-	-							
	15	✓	✓							
	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							
	21	✓	✓							
	22	✓	✓							
	23	✓	✓							
	24	✓	✓							
	25	✓	✓							
	26	✓	✓							

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06Q10/087, G06Q10/00	07/16/2019	VD
G05D1/0261, G05D1/0274, G05D1/0246	07/16/2019	VD
G05D2201/0216	07/16/2019	VD
G06Q30/02, G06Q30/0603	07/16/2019	VD
G07G1/12	07/16/2019	VD

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
EAST text search	07/16/2019	VD
Inventor name search	07/16/2019	VD
Assignee name search	07/16/2019	VD
EAST text search (update)	02/26/2020	VD

/VANESSA DELIGI/ Examiner, Art Unit 3627	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G06Q	10/087, 10/00 , 30/02, 30/0603	07/16/2019	VD
G05D	1/0261, 1/0274, 1/0246, 2201/0216	07/16/2019	VD
G07G	1/12	07/16/2019	VD

/VANESSA DELIGI/ Examiner, Art Unit 3627	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S63	3854	camera SAME (bound$3 NEAR5 box$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 16:07
S64	697	S63 and (train$3 SAME classif$5)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 16:08
S66	135	S64 and (LIDAR)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 16:09
S67	39	S66 and (depth NEAR5 map$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 16:09
S74	143	(lable) NEAR20 (box$3 or (bound$3 near3 box$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 17:27
S86	6888	(ROBOT SAME shelf)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:09
S87	4546	(recognition SAME product SAME tag)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:09
S88	11	S86 SAME3 S87	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:09
S89	4338	(box$3 SAME product SAME tag)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:15
S91	13	S86 SAME6 S89	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:17

S93	2377	(ROBOT SAME inventory)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:21
S94	91945	(recognition SAME product)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:21
S95	140	S93 and S94	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/23 18:22
S96	15	(shelf*3 or shelves) NEAR20 (associat$) NEAR20 (tag or a label) NEAR20 (bound$3 near3 box$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 08:02
S97	1453	(detect$3 OR scann$3 OR captur$4) NEAR5 (shelf*3 or shelves) NEAR5 (tag or a label)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 08:08
S100	14	S96 and S97	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 08:09
S102	9676	(product or object or item) NEAR10 (bound$3 NEAR3 box$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 08:10
S103	37	S97 and S102	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 08:10
S105	640	(comput$3 NEAR5 vision) SAME4 (object NEAR5 detection) SAME4 (bounding NEAR5 box)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 09:15
S106	11	S105 and (shelf NEAR5 product)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 09:46
S111	393	(associat$3 or correspond$3 or link$3 or relat$3 or correlat$3 or affiliat$3 or connect$3) NEAR20 (tag or label) NEAR20 (bound$3 NEAR2 box$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 10:16
S112	229	S111 and @ad<"20160329"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 11:24

S115	24195	(associat$3 or correspond$3 or link$3 or relat$3 or correlat$3 or affiliat$3 or connect$3) NEAR10 (tag or label) NEAR10 (product)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 11:48
S116	93787	(computer NEAR5 vision)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 11:48
S119	94	S115 and S116 and (bound$3 NEAR3 box$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/24 12:18
S134	84	(camera NEAR5 distance NEAR5 shelf)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/25 11:49
S139	552	(camera NEAR5 distance NEAR5 object) NEAR30 ((depth near3 map) NEAR10 distance NEAR10 object)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/25 11:52
S142	10	(depth near5 map) near10 label near10 shelf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/25 12:10
S144	12	(depth near5 map) same label same shelf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/25 14:01
S146	165	(depth) same tag same shelf	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/25 14:02
S148	10	(depth) near20 tag near20 shelf near20 location	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/02/25 14:15

EAST Search History (Interference)

<This search history is empty>

2/26/2020 7:33:11 PM
C:\Users\vdeligi\Documents\EAST\Workspaces\15471722.wsp

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	3/28/2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

U.S. PATENTS

Examiner Initials	Cite No.	Patent Number	Issue Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
/V.D./		9097800 B2	2015-08-04	Zhu	

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initials	Cite No.	Publication Number	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
/V.D./		20150363758 A1	2015-12-17	Wu et al.	
		20080077511 A1	2008-03-27	Zimmerman	
		20150139536 A1	2015-05-21	Jin et al.	
		20130182114 A1	2013-04-18	Zhang et al.	
		20160180533 A1	2016-03-23	Pavani et al.	
		20090094140 A1	2009-04-09	Kwan	
		20090059270 A1	2009-03-05	Opalach et al.	
		20100065634 A1	2010-03-18	Nakamura	
		20140003727 A1	2014-01-02	Lortz et al.	
		20140003655 A1	2014-01-02	Gopalakrishnan et al.	
		20090063307 A1	2009-03-05	Groenovelt et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /V.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	3/28/2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Document Number	Country Code	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant

NON-PATENT LITERATURE DOCUMENTS		
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.

EXAMINER SIGNATURE			
Examiner Signature	/VANESSA DELIGI/	Date Considered	02/26/2020

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /V.D./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	3/28/2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

CERTIFICATION STATEMENT	
	That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).
OR	That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).
	See attached certification statement.
	The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
X	A certification statement is not submitted herewith.

SIGNATURE			
Signature	/David R. Stevens/	Date (YYYY-MM-DD)	2019-12-19
Name/Print	David R. Stevens	Registration Number	38626

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /V.D./

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Mar 11, 2020 03:32:07 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	CTFR	03/11/2020	BOSS-01001
	892	03/11/2020	BOSS-01001
	1449	03/11/2020	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

Doc Code: ECOMM.AUTH/ECOMM.WTDW
Doc Description: Internet Communications Authorized/Internet Communications Authorization Withdrawn

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS

Application No.	15/471,722
Filing Date	03-28-2017
First Named Inventor	Sarjoun Skaff
Art Unit	3627
Examiner Name	DELIGI, VANESSA LIMA
Practitioner Docket No.	BOSS-01001

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. To authorize permission for Internet Communications.

☑ Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

II. To withdraw authorization for Internet Communications.

☐ The authorization given on _____, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 38626.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/David R. Stevens/ — Signature

06/2/2020 — Date

David R. Stevens — Typed or printed name

408-288-7588 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Juristic entities must be represented by a patent practitioner (see 37 CFR 1.31, which is applicable to any paper filed on or after September 16, 2012, that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

Electronic Acknowledgement Receipt	
EFS ID:	39606131
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/Annette Tri
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	02-JUN-2020
Filing Date:	28-MAR-2017
Time Stamp:	18:01:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Internet Communications Authorized	Authorization_for_Internet_Communications.pdf	59959 e726f30cbf78ee3173952dd7fd255e1917d70077	no	1

Warnings:

Information:	
Total Files Size (in bytes):	59959

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

34051 7590 06/12/2020

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

EXAMINER	
DELIGI, VANESSA LIMA	

ART UNIT	PAPER NUMBER
3627	

NOTIFICATION DATE	DELIVERY MODE
06/12/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@stevenslawgroup.com

Applicant-Initiated Interview Summary	**Application No.** 15/471,722	**Applicant(s)** Skaff et al.	
	Examiner VANESSA DELIGI	**Art Unit** 3627	**AIA (FITF) Status** Yes

All participants (applicant, applicants representative, PTO personnel):

(1) VANESSA DELIGI.

(2) Ryan (Florian) Zeender.

(3) David R. Stevens (38,626) and Michael Dodd (4637).

(4) Skaff Sarjoun (inventor).

Date of Interview: 02 June 2020.

Type: ☑ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☑ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☑Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 1.

Identification of prior art discussed: Zimmerman (U.S. 20080077511 Al).

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant's representative contacted the examiner to discuss 103 rejection. The examiner, examiner supervisor, the applicant's attorney, and inventor discussed the following:
1 - The inventor (Skaff Sarjoun) explained the invention to Examiner and Examiner supervisor;
2 - The inventor explained the difference between Zimmerman and the current application invention.
3 - Examiner and Examiner supervisor believes the content of para. 95-107 (Note: how geometry is use to associate label and product, and how the library is improved over time based on image patterns recognition using images from a current store and images from different stores as mention by the inventor) would advance prosecution;
4 - In addition, if the discussed features are amended, it would require further consideration and/or search.
No agreements were reached..

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☑ Attachment

/VANESSA DELIGI/ Patent Examiner, Art Unit 3627	/FLORIAN M ZEENDER/ Supervisory Patent Examiner, Art Unit 3627

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiners responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicants correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,-
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicants record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiners version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, Interview Record OK on the paper recording the substance of the interview along with the date and the examiners initials.

FOR DISCUSSION PURPOSES

Re: Case 15/471,722 (Atty Docket BOSS-01001)
System and Method for Locating, Identifying, and Counting Items

Telephonic Interview scheduled for Monday, June 1, 2020 at 1:00PM Eastern time

Examiner: Vanessa Lima Deligi

Thank you for agreeing to a telephone interview to discuss the above-referenced case. The following is an agenda for our interview.

Claims

1. (Previously Presented) A inventory monitoring method, comprising:

using a movable robot positioned at one location along a shelf, the robot acting as a movable base for a plurality of attached cameras facing the shelf;

utilizing at least one of the cameras to capture images of the shelf;

detecting and reading a shelf label on the shelf from content of the images;

defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the images;

associating the shelf label with the one or more product facing bounding boxes;

building a training data set based on the association of the shelf label with the one or more product facing bounding boxes;

performing at least one of: training a product classifier with the training data or forming a product library with the training data;

moving the robot to another location; and

using the product classifier or product library to participate in inventory management related activities with the robot.

Discussion of current claim rejections (Claims are rejected based on Zimmerman 2008/0077511 and Schwartz 2016/0171336 and under 35 USC 112(b)))

- Zimmerman is directed to a system and method for performing inventory using a mobile inventory robot. Zimmerman includes a mobile inventory robot with imaging devices. (Zimmerman, Figure 1). In one aspect, inventory is performed by navigating through a store via an inventory map. Shelf images are captured, and product bar codes are decoded from captured shelf images. Decoded

barcodes are used to retrieve product visual descriptions from a product database. It is determined whether the detected images match the retrieved product visual description and, if not, setting an out of stock flag for an item corresponding to the decoded bar code. (Zimmerman, para. [0016]).

- In one aspect of Zimmerman, images of individual products can be isolated. A bar code decoder can extract bar codes from images of bar code tags places on shelves below items. The extracted shelf barcode indicates which item is expected to be on the shelf. An inventory control system can use an image corresponding to the extracted bar code as a product visual descriptor. The image can be compared to the image of the item on the shelf to determine if the item on the shelf matches the bar code. (Zimmerman, para. [0054]). The comparison can be used to indicate misplaced, out of stock, etc. (Zimmerman, para. [0055]-[0057]).
- Schwartz describes realogram scene analysis of images: multiples for scene analysis. An object recognition system can detect and identify items in an image according to image recognition algorithms to match detected objects with images of known objects stored in a search database. The object recognition module generates an identified region or bounding box for each object and outputs a recognition result. (Schwartz, para. [0061]).
- However, the Office Action expressly states that Zimmerman fails to teach "associating the shelf label with the one or more product facing bounding boxes" and "building a training data set based on the association of the shelf label with the one or more product facing bounding boxes". (pages 5 and 6 of office action)
- Applicant also submits that the current claims particularly point out and distinctly claim the subject matter regarded as the invention.

We would also welcome your feedback and suggestions as to the proposed amendments. I look forward to our interview.

David R. Stevens
(408) 288-7588

Michael B. Dodd
(801) 550-4985

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	15/471,722	Filing Date	2017-03-28	Docket Number (if applicable)	BOSS-01001	Art Unit	3627
First Named Inventor	Sarjoun Skaff			Examiner Name	DELIGI, VANESSA LIMA		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 502421

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/David R. Stevens/	Date (YYYY-MM-DD)	2020-06-11
Name	David R. Stevens	Registration Number	38626

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	15471722
Filing Date:	28-Mar-2017
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Filer:	David R. Stevens/Annette Tri
Attorney Docket Number:	BOSS-01001

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	1	50	50
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
RCE- 1ST REQUEST	2801	1	650	650
		Total in USD ($)		**700**

Electronic Acknowledgement Receipt	
EFS ID:	39698737
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/Annette Tri
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	11-JUN-2020
Filing Date:	28-MAR-2017
Time Stamp:	19:56:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$700
RAM confirmation Number	E20206AJ57118836
Deposit Account	502421
Authorized User	Annette Tri
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response.pdf	117390 d0e2def3407075f49d16ff4d8044386dd40604d7	yes	15
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Applicant Arguments/Remarks Made in an Amendment		10	15	
	Claims		2	9	
	Response After Final Action		1	1	
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	RCE_Final.pdf	81649 62ba06d70be33e55cd5a9eb6be4bd6ab3cd603f0	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32001 b8e86916fee74b3b323affe5f1a688cbdbd7e315	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	231040		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

REMARKS

The Final Office Action mailed March 11, 2020 considered and rejected claims 1-10 and 15-26. Claims 1-10 and 15-26 are rejected under 35 USC 112(b) or USC 112 (pre-AIA), second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. Claims 1, 5, 7, 9, 10, 23 and 24 are rejected under 35 USC 103 as being unpatentable over Zimmerman (2008/0077511) in view of Schwartz (2016/0171336). Claim 2 is rejected under 35 USC 103 as being unpatentable over Zimmerman and Schwartz and further in view of Wu (2015/0363758). Claims 3 and 25 are rejected under 35 USC 103 as being unpatentable over Zimmerman and Schwartz and further in view of Zhu (9,097,800). Claim 4 is rejected under 35 USC 103 as being unpatentable over Zimmerman, Schwartz, and Wu and further in view of Ren (10,169,677). Claims 6 and 8 are rejected under 35 USC 103 as being unpatentable over Zimmerman and Schwartz and further in view of Nakamura (2010/0065634). Claims 15-22 are rejected under 35 USC 103 as being unpatentable over Zimmerman, in view of Wu, in view of Schwartz, and further in view of Ren. Claim 26 is rejected over Zimmerman and Schwartz and further in view of Ren

Telephonic Interview

Initially, Applicant thanks the Examiner for the courtesies extended during the recent telephonic interview held on June 1, 2020. The claim amendments and remarks submitted in this paper are consistent with the amendments and remarks presented during the course of the interview and which should be found to overcome the existing rejections of record. While no agreement was reached regarding allowability of the claims at the time of the interview, inasmuch as further review and an updated search would be required, it appeared as though the amendments discussed during the interview clarified aspects of the invention that distinguished the pending claims over the art of record. Accordingly, entry of this amendment and favorable reconsideration of the pending claims is respectfully requested.

Summary Of Claim Amendments

By this amendment, claims 1, 2, 6-9, 16, and 20-22 are amended, claims 3-5, 10, 11, 15, 17-19, and 23-26 are canceled, and claims 27-37 are new. Accordingly, claims 1, 2, 6-9, 16, 20-22, and 27-37 are pending, of which claims 1, 27, and 31 are the independent claims. Support for the claim amendments is found throughout U.S. Pat. Appl. Pub. No. 2017/0286901 including paragraphs [0021], [0026]-[0029], [0033], [0037], [0039]-[0042], [0055], [0076]-[0088], [0090]-[00106], [00107], and [01008] and Figures 1, 2, 5A, 5B, and 6.

Clarity Rejections

Claims 1-10 and 15-26 are rejected under 35 USC 112(b) or USC 112 (pre-AIA), second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. More specifically, with respect to claim 1, Examiner is unclear how the server is using the robot, utilizing the cameras, moving the robot if the specification describes an autonomous robot communicates information to the server. It is also unclear how the server is participating in inventory management activities with the robot.

Regarding claims 2 and 4, the claim language narrows both the robot and the server. Examiner is not sure what is being performed by the robot and what is being performed by the server.

Regarding claims 6 and 20 it is unclear how the server is using manual input.

Regarding claim 7 it is unclear how the server is manually associating bounding boxes.

Claims 1 and 2 are amended to remove language Examiner found unclear. Claims 4, 6, 7, 15 and 23 are canceled. Applicant submits that the amended claims particularly point out and distinctly claim the subject matter regarded as the invention. Accordingly, Applicant respectfully requests that the 35 USC 112(b) or USC 112 (pre-AIA), second paragraph, rejections be withdrawn.

Substantive Rejections

Zimmerman describes system and method for performing inventory using a mobile inventory robot. Zimmerman includes a mobile inventory robot with imaging devices. (Zimmerman, Figure 1). In one aspect, inventory is performed by navigating through a store via an inventory map. Shelf images are captured, and product bar codes are decoded from captured

shelf images. Decoded barcodes are used to retrieve product visual descriptions from a product database. It is determined whether the detected images match the retrieved product visual description and, if not, setting an out of stock flag for an item corresponding to the decoded bar code. (Zimmerman, para. [0016]).

Images of individual products can be isolated. A bar code decoder can extract bar codes from images of bar code tags places on shelves below items. The extracted shelf barcode indicates which item is expected to be on the shelf. An inventory control system can use an image corresponding to the extracted bar code as a product visual descriptor. The image can be compared to the image of the item on the shelf to determine if the item on the shelf matches the bar code. (Zimmerman, para. [0054]). The comparison can be used to indicate misplaced, out of stock, etc. (Zimmerman, para. [0055]-[0057]).

Schwartz describes realogram scene analysis of images: multiples for scene analysis. An object recognition system can detect and identify items in an image according to image recognition algorithms to match detected objects with images of known objects stored in a search database. The object recognition module generates an identified region or bounding box for each object and outputs a recognition result. (Schwartz, para. [0061]).

Wu describes store shelf imaging system. One or more movable cameras can be directed at a display unit. Camera field of view is an adjustable parameter (Wu, [0028], [0033], [0043], [0045], and [0050] and Figs. 3 and 4).

Ren describes counting stacked inventory using image analysis. A camera may generate depth information representing a distance of an object from the camera. Based on depth information of an item, an inventory count can be determined. (Ren, Col. 3, Lines 15-30).

Zhu is cited for teaching LIDAR systems and bounding boxes around objects and in an image.

However, Zimmerman, Schwartz, Wu, Ren, and Zhu fail to teach or suggest cross-correlating one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the content of their associated shelf labels. Zimmerman, Schwartz, Wu, Ren, and Zhu also fail to teach or suggest building a training data set based on the association of the shelf label with the one or more product facing bounding boxes, correlated across the one or more stores. Zimmerman, Schwartz, Wu, Ren, and Zhu additionally fail to teach or suggest building a product classifier from a training data set,

wherein the training data set is based on the association of the shelf label with the one or more product facing bounding boxes correlated across the one or more stores.

The other art of record fails to compensate for the deficiencies of Zimmerman, Schwartz, Wu, Ren, and Zhu.

Accordingly, the cited art fails to teach or suggest, either singly or in combination:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label within the one or more images;

defining one or more product facing bounding boxes that surround an image of a product facing within the one or more images;

associating a shelf label with one or more product facing bounding boxes;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the content of their associated shelf labels;

building a training data set based on the association of the shelf label with the one or more product facing bounding boxes correlated across the one or more stores;

using the training data to build a product classifier; and

using the product classifier to classify an item.

as recited in claim 1. For at least this reason, claim 1 patentably defines over the art of record. For at least the same reason, dependent claims 2, 6-10, and 35-37 and also patentably define over the art of record.

Many of the dependent claims independently distinguish over the art of record. For example, the cited art fails to teach or suggest:

capturing further images of another portion of a shelf;

reading another shelf label within further image content contained in the further one or more images;

defining another product facing bounding box that surrounds an image of another product facing within the further image content;

associating another shelf label with the defined other product facing bounding box; cross-correlating the defined other product facing bounding box and the one or more other product facing bounding boxes across the one or more stores by matching the content of their associated labels; and

building the training data set based on the association of the other shelf label with the one or more product facing bounding boxes correlated across the one or more stores.

as recited in claim 35. For at least this further reason, claim 35 patentably defines over the art of record.

The cited art further fails to teach or suggest "capturing the further images of the portion of the shelf subsequent to capturing the one or more images", as recited in claim 36. For at least this further reason, claim 36 patentably defines over the art of record.

The cited art additionally fails to teach or suggest "capturing further images of a portion of a shelf in another store", as recited in claim 37. For at least this further reason, claim 37 patentably defines over the art of record.

Claim 27 is another method claim similar to claim 1. As such, claim 27 patentably defines over the art of record for reasons similar to claim 1. For at least this same reason claims 16, 20-22, and 28-30 also patentably define over the art of record. Claims 28-30 also patentably define over the art of record for reasons similar to claims 35-37 respectively.

Claim 31 is another method claim similar to claim 1. As such, claim 31 patentably defines over the art of record for reasons similar to claim 1. For at least this same reason claims 32-34 also patentably define over the art of record. Claims 32-34 also patentably define over the art of record for reasons similar to claims 35-37 respectively.

CONCLUSION

Accordingly, Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

The Commissioner is authorized to charge any additional fees to process this Amendment, or credit any over-payments that may apply, to our Deposit Account No. 50-2421.

Respectfully submitted,

Dated: June 11, 2020

/David R. Stevens/
David R. Stevens
Reg. No. 38,626

Stevens Law Group
1754 Technology Dr., Ste. 226
San Jose, CA 95110
Tel (408) 288-7588
Fax (408) 288-7542

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A ~~inventory monitoring~~ method[[,]] comprising:

~~using a movable robot positioned at one location along a shelf, the robot acting as a movable base for a plurality of attached cameras facing the shelf;~~

~~utilizing at least one of the cameras to capture~~ capturing one or more images of [[the]]a portion of a shelf with a camera;

detecting and reading content of a shelf label within ~~on the shelf from content of~~ the one or more images;

defining one or more product facing bounding boxes that surround an ~~around potential inventory on the shelf from the content of at least one of the~~ image[[s]] of a product facing within the one or more images;

associating [[the]]a shelf label with the one or more product facing bounding boxes;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the content of their associated labels;

building a training data set based on the association of the shelf label with the one or more product facing bounding boxes correlated across the one or more stores;

~~performing at least one of: training a product classifier with the training data or forming a product library with~~ using the training data to build a product classifier; and

~~moving the robot to another location; and~~

using the product classifier to classify an item~~or product library to participate in inventory management related activities with the robot~~.

2. (Currently Amended)The ~~inventory monitoring~~ method of claim 1, wherein capturing one or more images comprises capturing the one or more images with a camera attached to a moveable robot. ~~using a movable robot comprises using a movable robot acting as a movable base for a wider field camera and a narrower field camera;~~

~~wherein utilizing at least one of the cameras to capture images of the shelf comprises using the wider field camera to capture a wider field image of the shelf and using the narrower field camera to capture a narrower field image of the shelf;~~

~~wherein detecting and reading a shelf label on the shelf from content of the images comprises detecting and reading the shelf label from the narrower field image; and~~

~~wherein defining one or more product facing bounding boxes around potential inventory on the shelf from the content of at least one of the images comprises defining the one or more product facing bounding boxes from the content of the wider field image.~~

3. (Canceled).

4. (Canceled).

5. (Canceled).

6. (Currently Amended) The ~~inventory monitoring~~ method of claim 1, further comprising using manual input to identify potential inventory designated in the one or more product facing bounding boxes.

7. (Currently Amended) The ~~inventory monitoring~~ method of claim 1, wherein the one or more product facing bounding boxes include both potential inventory and gaps between potential inventory.

8. (Currently Amended) The ~~inventory monitoring~~ method of claim 1, wherein associating a shelf label with the one or more product facing bounding boxes comprises manually associating the shelf label with the one or more product facing bounding boxes ~~are manually associated with at least one of a shelf label or an on-product marker~~.

9. (Currently Amended) The ~~inventory monitoring~~ method of claim 1, wherein associating a shelf label with the one or more product facing bounding boxes comprises automatically associating the shelf label with the one or more product facing bounding boxes ~~are~~

~~automatically associated with at least one of a shelf label or an on-product marker~~.

10. (Canceled).

11. (Canceled).

12. (Canceled).

13. (Canceled).

14. (Canceled).

15. (Canceled).

16. (Currently Amended) The ~~inventory monitoring~~ method of claim [[15]]27, wherein capturing one or more images of a portion of a shelf with a camera comprises ~~utilizing the narrower field camera to capture another~~ capturing the one or more images with a camera attached to a moveable ~~comprises the~~ robot ~~autonomously reading shelf labels~~.

17. (Canceled).

18. (Canceled).

19. (Canceled).

20. (Currently Amended) The ~~inventory monitoring~~ method of claim [[15]]27, further comprising ~~building the product library~~ using manual input to identify potential inventory designated in the one or more bounding boxes.

21. (Currently Amended) The ~~inventory monitoring~~ method of claim [[15]]27, wherein the one or more bounding boxes surround gaps between potential inventory.

22. (Currently Amended) The ~~inventory monitoring~~ method of claim [[15]]27, ~~further comprising building the product library without use of an initial planogram~~ wherein associating a shelf label with one or more product facing bounding boxes comprises automatically associating the shelf label with the one or more product facing bounding boxes.

23. (Canceled).

24. (Canceled).

25. (Canceled).

26. (Canceled).

27. (New) A method comprising:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label within the one or more images;

defining one or more product facing bounding boxes that surround an image of a product facing within the one or more images;

associating a shelf label with the one or more product facing bounding boxes;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the content of their associated shelf labels;

building a training data set based on the association of the shelf label with the one or more product facing bounding boxes correlated across the one or more stores;

using the training data to build a product classifier; and

using the product classifier to perform an inventory management related activity.

28. (New) The method of claim 27, further comprising:

capturing further images of another portion of a shelf;

reading another shelf label within further image content contained in the further one or more images;

defining another product facing bounding box that surrounds an image of another product facing within the further image content;

associating another shelf label with the defined other product facing bounding box; cross-correlating the defined other product facing bounding box and the one or more other product facing bounding boxes across the one or more stores by matching the content of their associated labels; and

building the training data set based on the association of the other shelf label with the one or more product facing bounding boxes correlated across the one or more stores.

29. (New) The method of claim 28, wherein capturing further images of another portion of a shelf comprises capturing the further images of the portion of the shelf subsequent to capturing the one or more images.

30. (New) The method of claim 28, wherein capturing further images of another portion of a shelf comprises capturing further images of a portion of a shelf in another store.

31. (New) A system comprising:

a processor;

system memory coupled to the processor and storing instructions configured to cause the processor to:

capture one or more images of a portion of a shelf with a camera;

detect and reading content of a shelf label within the one or more images;

define one or more product facing bounding boxes that surround an image of a product facing within the one or more images;

associate a shelf label with the one or more product facing bounding boxes;

cross-correlate the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the content of their associated shelf labels;

build a training data set based on the association of the shelf label with the one or more product facing bounding boxes correlated across the one or more stores;

use the training data to build a product classifier; and

use the product classifier to perform one or more of: an inventory management related activity or classifying an item.

32. (New) The system of claim 31, further comprising instructions configured to:

capture further images of another portion of a shelf;

read another shelf label within further image content contained in the further one or more images;

define another product facing bounding box that surrounds an image of another product facing within the further image content;

associating another shelf label with the defined other product facing bounding box; cross-correlate the defined other product facing bounding box and the one or more

other product facing bounding boxes across the one or more stores by matching the content of their associated labels; and

build the training data set based on the association of the other shelf label with the one or more product facing bounding boxes correlated across the one or more stores.

33. (New) The system of claim 31, wherein instructions configured to capture further images of another portion of a shelf comprise instructions configured to capture the further images of the portion of the shelf subsequent to capturing the one or more images.

34. (New) The system of claim 31, wherein instructions configured to capture further images of another portion of a shelf comprise instructions configured to capture further images of a portion of a shelf in another store.

35. (New) The method of claim 1, further comprising:

capturing further images of another portion of a shelf;

reading another shelf label within further image content contained in the further one or more images;

defining another product facing bounding box that surrounds an image of another product facing within the further image content;

associating another shelf label with the defined other product facing bounding box; cross-correlating the defined other product facing bounding box and the one or more other product facing bounding boxes across the one or more stores by matching the content of their associated labels; and

building the training data set based on the association of the other shelf label with the one or more product facing bounding boxes correlated across the one or more stores.

36. (New) The method of claim 35, wherein capturing further images of another portion of a shelf comprises capturing the further images of the portion of the shelf subsequent to capturing the one or more images.

37. (New) The method of claim 35, wherein capturing further images of another portion of a shelf comprises capturing further images of a portion of a shelf in another store.

Via EFS Attorney Docket No. BOSS-01001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Sarjoun Skaff	Art Unit:	3627
Serial No:	15/471,722	Examiner:	Vanessa Lima Deligi
Filed:	3/28/2017		
Title:	System and Method for Locating, Identifying, and Counting Items		

AMENDMENT AND RESPONSE AFTER FINAL OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Final Office Action mailed March 11, 2020 (paper no. 20200223), please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 10 of this paper.

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Jun 12, 2020 03:52:09 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	INTV.SUM.APP	06/12/2020	BOSS-01001
	OA.APPENDIX	06/12/2020	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/471,722	Filing Date 03/28/2017	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $40 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $210 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/11/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 22	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ADRIENE D. SELLMAN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

34051 7590 08/06/2020

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110

EXAMINER	
DELIGI, VANESSA LIMA	

ART UNIT	PAPER NUMBER
3627	

NOTIFICATION DATE	DELIVERY MODE
08/06/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@stevenslawgroup.com

Office Action Summary	**Application No.** 15/471,722	**Applicant(s)** Skaff et al.	
	Examiner VANESSA DELIGI	**Art Unit** 3627	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 06/11/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-2,6-9,16,20-22 and 27-37 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-2,6-9,16,20-22 and 27-37 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **06/11/2020** has been entered.

Response to Amendment

Applicant's "Response to Amendment and Reconsideration" filed on **06/11/2020** has been considered.

Applicant's response by virtue of amendment to **claims 1-2, 6-9, 16, 20-22** has overcome the Examiner's rejection under 35 USC § 112 paragraph (necessitated by amendment).

Claims 1-2, 6-9, 16, 20-22 are amended.

Claims 3-5, 10-15, 17-19, 23-26 are canceled.

Claims 27-37 are new.

Claims 1-2, 6-9, 16, 20-22, 27-37 are pending in this application and an action on the merits follows.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the

statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim(s) 1, 2, 7, 9, 16, 21-22, 27-37, are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman (U.S. 20080077511 A1), in view of Calhoon et al. (US 10007964 B1, hereinafter Calhoon), in view of Schwartz (U.S. 20160171336 A1), and further in view of Ihara et al. (US 20130010103 A1, hereinafter Ihara).

Regarding claim 1, Zimmerman discloses:

capturing one or more images of a shelf with a camera; ¶83 – captures a shelf image;

detecting and reading content of a shelf label within the one or more images; ¶83 – decode a shelf barcode from capture image (see figure 10);

building a training data set based on the association of the shelf label with the one or more product; ¶83 - product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database;

using the training data to build a product classifier; and using the product classifier to classify an item. ¶¶52-72 - The inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode (step 635)…the out-of-stock detector 215 determines whether the product visual descriptor in the product database 225 sufficiently matches the shelf image captured by the imaging device 30 (decision step 640). If

yes, the inventory control module 230 marks the found barcode as old, and processing returns to step 610 (step 645). Otherwise, the product visual descriptor does not sufficiently match the shelf image (decision step 630), and the inventory control module 230 an out-of-stock flag (step 650) for the expected product at the product location;

Zimmerman discloses on figure 10 ¶83 – the method to generate a product database - the product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; **however does not explicitly disclose** *"associating a shelf label with the one or more product, building a training data set based on the association of the shelf label with the one or more product";* however, **Zimmerman discloses on figure 6 and ¶¶59-72** – decodes a product barcode from the captured image; the method to operate the system; If at decision step 620 a barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the The inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to place the indexing of the barcode with the product visual descriptor in the database in the steps of figure 10, specifically because the index is used during the operating time, as taught by **Zimmerman,** in order to use a robot to detect out-of-stock items and report on the appearance and placement of products on the shelves, **(see: Zimmerman ¶14)**.

Zimmerman discloses ¶83 capturing shelf image; however does not explicitly discloses *a portion of a shelf* **Calhoon discloses 1:50-67 -** capture imagery of every product on every shelf;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Calhoon admitted prior art,** in order to alert store management about shelf locations that need re-stocking, **(see, Calhoon admitted prior art 1:50-67).**

Zimmerman discloses at least ¶83 – the image is segmented to identify a shelf image of the product; **however does not explicitly disclose** *defining one or more product facing bounding boxes that surround an of a product facing within the one or more images; "product facing bounding boxes";* **Schwartz discloses - ¶61 and figure 4** the object recognition module 201 generates an identified region or bounding box for each identified object in the one or more images and outputs a recognition result;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by Schwartz, in order to identify objects, shelf fronts and labels on the shelf fronts, empty space under shelves, areas where unidentified objects may be, and vacant areas in the image, **(see,** Schwartz **¶2).**

Zimmerman discloses at least ¶95 - The product visual descriptors are placed in the product database 225; **Zimmerman in view of Schwartz discloses ¶61 –** product facing bounding boxes*;* **however does not explicitly discloses** *cross-correlating the one or more* ***[images]*** *and one or more other* ***[image]*** *across one or more stores by matching the content of their associated labels;* ***[image]*** *correlated across the one or more stores;* **Ihara discloses - ¶117**

– product from a plurality of shop; product information in the plural shops selling the product is retrieved; the correlation of image data of products of plural shops and product IDs is managed in the flier information DB 102. When plural sets of image data of the product matching with or similar to the image data…and a combination of any one of the product IDs correlated with all sets of image data…exists in the user information DB 101;

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **Zimmerman** to include the above limitations as taught by **Ihara,** in order to facilitate the obtaining of product information, **(see, Ihara ¶29),** and to avoid data duplication in case images are equal.

Regarding claim 2, Zimmerman discloses:

wherein capturing one or more images comprises capturing the one or more images with a camera attached to a moveable robot **Figures 2, 3, 10 - ¶59-61; ¶83 -** robot, imaging device, capture image;

Regarding claim 7, Zimmerman discloses at least the images - **¶¶59-61, ¶83 and figures 3, 10, however, Schwartz discloses** *wherein the one or more product facing bounding boxes include both potential inventory and gaps between potential inventory.* - **¶61 and figure 4;**

It would have been obvious to combine for the same reason as stated in the rejection of claim(s) 1 above.

Regarding claim 9, Zimmerman discloses on figure 10 ¶83 – the method to generate a product database - the product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; **however does not explicitly disclose** *"wherein*

associating a shelf label with the one or more product facing bounding boxes comprises automatically associating the shelf label with the one or more product"; however, **Zimmerman discloses on figure 6 and ¶¶59-72 –** decodes a product barcode from the captured image; the method to operate the system; If at decision step 620 a barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode; and **Schwartz discloses - ¶61 and figure 4** *product facing bounding boxes*

It would have been obvious to combine for the same reason as stated in the rejection of claim(s) 1 above.

Regarding claim 35, Zimmerman discloses:

capturing ~~further~~ image of ~~another~~ portion of a shelf, ¶83;

reading ~~another~~ shelf label within ~~further~~ image content contained in the ~~further~~ one or more images; ¶83;

building a training data set based on the association of the ~~other~~ shelf label with the one or more product; ¶83;

Zimmerman discloses on figure 10 ¶83 – the method to generate a product database - the product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; **however does not explicitly disclose** *"associating ~~another~~ shelf label with the defined ~~other~~ product;, building the training data set based on the association of the ~~other~~ shelf label with the one or more product";* however, **Zimmerman discloses on figure 6 and ¶¶59-72 –** decodes a product barcode from the captured image; the

method to operate the system; If at decision step 620 a barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode;

It would have been obvious to combine for the same reason as stated in the rejection of claim(s) 1 above.

Zimmerman discloses ¶83 capturing shelf image; however does not explicitly discloses *images a portion of a shelf* **Calhoon discloses 1:50-67 -** capture imagery of every product on every shelf;

It would have been obvious to combine for the same reason as stated in the rejection of claim(s) 1 above.

Zimmerman discloses at least ¶83 – the image is segmented to identify a shelf image of the product; **however does not explicitly disclose** *defining ~~another~~ product facing bounding box that surrounds an image of ~~another~~ product facing within the ~~further~~ image content; "product facing bounding boxes";* **Schwartz discloses - ¶61 and figure 4** the object recognition module 201 generates an identified region or bounding box for each identified object in the one or more images and outputs a recognition result;

It would have been obvious to combine for the same reason as stated in the rejection of claim(s) 1 above.

Zimmerman discloses at least ¶95 - The product visual descriptors are placed in the product database 225; **Zimmerman in view of Schwartz discloses ¶61 –** product facing bounding boxes*;* **however does not explicitly discloses** *cross-correlating the defined ~~other~~ **[images]** and one or more other **[image]** across one or more stores by matching the content of*

their associated labels; ***[image]*** *correlated across the one or more stores;* **Ihara discloses - ¶117** – product from a plurality of shop; product information in the plural shops selling the product is retrieved; the correlation of image data of products of plural shops and product IDs is managed in the flier information DB 102. When plural sets of image data of the product matching with or similar to the image data…and a combination of any one of the product IDs correlated with all sets of image data…exists in the user information DB 101;

It would have been obvious to combine for the same reason as stated in the rejection of claim(s) 1 above.

In addition, claim 35 is a duplication of claim 1, specifically because claim 35 are performing the same steps as claim 1 but for another portion of the shelf that has another product to produce a predictable result; therefore, does not patentably distinguish the claimed invention from the prior art, as it is a mere duplication of parts without production of a new and unexpected result, as in In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). See MPEP § 2144.04 VI. B.

Regarding claim 36, Zimmerman discloses:

wherein capturing ~~further~~ images of ~~another~~ portion of a shelf comprises capturing the ~~further~~ images of the portion of the shelf subsequent to capturing the one or more images. **Zimmerman discloses ¶83** capturing shelf image; however does not explicitly discloses *images a portion of a shelf*; **however, Calhoon discloses 1:50-67 -** capture imagery of every product on every shelf;

In addition, claim 36 further images, another portion of a shelf is a duplication of one or more images and portion of a shelf of claim 1 to produce a predictable result; therefore, does not patentably distinguish the claimed invention from the prior art, as it is a mere duplication of parts

without production of a new and unexpected result, as in In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). See MPEP § 2144.04 VI. B.

Regarding claim 37, Zimmerman discloses:

wherein capturing ~~further~~ images of ~~another~~ portion of a shelf comprises capturing further images of a portion of a shelf in ~~another~~ store. **¶83** capturing shelf image; however does not explicitly discloses *images a portion of a shelf*; **however, Calhoon discloses 1:50-67 -** capture imagery of every product on every shelf; Ihara disclose **¶117** - image data of products of plural shops

In addition, claim 37 further images, another portion of a shelf, another store (note: although applicant is not explicitly claiming that the one or more images are been captured in a first store, claim 37 inferred that one or more image are capture in a first store) are a duplication of one or more images, portion of a shelf, and first store (e.g.,; inferred but applicant claim language) of claim 1 to produce a predictable result; therefore, does not patentably distinguish the claimed invention from the prior art, as it is a mere duplication of parts without production of a new and unexpected result, as in In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). See MPEP § 2144.04 VI. B.

Regarding claim(s) 27, this claim(s) recite(s) substantially similar limitations as claim(s) 1, and is rejected using the same art and rationale as above.

In addition, regarding claim 27, Zimmerman discloses:

using the product classifier to perform an inventory management related activity **¶¶52-72 -**The inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode (step 635)…the out-of-stock detector 215 determines whether the product visual descriptor in the product database 225 sufficiently

matches the shelf image captured by the imaging device 30 (decision step 640). If yes, the inventory control module 230 marks the found barcode as old, and processing returns to step 610 (step 645). Otherwise, the product visual descriptor does not sufficiently match the shelf image (decision step 630), and the inventory control module 230 an out-of-stock flag (step 650) for the expected product at the product location;

Regarding claim(s) 16, this claim(s) recite(s) substantially similar limitations as claim(s) 2, and is rejected using the same art and rationale as above.

Regarding claim(s) 21, this claim(s) recite(s) substantially similar limitations as claim(s) 7, and is rejected using the same art and rationale as above.

Regarding claim(s) 22, this claim(s) recite(s) substantially similar limitations as claim(s) 9, and is rejected using the same art and rationale as above.

Regarding claim(s) 28, this claim(s) recite(s) substantially similar limitations as claim(s) 35, and is rejected using the same art and rationale as above.

Regarding claim(s) 29, this claim(s) recite(s) substantially similar limitations as claim(s) 36, and is rejected using the same art and rationale as above.

Regarding claim(s) 30, this claim(s) recite(s) substantially similar limitations as claim(s) 37, and is rejected using the same art and rationale as above.

Regarding claim(s) 31, this claim(s) recite(s) substantially similar limitations as claim(s) 1, and is rejected using the same art and rationale as above.

In addition, regarding claim 31, Zimmerman discloses:

a processor; system memory coupled to the processor and storing instructions configured to cause the processor to: **figures 1-3, 10;**

use the product classifier to perform one or more of: an inventory management related activity or classifying an item **¶¶52-72 -** The inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode (step 635)…the out-of-stock detector 215 determines whether the product visual descriptor in the product database 225 sufficiently matches the shelf image captured by the imaging device 30 (decision step 640). If yes, the inventory control module 230 marks the found barcode as old, and processing returns to step 610 (step 645). Otherwise, the product visual descriptor does not sufficiently match the shelf image (decision step 630), and the inventory control module 230 an out-of-stock flag (step 650) for the expected product at the product location;

Regarding claim(s) 32, this claim(s) recite(s) substantially similar limitations as claim(s) 35, and is rejected using the same art and rationale as above.

Regarding claim(s) 33, this claim(s) recite(s) substantially similar limitations as claim(s) 36, and is rejected using the same art and rationale as above.

Regarding claim(s) 34, this claim(s) recite(s) substantially similar limitations as claim(s) 37, and is rejected using the same art and rationale as above.

Claim(s) 6, 8, 20 are rejected under 35 U.S.C. 103 as being unpatentable over Zimmerman and Schwartz combination as applied to claims 1 and 27, and further in view of Nakamura (U.S. 20100065634 A1).

Regarding claim 6, the combination discloses *"one or more product facing bounding boxes"*, **Zimmerman discloses at least ¶83 –** the image with the product; **Schwartz discloses ¶61 and figure 4; however, does not explicitly disclose** *"further comprising using manual input to identify potential inventory designated"*. **Nakamura discloses: ¶¶59, 72, 82-83, and 111 -** "when a worker having the handy scanner 7 desires to perform the similar associating

process…the associating process can be performed with the electronic shelf label 5 being attached to the shelf 60 so that errors occurring when attaching the electronic shelf label 5 can be reduced, compared to a case in which the electronic shelf label 5 is attached after the associating process";

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Nakamura,** in order reduce errors occurring when attaching a shelf label, **(see, Nakamura, ¶111)**.

Regarding claim 8, Zimmerman discloses on figure 10 ¶83 – the method to generate a product database **-** the product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; **however does not explicitly disclose** *"wherein associating a shelf label with the one or more product facing bounding boxes comprises associating the shelf label with the one or more product facing bounding boxes";* **however, Zimmerman discloses on figure 6 and ¶¶59-72 –** decodes a product barcode from the captured image; the method to operate the system; If at decision step 620 a barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode; and **Schwartz discloses - ¶61 and figure 4** *product facing bounding boxes*

It would have been obvious to combine for the same reason as stated in the rejection of claim(s) 1 above.

The combination substantially discloses the claim invention; however, does not explicitly disclose; *manually associating the shelf label with the one or more product.*

Nakamura discloses - *"*when a worker having the handy scanner 7 desires to perform the similar associating process…the associating process can be performed with the electronic shelf label 5 being attached to the shelf 60 so that errors occurring when attaching the electronic shelf label 5 can be reduced, compared to a case in which the electronic shelf label 5 is attached after the associating process."**, see at least ¶¶59, 72, 82-83, and 110-111;**

It would have been obvious to one with ordinary skill in the art before the effective filing date of the invention, to modify **the combination** to include the above limitations as taught by **Nakamura,** in order reduce errors occurring when attaching a shelf label, **(see, Nakamura, ¶111**).

Regarding claim(s) 20, this claim(s) recite(s) substantially similar limitations as claim(s) 6, and is rejected using the same art and rationale as above.

Response to Arguments

Applicant's arguments filed on **06/11/2020** have been fully considered, but are moot in view of the new combination of references being used in the current rejection.

In addition, applicant argues **Zimmerman** and **Schwartz do not teach** *"build a training data set based on the association of the shelf label with the one or more product facing bounding boxes".* Examiner disagreed. **Zimmerman** *build a training data set based on the association of the shelf label with the one or more product* ¶83 - product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; it would have been obvious to one with ordinary skill in the art before the effective filing date of the invention,

to modify **Zimmerman** to place the indexing of the barcode with the product visual descriptor in the database in the steps of figure 10, specifically because the index is used during the operating time, as taught by **Zimmerman,** in order to use a robot to detect out-of-stock items and report on the appearance and placement of products on the shelves, **(see: Zimmerman ¶14)**.

Further, Examiner turns to **Schwartz to disclose** *product facing bounding boxes* - **¶61 and figure 4** the object recognition module 201 generates an identified region or bounding box for each identified object in the one or more images and outputs a recognition result; in order to identify objects, shelf fronts and labels on the shelf fronts, empty space under shelves, areas where unidentified objects may be, and vacant areas in the image, **(see,** Schwartz **¶2).**

Applicant argues the cited references fails to teach claims **35-37.** Examiner respectfully disagree.

Regarding claim 35, Zimmerman discloses: *capturing ~~further~~ image of ~~another~~ portion of a shelf,* ¶83; *reading ~~another~~ shelf label within ~~further~~ image content contained in the ~~further~~ one or more images;* ¶83; *building a training data set based on the association of the ~~other~~ shelf label with the one or more product;* ¶83; in addition, **Zimmerman discloses on figure 10 ¶83 –** the method to generate a product database **-** the product barcode is decoded from the image, and the image is segmented to identify a shelf image of the product, wherein a product visual descriptor are extracted from the image of the product and placed in the database; **however does not explicitly disclose** *"associating ~~another~~ shelf label with the defined ~~other~~ product;, building the training data set based on the association of the ~~other~~ shelf label with the one or more product";* however, **Zimmerman discloses on figure 6 and ¶¶59-72 –** decodes a product barcode from the captured image; the method to operate the system; If at decision step 620 a

barcode is found in the image, the product image segmentation module 205 segments the captured image to identify a shelf image of the product, wherein the inventory control module 230 retrieves the product visual descriptor from the product database 225, indexed by the found barcode; Further **Zimmerman discloses at least ¶83** – the image is segmented to identify a shelf image of the product; **however does not explicitly disclose** *defining ~~another~~ product facing bounding box that surrounds an image of ~~another~~ product facing within the ~~further~~ image content; "product facing bounding boxes";* **Schwartz discloses – ¶61 and figure 4** the object recognition module 201 generates an identified region or bounding box for each identified object in the one or more images and outputs a recognition result;

In addition, Examiner would like to point out that claims 28-30, 35-37 are duplications of parts, therefore does not patentably distinguish the claimed invention from the prior art, as it is a mere duplication of parts without production of a new and unexpected result, as in In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). See MPEP § 2144.04 VI. B. See rejection above.

Therefore, Examiner maintained the rejection under Zimmerman *and* Schwartz combination.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure can be found on the attached PTO-892 form.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VANESSA DELIGI whose telephone number is (571)272-0503. The examiner can normally be reached on Monday-Friday 07:30AM-5PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is

encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Florian (Ryan) Zeender can be reached on (571) 272-6790. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VANESSA DELIGI/
Patent Examiner, Art Unit 3627

MR

/FLORIAN M ZEENDER/
Supervisory Patent Examiner, Art Unit 3627

Notice of References Cited	Application/Control No. 15/471,722	Applicant(s)/Patent Under Reexamination Skaff et al.	
	Examiner VANESSA DELIGI	Art Unit 3627	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-10007964-B1	06-2018	Calhoon; Sean	G06K9/4604	1/1
*	B	US-20130010103-A1	01-2013	Ihara; Noboru	G06Q30/0639	348/116
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06Q10/087, G06Q10/00	07/16/2019	VD
G05D1/0261, G05D1/0274, G05D1/0246	07/16/2019	VD
G05D2201/0216	07/16/2019	VD
G06Q30/02, G06Q30/0603	07/16/2019	VD
G07G1/12	07/16/2019	VD

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
EAST text search	07/16/2019	VD
Inventor name search	07/16/2019	VD
Assignee name search	07/16/2019	VD
EAST text search (update)	02/26/2020	VD
PE2E search	07/30/2020	VD

/VANESSA DELIGI/ Examiner, Art Unit 3627	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G06Q	10/087, 10/00 , 30/02, 30/0603	07/16/2019	VD
G05D	1/0261, 1/0274, 1/0246, 2201/0216	07/16/2019	VD
G07G	1/12	07/16/2019	VD

/VANESSA DELIGI/ Examiner, Art Unit 3627	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	07/16/2019	02/26/2020	07/30/2020						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	-						
	4	✓	✓	-						
	5	✓	✓	-						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	-						
	11	-	-	-						
	12	-	-	-						
	13	-	-	-						
	14	-	-	-						
	15	✓	✓	-						
	16	✓	✓	✓						
	17	✓	✓	-						
	18	✓	✓	-						
	19	✓	✓	-						
	20	✓	✓	✓						
	21	✓	✓	✓						
	22	✓	✓	✓						
	23	✓	✓	-						
	24	✓	✓	-						
	25	✓	✓	-						
	26	✓	✓	-						
	27			✓						
	28			✓						
	29			✓						
	30			✓						
	31			✓						
	32			✓						
	33			✓						
	34			✓						
	35			✓						

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L151	69749	G06Q10/087	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 01:19 PM
L153	16148	(item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit*) WITH (bound* near2 box*)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 01:22 PM
L155	68	L154 AND L153	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 01:23 PM
L156	23012	(detect* OR read* OR scan*) WITH ((label OR tag) near3 (shelf OR fixture OR bin OR display OR rack OR stand OR lane))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 01:30 PM
L157	108	L153 AND L156	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 01:31 PM
L158	309558	((library OR database OR daset OR data) near3 (train*))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 01:34 PM
L159	50	L157 AND L158	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 01:34 PM
L162	254	((imag*) WITH (class*) WITH (identif*)) SAME ((multiple OR pluralit*) near3 (store OR retail OR manufacture))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 02:40 PM
L163	8	((imag*) WITH (class*) WITH (identif*)) SAME ((multiple OR pluralit*) near3 (retail OR manufacture))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 02:41 PM
L167	97	(captur* near5 image) NEAR10 (product*)	US-PGPUB; USPAT; USOCR; FIT (CN, FR,	OR	ON	ON	2020/07/29 03:06 PM

		near10 ((multiple OR plurality) near3 (retail OR store OR facility OR manufacturer))	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB				
L168	1541321	(compar* OR correlat* OR match*) near10 imag*	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 03:08 PM
L169	81	L167 AND L168	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 03:09 PM
L170	1045	(compar* OR correlat* OR match*) near10 imag* near10 ((multiple OR plurality) near3 (retails OR stores OR facilities OR manufactureres))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 03:17 PM
L171	579	(captur* near5 image) NEAR10 (product*) near10 (shelf)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 03:17 PM
L172	5	L171 AND L170	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 03:17 PM
L173	497	(compar* OR correlat* OR match*) near5 imag* near5 ((multiple OR plurality) near3 (retails OR stores OR facilities OR manufactureres))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 03:19 PM
L174	385	L173 AND @ad<20160329	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 03:20 PM
L176	217	(robot) WITH ((capt* near3 image) near5 (product OR items OR goods OR articles))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 04:08 PM
L178	5	L176 AND ((library OR databas*) WITH (built* OR train*))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 04:10 PM
L181	35	(robot) WITH ((detect*) near5 (shelf) near5 (tag OR label))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 04:40 PM

L183	68	(robot) WITH ((detect* OR read OR scan*) near5 (shelf) near5 (tag OR label))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 04:46 PM
L187	15	((creat* OR defi*) near5 (bound* near3 box*) near5 product) SAME shelf	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 05:12 PM
L188	20	(match* near10 (tag OR label)) WITH different WITH retail*	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:15 PM
L191	11	(match* near10 (tag OR label)) near10 different near10 retail*	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:16 PM
L194	18	(match* near10 product near10 (tag OR label OR barcode OR code)) SAME ((another OR different) near10 retail*)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:20 PM
L200	558	((match* OR compar*) near10 (tag OR label OR barcode OR code OR id)) SAME ((another OR different) near3 (retail* OR facilit*))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:25 PM
L201	400	((match* OR compar*) near5 (tag OR label OR barcode OR code OR id)) SAME ((another OR different) near3 (retail* OR facilit*))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:25 PM
L202	78	((match* OR compar*) near5 (tag OR label OR barcode OR code OR id)) near10 ((another OR different) near3 (retail* OR facilit*))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:25 PM
L203	36	((match* OR compar*) near5 (tag OR label OR barcode OR code OR id)) near10 ((another OR different) near3 (retail* OR facility OR facilities))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:29 PM
L206	164	((match* OR compar*) near5 (product OR item OR article)) near10 ((another OR different) near3 (retail* OR facility OR facilities))	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:36 PM

L208	11	((match*) near5 (product) near5 (id OR identif*)) near10 (correlat* near5 image)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:43 PM
L209	9	((match*) near5 (product) near5 (id OR identif*)) adj10 (correlat* near5 image)	US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	ON	2020/07/29 06:45 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Aug 06, 2020 04:05:49 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Drive
Suite #226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	CTNF	08/06/2020	BOSS-01001
	892	08/06/2020	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

RECEIVED
CENTRAL FAX CENTER
DEC 07 2020

Via EFS

Attorney Docket No. BOSS-01001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Sarjoun Skaff	Art Unit:	3627
Serial No:	15/471,722	Examiner:	Vanessa Lima Deligi
Filed:	3/27/2017		

Title: System and Method for Locating, Identifying, and Counting Items

AMENDMENT AND RESPONSE AFTER NON-FINAL OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Non-Final Office Action mailed August 6, 2020 (paper no. 20200729), please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 10 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method comprising:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label on the portion of the shelf within the one or more images;

defining one or more product facing bounding boxes ~~that surround an~~ surrounding one or more corresponding ~~image~~ facings of a product ~~facing~~ within the one or more images;

associating [[a]]the shelf label content with each of the one or more product facing bounding boxes and each of the one or more corresponding product facings;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content ~~of their associated labels~~ associated with the one or more other product facing bounding boxes;

building [[a]] training data ~~set~~ based on the association of the shelf label content with the cross-correlated ~~one or more~~ product facing bounding boxes ~~correlated across the one or more stores~~;

using the training data to build a product classifier; and

using the product classifier to classify an item as the product.

2. (Previously Presented)The method of claim 1, wherein capturing one or more images comprises capturing the one or more images with a camera attached to a moveable robot.

3. (Canceled).

4. (Canceled).

5. (Canceled).

PAGE 4/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

6. (Previously Presented) The method of claim 1, further comprising using manual input to identify potential inventory designated in the one or more product facing bounding boxes.

7. (Currently Amended) The method of claim 1, wherein using the training data to build a product classifier comprises integrating training to: (1) learn product image descriptors and (2) classify items into a neural network ~~the one or more product facing bounding boxes include both potential inventory and gaps between potential inventory~~.

8. (Currently Amended) The method of claim 1, wherein associating [[a]] the shelf label content with each of the one or more product facing bounding boxes comprises manually associating the shelf label content with each of the one or more product facing bounding boxes.

9. (Currently Amended) The method of claim 1, wherein associating [[a]] the shelf label content with each of the one or more product facing bounding boxes comprises automatically associating the shelf label content with each of the one or more product facing bounding boxes.

10. (Canceled).

11. (Canceled).

12. (Canceled).

13. (Canceled).

14. (Canceled).

15. (Canceled).

16. (Previously Presented) The method of claim 27, wherein capturing one or more

PAGE 5/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

images of a portion of a shelf with a camera comprises capturing the one or more images with a camera attached to a moveable robot.

17. (Canceled).

18. (Canceled).

19. (Canceled).

20. (Previously Presented) The method of claim 27, further comprising using manual input to identify potential inventory designated in the one or more bounding boxes.

21. (Previously Presented) The method of claim 27, wherein the one or more bounding boxes surround gaps between potential inventory.

22. (Currently Amended) The method of claim 27, wherein associating [[a]]the shelf label content with each of the one or more product facing bounding boxes comprises automatically associating the shelf label content with each of the one or more product facing bounding boxes.

23. (Canceled).

24. (Canceled).

25. (Canceled).

26. (Canceled).

PAGE 6/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

27. (Currently Amended) A method comprising:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label on the portion of the shelf within the one or more images;

defining one or more product facing bounding boxes ~~that surround an image~~ surrounding one or more facings of a product ~~facing~~within the one or more images;

associating [[a]]the shelf label content with each of the one or more product facing bounding boxes and each of the one or more corresponding product facings;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content ~~of their~~ associated ~~shelf labels~~ with the one or more other product facing bounding boxes;

building [[a]] training data ~~set~~ based on the association of the shelf label content with the cross-correlated ~~one or more~~ product facing bounding boxes ~~correlated across the one or more stores~~;

using the training data to build a product classifier; and

using the product classifier to perform an inventory management ~~related~~ activity related to the product.

28. (Currently Amended) The method of claim 27, wherein capturing one or more images of a portion of a shelf comprises capturing one or more images of a portion of a shelf in a first store; and

further comprising:

capturing one or more further images of ~~another~~ a portion of another shelf in a second store;

reading content of another shelf label on the portion of the other shelf within ~~further image content contained in~~ the ~~further~~ one or more further images;

defining one or more [[an]]other product facing bounding boxes ~~that surrounds an~~ surrounding one or more other corresponding facings ~~image~~ of another product ~~facing~~ within the one or more further images ~~content~~; and

PAGE 7/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

associating the [[an]]other shelf label content with each of the ~~defined~~ one or more other product facing bounding boxes and each of the one or more other corresponding product facings;

wherein cross-correlating comprises cross-correlating the ~~defined other~~ one or more product facing bounding boxes and the one or more other product facing bounding boxes across the ~~one or more~~ the first store and the second store[[s]] by matching the shelf label content ~~of their associated~~ with the other shelf label[[s]] content; and

wherein building [[the]]a training data ~~set~~ comprises building the training data set based on the association of the shelf label content and the other shelf label content with the ~~one or more~~ cross-correlated product facing bounding boxes correlated across the ~~one or more~~ first store[[s]] and the second store.

29. (Currently Amended) The method of claim 28, wherein capturing one or more further images ~~of another portion of a shelf~~ comprises capturing the one or more further ~~images of the portion of the shelf~~ subsequent to capturing the one or more images.

30. (Currently Amended) The method of claim 28, wherein capturing one or more further images ~~of another portion of a shelf~~ comprises capturing the one or more further images ~~of a portion of a shelf in another store~~ prior to capturing the one or more images.

PAGE 8/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

31. (Currently Amended) A system comprising:

a processor;

system memory coupled to the processor and storing instructions configured to cause the processor to:

capture one or more images of a portion of a shelf with a camera;

detect and reading content of a shelf label on the portion of the shelf within the one or more images;

define one or more product facing bounding boxes that surround an surrounding one or more corresponding ~~image~~ facings of a product ~~facing~~ within the one or more images;

associate [[a]]the shelf label content with each of the one or more product facing bounding boxes and each of the one or more corresponding product facings;

cross-correlate the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content ~~of their~~ associated with the one or more other product facing bounding boxes ~~shelf labels~~;

build [[a]] training data ~~set~~ based on the association of the shelf label content with the cross-correlated ~~one or more~~ product facing bounding boxes ~~correlated across the one or more stores~~;

use the training data to build a product classifier; and

use the product classifier to perform one or more of: (1) an inventory management ~~related~~ activity related to the product or (2) classifying an item the product.

32. (Currently Amended) The system of claim 31, wherein instructions configured to capture one or more images of a portion of a shelf comprise instructions configured to capture one or more images of a portion of a shelf in a first store; and

further comprising instructions configured to:

capture one or more further images of ~~another~~ a portion of another shelf in a second store;

PAGE 9/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

read content of another shelf label on a portion of the other shelf within ~~further image content contained in~~ the ~~further~~ one or more further images;

define one or more [[an]]other product facing bounding boxes ~~that surrounds an~~ surrounding one or more other corresponding facings ~~image~~ of another product ~~facing~~ within the one or more further images ~~content~~; and

~~associating~~ associate the [[an]]other shelf label content with each of the ~~defined~~ one or more other product facing bounding boxes and each of the one or more other corresponding product facings;

wherein instructions configured to cross-correlate the ~~defined other~~ the one or more product facing bounding boxes and the one or more other product facing bounding boxes across the ~~one or more~~ first store and the second store[[s]] by matching the shelf label content ~~of their associated~~ with the other shelf label[[s]] content; and

wherein instructions configured to build [[the]]a training data ~~set~~ comprising building the training data sent based on the association of the shelf label content and the other shelf label content with the cross-correlated ~~one or more~~ product facing bounding boxes correlated across the ~~one or more~~ first store[[s]] and the second store.

33. (Currently Amended) The system of claim 31, wherein instructions configured to capture one or more further images ~~of another portion of a shelf~~ comprise instructions configured to capture the one or more further images ~~of the portion of the shelf~~ subsequent to capturing the one or more images.

34. (Currently Amended) The system of claim 31, wherein instructions configured to capture one or more further images of another portion of a shelf comprise instructions configured to capture the one or more further images ~~prior to capturing the one or more images of a portion of a shelf in another store~~.

35. (Currently Amended) The method of claim 1, wherein capturing one or more images of a portion of a shelf comprises capturing one or more images of a portion of a shelf in a first store; and

further comprising:

PAGE 10/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

capturing one or more further images of ~~another~~ portion of another shelf in a second store;

reading content of another shelf label on the portion of the other shelf within the one or more further images ~~content contained in the further one or more images~~;

defining one or more [[an]]other product facing bounding boxes ~~that surrounds an~~ surrounding one or more other corresponding facings ~~image~~ of another product ~~facing~~ within the one or more further images ~~content~~; and

associating the [[an]]other shelf label content with each of the ~~defined~~ one or more other product facing bounding boxes and each of the one or more other corresponding product facings;

wherein cross-correlating comprises cross-correlating the ~~defined other~~ one or more product facing bounding boxes and the one or more other product facing bounding boxes across the ~~one or more~~ the first store and the second store[[s]] by matching the shelf label content ~~of their associated~~ with the other shelf label[[s]] content; and

wherein building [[the]] training data [[set]] comprises building the training data based on the association of the shelf label content and the other shelf label content with the ~~one or more~~ cross-correlated product facing bounding boxes correlated across the ~~one or more~~ first store[[s]] and the second store.

36. (Currently Amended) The method of claim 35, wherein capturing one or more further images ~~of another portion of a shelf~~ comprises capturing the one or more further images ~~of the portion of the shelf~~ subsequent to capturing the one or more images.

37. (Currently Amended) The method of claim 35, wherein capturing one or more further images ~~of another portion of a shelf~~ comprises capturing the one or more further images ~~of a portion of a shelf in another store~~ prior to capturing the one or more images.

PAGE 11/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

REMARKS

The Non-Final Office Action mailed August 6, 2020 considered and rejected claims 1, 2, 6-9, 16, 20-22, and 27-37.

By this amendment, claims 1, 8, 9, 22, and 27-37 are amended. Accordingly, claims 1, 2, 6-9, 16, 20-22, and 27-37 are pending, of which claims 1, 27, and 31 are the independent claims. Support for the claim amendments is found at least at paragraphs [0006]-[0011], [0022], [0028], [0029], [0033], [0037], [0039], [0040], [0074], [0088]-[0096], [0105], [0107], [0125] and Figures 1, 2, 5A, 5B, 6, and 7.

Substantive Rejections

Claims 1, 2, 7, 9, 16, 21, 22, and 27-37 are rejected under 35 USC 103 as being unpatentable over Zimmerman (2008/0077511), in view of Calhoon (10,007,964), in view of Schwartz (2016/0171336) and further in view of Ihara (2013/0010103). Claims 6, 8, and 20 are rejected under 35 USC 103 as being unpatentable over Zimmerman (2008/0077511), in view of Calhoon (10,007,964), in view of Schwartz (2016/0171336), in view of Ihara (2013/0010103), and further in view of Nakamura (2010/0065634).

Zimmerman describes system and method for performing inventory using a mobile inventory robot. Zimmerman includes a mobile inventory robot with imaging devices. (Zimmerman, Figure 1). In one aspect, inventory is performed by navigating through a store via an inventory map. Shelf images are captured, and product bar codes are decoded from captured shelf images. Decoded barcodes are used to retrieve product visual descriptions from a product database. It is determined whether the detected images match the retrieved product visual description and, if not, setting an out of stock flag for an item corresponding to the decoded bar code. (Zimmerman, para. [0016]).

Images of individual products can be isolated. A bar code decoder can extract bar codes from images of bar code tags places on shelves below items. The extracted shelf barcode indicates which item is expected to be on the shelf. An inventory control system can use an image corresponding to the extracted bar code as a product visual descriptor. The image can be compared to the image of the item on the shelf to determine if the item on the shelf matches the bar code. (Zimmerman, para. [0054]). The comparison can be used to indicate misplaced, out of stock, etc. (Zimmerman, para. [0055]-[0057]).

PAGE 12/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

The Office Action relies heavily on paragraph [0083] of Zimmerman with respect to teaching "associating a shelf label with one or more product, building a training data set based on the associated of the shelf label with the one or more product" (Office Action , pages 3 and 4). Applicant traverses. Paragraph [0083] is reproduced here in its entirety:

> [0083] FIG. 10 illustrates a method 1000 of generating a product database 225, starting at step 1010. The imaging device 30 captures a shelf image (step 610). The product barcode decoder 210 decodes a product barcode from the captured image (step 615). The product image segmentation module 205 segments the captured image to identify a shelf image of the product (step 630). One or more product visual descriptors are extracted from the segmented image of the product (step 1020). The product visual descriptors are placed in the product database 225 (step 1030). If there are any more unprocessed shelf barcodes (step 1040), the unprocessed shelf barcode is decoded (step 615). If all the shelves in the store have been processed (step 1050) the generation of the product database 225 is complete (step 1060), otherwise a new shelf image is captured (step 610).

Applicant submits that storing data (whether it be product visual descriptors or any other data) doesn't in and of itself imply or lead to any inference that the stored data is "training data" or "building training data".

The Office Action also heavily relies on paragraphs [0052]-[0072] of Zimmerman with respect to teaching "using the training data to build a product classifier ; and using the product classifier to classify an item". More specifically, "An inventory control module can retrieve a product visual descriptor from the product database... An out of stock detector determines whether the product visual descriptor sufficiently matches a shelf captured image. If the inventory control module marks the found barcode as old, processing returns to step 610. Otherwise, the product visual descriptor does not sufficiently match the shelf image and the inventory control module an out of stock flag for the expected product at the product location." (Office Action, pages 3 and 4). Applicant transverses. Paragraphs [0068] and [0069] of Zimmerman require identification of a barcode and use direct image comparison to determine product location. This is different than building a product classifier from training data and using the product classifier to subsequently classify an item (possibly in absence of a barcode on the item).

The Office Action further indicates that Zimmerman does not expressly teach "associating a shelf label with one or more product, building a training set based on

PAGE 13/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

association of the shelf label with the one or more products". Applicant agrees with this statement, as Applicant submits that Zimmerman fails to teach training data at all.

Schwartz describes realogram scene analysis of images: multiples for scene analysis. An object recognition system can detect and identify items in an image according to image recognition algorithms to match detected objects with images of known objects stored in a search database. The object recognition module generates an identified region or bounding box for each object and outputs a recognition result. (Schwartz, para. [0061]).

Ihara is cited for teaching cross-correlation. Ihara images a product on a flier, compares it to a product in a store and to a database of product information to display in augmented reality. Applicant submits that the cross correlation is to a plurality shops and has do with retrieving product information of products in other shops that match the flier. However, Ihara has nothing to do with cross-correlating label content in order to group product facings under one class.

Accordingly, the cited art fails to teach or suggest, either singly or in combination:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label on the portion of the shelf within the one or more images;

defining one or more product facing bounding boxes surrounding one or more corresponding facings of a product on the portion of the shelf within the one or more images;

associating the shelf label content with each of the one or more product facing bounding boxes and each of the one or more corresponding product facings;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;

building training data based on the association of the shelf label content with the cross-correlated product facing bounding boxes;

using the training data to build a product classifier; and

using the product classifier to classify an item as the product.

PAGE 14/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

as recited in claim 1. For at least this reason, claim 1 patentably defines over the art of record. For at least this same reason, dependent claims 2, 6-10, and 35-37 and also patentably define over the art of record.

Claim 27 is another method claim similar to claim 1. As such, claim 27 patentably defines over the art of record for reasons similar to claim 1. For at least this same reason claims 16, 20-22, and 28-30 also patentably define over the art of record.

Claim 31 is a system claim similar to claim 1. As such, claim 31 patentably defines over the art of record for reasons similar to claim 1. For at least this same reason claims 32-34 also patentably define over the art of record.

PAGE 15/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

CONCLUSION

Accordingly, Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

The Commissioner is authorized to charge any additional fees to process this Amendment, or credit any over-payments that may apply, to our Deposit Account No. 50-2421.

Respectfully submitted,

Dated: December 7, 2020

/David R. Stevens/
David R. Stevens
Reg. No. 38,626

Stevens Law Group
1754 Technology Dr., Ste. 226
San Jose, CA 95110
Tel (408) 288-7588
Fax (408) 288-7542

PAGE 16/16 * RCVD AT 12/7/2020 6:41:13 PM [Eastern Standard Time] * SVR:W-PTOFAX-001/41 * DNIS:2738300 * CSID:14082887542 * ANI:4082887542 * DURATION (mm-ss):02-21

Best Available Copy

Doc Code: TRAN.LET

Document Description: Transmittal Letter

RECEIVED
CENTRAL FAX CENTER
DEC 07 2020

PTO/SB/21 (07-09)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	16

Application Number	15/471,722
Filing Date	03-27-2017
First Named Inventor	Serjoun Skaff
Art Unit	3627
Examiner Name	DELIGI, VANESSA LIMA
Attorney Docket Number	BOSS-01001

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☑ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☑ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) (please identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Stevens Law Group		
Signature	/David R. Stevens/		
Printed name	David R. Stevens		
Date	12/7/2020	Reg. No.	38626

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature	/David R. Stevens/		
Typed or printed name	David R. Stevens	Date	12/7/2020

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Best Available Copy

Apps | USPTO - Request M... | DTSV, INC - Time Tr... | PTOWeb homepage | Log In to Fidelity N...

Sale Processing

Request Type ID: SALEP-20201208-47594
Request ID: REQST-20201208-47593

Submit | Close | Forward

Sale Details | Funds Source | Payment Review

Deposit Account Information

Required fields *

Total Fees Due: $110.00

Save Changes | Reset

Deposit Account Number *	502421
General Authorization	☐
Available Balance	$12,838.21
Account Status	Active
Authorized User *	-Select-
Authorized Amount *	

-Select-
Annette Tri
KIM VAN-DINH
TRAM RICHARDS
USPTO Internal User

Document Code: IMIS

Notice of Fee Due

Application Number: 15471722 Date: 12-8-20

Fees are due for the application or document dated 12-7-20 The payment was not collectable for the reason indicated below.

Note: If the fee due is for any of the filing fees, the surcharge for late payment of the filing fees is now due as well.

- ☐ Insufficient payment by check or money order. Wire Terfer money
- ☐ No authorization to charge a deposit account.
- ☐ Invalid deposit account number.
- ☑ User name not listed in deposit 502421 at 7:33AM (time).
- ☐ Insufficient funds in deposit account _____ at _____ (time).
- ☐ Insufficient payment by credit card.
- ☐ Declined credit car _____ (time).

Fee code(s) to be applied:	2251	$110.
		$
		$
		$
		$
	1506	$
Amount in holding fee code:	1622/2622	$
	1206/2206	$
	1999	$
Total remaining due from applicant:		$
		$110.

1. RAM Operator *C Cynthia*

Rev. 04/10/2013

RECEIVED
CENTRAL FAX CENTER

DEC 07 2020

PTO/AIA/22 (10-20)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) BOSS-01001
Application Number 15/471,722	Filed 03-27-2017
For System and Method for Locating, Identifying and Counting Items	
Art Unit 3627	Examiner DELIGI, VANESSA LIMA

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$220	$110	$55	$ 110
☐	Two months (37 CFR 1.17(a)(2))	$640	$320	$160	$
☐	Three months (37 CFR 1.17(a)(3))	$1,480	$740	$370	$
☐	Four months (37 CFR 1.17(a)(4))	$2,320	$1,160	$580	$
☐	Five months (37 CFR 1.17(a)(5))	$3,160	$1,580	$790	$

☑ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 50-2421.

☐ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 38626.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/David R. Stevens/ — Signature

12/7/2020 — Date

David R. Stevens — Typed or printed name

(408) 288-7588 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/471,722	Filing Date 03/28/2017	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $80 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $420 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/07/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 22	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/TARA A WASHINGTON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :65611

Sale Accounting Date:01/05/2021

Sale Item Reference Number	Effective Date
15471722	12/07/2020

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I202115822172494	2251	EXTENSION FOR RESPONSE WITHIN 1ST MONTH	$110.00	Deposit Account

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

34051 7590 03/24/2021

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110

EXAMINER
DELIGI, VANESSA LIMA

ART UNIT	PAPER NUMBER
3627	

DATE MAILED: 03/24/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

TITLE OF INVENTION: System and Method for Locating, Identifying and Counting Items

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	06/24/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34051 7590 03/24/2021

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

TITLE OF INVENTION: System and Method for Locating, Identifying and Counting Items

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	06/24/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
DELIGI, VANESSA LIMA	3627	705-028000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

34051 7590 03/24/2021

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110

EXAMINER	
DELIGI, VANESSA LIMA	
ART UNIT	PAPER NUMBER
3627	

DATE MAILED: 03/24/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/471,722	Applicant(s) Skaff et al.	
	Examiner VANESSA DELIGI	Art Unit 3627	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 12/07/2020.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-2,6-9,16,20-22 and 27-37 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☑ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/VANESSA DELIGI/ Patent Examiner, Art Unit 3627	/FLORIAN M ZEENDER/ Supervisory Patent Examiner, Art Unit 3627

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

1. (Currently Amended) A method comprising:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label on the portion of the shelf within the one or more images;

defining one or more product facing bounding boxes surrounding one or more corresponding facings of a product within the one or more images;

associating the shelf label content with each of the one or more product facing bounding boxes [[and]]<u>that includes and defines</u> each of the one or more corresponding product facings;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;

building training data based on the association of the shelf label content with the cross-correlated product facing bounding boxes;

using the training data to build a product classifier; and

using the product classifier to classify an item as the product.

2. (Previously Presented) The method of claim 1, wherein capturing one or more images comprises capturing the one or more images with a camera attached to a moveable robot.

3. (Canceled).

4. (Canceled).

5. (Canceled).

6. (Previously Presented) The method of claim 1, further comprising using manual input to identify potential inventory designated in the one or more product facing bounding boxes.

7. (Previously Presented) The method of claim 1, wherein using the training data to build a product classifier comprises integrating training to: (1) learn product image descriptors and (2) classify items into a neural network.

8. (Previously Presented) The method of claim 1, wherein associating the shelf label content with each of the one or more product facing bounding boxes comprises manually associating the shelf label content with each of the one or more product facing bounding boxes.

9. (Previously Presented) The method of claim 1, wherein associating the shelf label content with each of the one or more product facing bounding boxes comprises automatically associating the shelf label content with each of the one or more product facing bounding boxes.

10. (Canceled).

11. (Canceled).

12. (Canceled).

13. (Canceled).

14. (Canceled).

15. (Canceled).

16. (Previously Presented) The method of claim 27, wherein capturing one or more images of a portion of a shelf with a camera comprises capturing the one or more images with a camera attached to a moveable robot.

17. (Canceled).

18. (Canceled).

19. (Canceled).

20. (Previously Presented) The method of claim 27, further comprising using manual input to identify potential inventory designated in the one or more bounding boxes.

21. (Previously Presented) The method of claim 27, wherein the one or more bounding boxes surround gaps between potential inventory.

22. (Previously Presented) The method of claim 27, wherein associating the shelf label content with each of the one or more product facing bounding boxes comprises automatically associating the shelf label content with each of the one or more product facing bounding boxes.

23. (Canceled).

24. (Canceled).

25. (Canceled).

26. (Canceled).

27. (Currently Amended) A method comprising:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label on the portion of the shelf within the one or more images;

defining one or more product facing bounding boxes surrounding one or more facings of a product within the one or more images;

associating the shelf label content with each of the one or more product facing bounding boxes [[and]]that includes and defines each of the one or more corresponding product facings;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;

building training data based on the association of the shelf label content with the cross-correlated product facing bounding boxes;

using the training data to build a product classifier; and

using the product classifier to perform an inventory management activity related to the product.

28. (Currently Amended) The method of claim 27, wherein capturing one or more images of a portion of a shelf comprises capturing one or more images of a portion of a shelf in a first store; and

further comprising:

capturing one or more further images of a portion of another shelf in a second store;

reading content of another shelf label on the portion of the other shelf within the one or more further images;

defining one or more other product facing bounding boxes surrounding one or more other corresponding facings of another product within the one or more further images; and

associating the other shelf label content with each of the one or more other product facing bounding boxes [[and]]that includes and defines each of the one or more other corresponding product facings;

wherein cross-correlating comprises cross-correlating the one or more product facing bounding boxes and the one or more other product facing bounding boxes across the [[the]] first store and the second store by matching the shelf label content with the other shelf label content; and

wherein building a training data comprises building the training data set based on the association of the shelf label content and the other shelf label content with the cross-correlated product facing bounding boxes correlated across the first store and the second store.

29. (Previously Presented) The method of claim 28, wherein capturing one or more further images comprises capturing the one or more further subsequent to capturing the one or more images.

30. (Previously Presented) The method of claim 28, wherein capturing one or more further images comprises capturing the one or more further images prior to capturing the one or more images.

31. (Currently Amended) A system comprising:

a processor;

system memory coupled to the processor and storing instructions configured to cause the processor to:

capture one or more images of a portion of a shelf with a camera;

detect and reading content of a shelf label on the portion of the shelf within the one or more images;

define one or more product facing bounding boxes that surround an surrounding one or more corresponding facings of a product within the one or more images;

associate the shelf label content with each of the one or more product facing bounding boxes [[and]]that includes and defines each of the one or more corresponding product facings;

cross-correlate the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;

build training data based on the association of the shelf label content with the cross-correlated product facing bounding boxes;

use the training data to build a product classifier; and

use the product classifier to perform one or more of: (1) an inventory management activity related to the product or (2) classifying an item as the product.

32. (Currently Amended) The system of claim 31, wherein instructions configured to capture one or more images of a portion of a shelf comprise instructions configured to capture one or more images of a portion of a shelf in a first store; and

further comprising instructions configured to:

capture one or more further images of a portion of another shelf in a second store;

read content of another shelf label on a portion of the other shelf within the one or more further images;

define one or more other product facing bounding boxes surrounding one or more other corresponding facings of another product within the one or more further images; and

associate the other shelf label content with each of the one or more other product facing bounding boxes [[and]]that includes and defines each of the one or more other corresponding product facings;

wherein instructions configured to cross-correlate the [[the]] one or more product facing bounding boxes and the one or more other product facing bounding boxes across the first store and the second store by matching the shelf label content with the other shelf label content; and

wherein instructions configured to build a training data comprising building the training data sent based on the association of the shelf label content and the other shelf label content with the cross-correlated product facing bounding boxes correlated across the first store and the second store.

33. (Previously Presented) The system of claim 31, wherein instructions configured to capture one or more further images comprise instructions configured to capture the one or more further images subsequent to capturing the one or more images.

34. (Previously Presented) The system of claim 31, wherein instructions configured to capture one or more further images of another portion of a shelf comprise instructions configured to capture the one or more further images.

35. (Currently Amended) The method of claim 1, wherein capturing one or more images of a portion of a shelf comprises capturing one or more images of a portion of a shelf in a first store; and

further comprising:

capturing one or more further images of portion of another shelf in a second store;

reading content of another shelf label on the portion of the other shelf within the one or more further images;

defining one or more other product facing bounding boxes surrounding one or more other corresponding facings of another product within the one or more further images; and

associating the other shelf label content with each of the one or more other product facing bounding boxes [[and]]that includes and defines each of the one or more other corresponding product facings;

wherein cross-correlating comprises cross-correlating the one or more product facing bounding boxes and the one or more other product facing bounding boxes across the [[the]] first store and the second store by matching the shelf label content with the other shelf label content; and

wherein building training data comprises building the training data based on the association of the shelf label content and the other shelf label content with the cross-correlated product facing bounding boxes correlated across the first store and the second store.

36. (Previously Presented) The method of claim 35, wherein capturing one or more further images comprises capturing the one or more further images subsequent to capturing the one or more images.

37. (Previously Presented) The method of claim 35, wherein capturing one or more further images comprises capturing the one or more further images prior to capturing the one or more images.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance:

None of the prior art of the record teaches *"associating the shelf label content with each of the one or more product facing bounding boxes that includes and defines each of the one or more corresponding product facings;"* The closest prior art of the record for this specific limitation is **Zimmerman (U.S. 20080077511 A1). However, Zimmerman differs from the current claim language because** the segmentation of **Zimmerman** is done after the barcode being found in the image, and the segmentation of **Zimmerman** is done to associate the image of

the product with the visual descriptor found in the database, and **the current claim language requires** that the label content to be associated with the on the one or more product facing bounding boxes that includes and defines each of the one or more corresponding product facings, which differs from **Zimmerman**, see f**igure 6 and ¶¶59-72**

In addition, none of the prior art of the record teaches *"cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;"* The closest prior art of the record for this specific limitation is **Ihara et al. (US 20130010103 A1, hereinafter Ihara). Ihara teaches ¶117 -** correlation of image data of products of plural shops and product IDs is managed in the flier information DB 102. When plural sets of image data of the product matching with or similar to the image data of a product to buy; **which differ from the current claim language that requires** the matching to be a shelf label content with other shelf label content across one or more store, where the shelf label content is associated with the one or more other product facing bounding boxes;

Therefore, none of the prior art of record, neither singularly nor in combination, teach or show the features present in independent claim(s) 1, 27, and 31. The limitations not disclosed in the prior, in combination with the other limitations clearly claimed in claims 1, 27, and 31, are novel and unobvious.

Accordingly, dependent claim(s) 2, 6-9, 16, 20-22, 28-30 and 32-37 are allowed for the same reasons stated above.

Therefore, the Examiner is allowing claim(s) 1,2, 6-9, 16, 20-22, 27-37.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VANESSA DELIGI whose telephone number is (571)272-0503. The examiner can normally be reached on Monday-Friday 07:30AM-5PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Florian (Ryan) Zeender can be reached on (571) 272-6790. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VANESSA DELIGI/
Patent Examiner, Art Unit 3627

/FLORIAN M ZEENDER/
Supervisory Patent Examiner, Art Unit 3627

Examiner-Initiated Interview Summary	Application No. 15/471,722	Applicant(s) Skaff et al.		
	Examiner VANESSA DELIGI	Art Unit 3627	AIA (First Inventor to File) Status Yes	Page 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	Title	Type
VANESSA DELIGI	Examiner	Telephonic
Michael Dodd (46437)	Attorney of Record	
Ryan Zeender	SPE	

Date of Interview: 09 March 2021

Issues Discussed:

35 U.S.C. 112

See proposed Amendment section.

Proposed Amendment(s)

Examiner proposed to applicant representative to amend claims 1, 27, 28, 31-32, 35 in order to allow the case. The amendment would overcome the 112 issue found by the Examiner during examination time.
Limitation before amendments: "associating the shelf label content with each of the one or more product facing bounding boxes and each of the one or more corresponding product facings;"
Limitations after the amendment: "associating the shelf label content with each of the one or more product facing bounding boxes [[and]]that includes and defines each of the one or more corresponding product facings;"
Applicant representative agreed, and email examiner the propose amendments.

☑ Attachment

/VANESSA DELIGI/ Patent Examiner, Art Unit 3627	/FLORIAN M ZEENDER/ Supervisory Patent Examiner, Art Unit 3627

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Notice of References Cited	Application/Control No. 15/471,722	Applicant(s)/Patent Under Reexamination Skaff et al.	
	Examiner VANESSA DELIGI	Art Unit 3627	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20080077511-A1	03-2008	Zimmerman; Thomas Guthrie	G06Q10/00	705/28
*	B	US-9097800-B1	08-2015	Zhu; Jiajun	G01S7/4802	1/1
*	C	US-20160171707-A1	06-2016	Schwartz; Edward	G06K9/342	382/180
*	D	US-20150363758-A1	12-2015	Wu; Wencheng	G06Q10/087	705/20
*	E	US-10169677-B1	01-2019	Ren; Xiaofeng	H04W4/33	1/1
*	F	US-20130010103-A1	01-2013	Ihara; Noboru	G06Q30/06	348/116
*	G	US-20160155011-A1	06-2016	Sulc; Milan	G06K9/00671	382/103
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06Q10/087, G06Q10/00	07/16/2019	VD
G05D1/0261, G05D1/0274, G05D1/0246	07/16/2019	VD
G05D2201/0216	07/16/2019	VD
G06Q30/02, G06Q30/0603	07/16/2019	VD
G07G1/12	07/16/2019	VD
G06K9/00201 G06K9/00664 G06K9/3216 G06K9/3241 G06K9/6267	03/10/2021	VD

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

/VANESSA DELIGI/ Examiner, Art Unit 3627	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

Search Notes		
Search Notes	**Date**	**Examiner**
EAST text search	07/16/2019	VD
Inventor name search	07/16/2019	VD
Assignee name search	07/16/2019	VD
EAST text search (update)	02/26/2020	VD
PE2E search	07/30/2020	VD
PE2E Search	03/10/2021	VD
NPL - Google, Google scholar	03/10/2021	VD
STIC - search report	03/10/2021	VD
Backward/Forward search on best reference	03/10/2021	VD

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G06Q	10/087, 10/00 , 30/02, 30/0603	07/16/2019	VD
G05D	1/0261, 1/0274, 1/0246, 2201/0216	07/16/2019	VD
G07G	1/12	07/16/2019	VD
G06N	20/00	03/10/2021	VD
G06K	9/00201 9/00664 9/3216 9/3241 9/6267	03/10/2021	VD

/VANESSA DELIGI/ Examiner, Art Unit 3627	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	**Art Unit**
	VANESSA DELIGI	3627

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	07/16/2019	02/26/2020	07/30/2020	03/10/2021					
	1	✓	✓	✓	=					
	2	✓	✓	✓	=					
	3	✓	✓	-	-					
	4	✓	✓	-	-					
	5	✓	✓	-	-					
	6	✓	✓	✓	=					
	7	✓	✓	✓	=					
	8	✓	✓	✓	=					
	9	✓	✓	✓	=					
	10	✓	✓	-	-					
	11	-	-	-	-					
	12	-	-	-	-					
	13	-	-	-	-					
	14	-	-	-	-					
	15	✓	✓	-	-					
	16	✓	✓	✓	=					
	17	✓	✓	-	-					
	18	✓	✓	-	-					
	19	✓	✓	-	-					
	20	✓	✓	✓	=					
	21	✓	✓	✓	=					
	22	✓	✓	✓	=					
	23	✓	✓	-	-					
	24	✓	✓	-	-					
	25	✓	✓	-	-					
	26	✓	✓	-	-					
	27			✓	=					
	28			✓	=					
	29			✓	=					
	30			✓	=					
	31			✓	=					
	32			✓	=					
	33			✓	=					
	34			✓	=					
	35			✓	=					
	36			✓	=					
	37			✓	=					

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	**Art Unit**
	VANESSA DELIGI	3627

CPC							
Symbol						**Type**	**Version**
G06Q	/	10	/	087		F	2013-01-01
G06K	/	9	/	6267		I	2013-01-01
G06N	/	20	/	00		I	2019-01-01
G05D	/	1	/	0246		I	2013-01-01
G06K	/	9	/	3241		I	2013-01-01
G06K	/	9	/	3216		I	2013-01-01
G06K	/	9	/	00201		I	2013-01-01
G06K	/	9	/	00664		I	2013-01-01

CPC Combination Sets								
Symbol						**Type**	**Set**	**Ranking**	**Version**
	/		/						

/VANESSA DELIGI/ Patent Examiner, Art Unit 3627	10 March 2021	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	21	
/FLORIAN M ZEENDER/ Supervisory Patent Examiner, Art Unit 3627	14 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20210223

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	Art Unit
	VANESSA DELIGI	3627

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06Q10/08	/	10	/	08
G06K9/62	/	9	/	62
G06N20/00	/	20	/	00
G05D1/02	/	1	/	02
G06K9/32	/	9	/	32
G06K9/00	/	9	/	00

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

/VANESSA DELIGI/ Patent Examiner, Art Unit 3627	10 March 2021	Total Claims Allowed:	
(Assistant Examiner)	(Date)	21	
/FLORIAN M ZEENDER/ Supervisory Patent Examiner, Art Unit 3627	14 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

U.S. Patent and Trademark Office — Part of Paper No.: 20210223

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/471,722	Skaff et al.
	Examiner	**Art Unit**
	VANESSA DELIGI	3627

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	27	19	32										
2	2	11	28	20	33										
3	6	12	29	21	34										
4	7	13	30												
5	8	14	16												
6	9	15	20												
7	35	16	21												
8	36	17	22												
9	37	18	31												

/VANESSA DELIGI/ Patent Examiner, Art Unit 3627	10 March 2021	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	21	
/FLORIAN M ZEENDER/ Supervisory Patent Examiner, Art Unit 3627	14 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

1. (Currently Amended) A method comprising:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label on the portion of the shelf within the one or more images;

defining one or more product facing bounding boxes surrounding one or more corresponding facings of a product within the one or more images;

associating the shelf label content with each of the one or more product facing bounding boxes [[and]]that includes and defines each of the one or more corresponding product facings;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;

building training data based on the association of the shelf label content with the cross-correlated product facing bounding boxes;

using the training data to build a product classifier; and

using the product classifier to classify an item as the product.

2. (Previously Presented)The method of claim 1, wherein capturing one or more images comprises capturing the one or more images with a camera attached to a moveable robot.

3. (Canceled).

4. (Canceled).

5. (Canceled).

6. (Previously Presented) The method of claim 1, further comprising using manual input to identify potential inventory designated in the one or more product facing bounding boxes.

7. (Previously Presented) The method of claim 1, wherein using the training data to build a product classifier comprises integrating training to: (1) learn product image descriptors and (2) classify items into a neural network.

8. (Previously Presented) The method of claim 1, wherein associating the shelf label content with each of the one or more product facing bounding boxes comprises manually associating the shelf label content with each of the one or more product facing bounding boxes.

9. (Previously Presented) The method of claim 1, wherein associating the shelf label content with each of the one or more product facing bounding boxes comprises automatically associating the shelf label content with each of the one or more product facing bounding boxes.

10. (Canceled).

11. (Canceled).

12. (Canceled).

13. (Canceled).

14. (Canceled).

15. (Canceled).

16. (Previously Presented) The method of claim 27, wherein capturing one or more images of a portion of a shelf with a camera comprises capturing the one or more images with a camera attached to a moveable robot.

17. (Canceled).

18. (Canceled).

19. (Canceled).

20. (Previously Presented) The method of claim 27, further comprising using manual input to identify potential inventory designated in the one or more bounding boxes.

21. (Previously Presented) The method of claim 27, wherein the one or more bounding boxes surround gaps between potential inventory.

22. (Previously Presented) The method of claim 27, wherein associating the shelf label content with each of the one or more product facing bounding boxes comprises automatically associating the shelf label content with each of the one or more product facing bounding boxes.

23. (Canceled).

24. (Canceled).

25. (Canceled).

26. (Canceled).

27. (Currently Amended) A method comprising:

capturing one or more images of a portion of a shelf with a camera;

detecting and reading content of a shelf label on the portion of the shelf within the one or more images;

defining one or more product facing bounding boxes surrounding one or more facings of a product within the one or more images;

associating the shelf label content with each of the one or more product facing bounding boxes [[and]]that includes and defines each of the one or more corresponding product facings;

cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;

building training data based on the association of the shelf label content with the cross-correlated product facing bounding boxes;

using the training data to build a product classifier; and

using the product classifier to perform an inventory management activity related to the product.

28. (Currently Amended) The method of claim 27, wherein capturing one or more images of a portion of a shelf comprises capturing one or more images of a portion of a shelf in a first store; and

further comprising:

capturing one or more further images of a portion of another shelf in a second store;

reading content of another shelf label on the portion of the other shelf within the one or more further images;

defining one or more other product facing bounding boxes surrounding one or more other corresponding facings of another product within the one or more further images; and

associating the other shelf label content with each of the one or more other product facing bounding boxes [[and]]that includes and defines each of the one or more other corresponding product facings;

wherein cross-correlating comprises cross-correlating the one or more product facing bounding boxes and the one or more other product facing bounding boxes across the [[the]] first store and the second store by matching the shelf label content with the other shelf label content; and

wherein building a training data comprises building the training data set based on the association of the shelf label content and the other shelf label content with the cross-correlated product facing bounding boxes correlated across the first store and the second store.

29. (Previously Presented) The method of claim 28, wherein capturing one or more further images comprises capturing the one or more further subsequent to capturing the one or more images.

30. (Previously Presented) The method of claim 28, wherein capturing one or more further images comprises capturing the one or more further images prior to capturing the one or more images.

31. (Currently Amended) A system comprising:

a processor;

system memory coupled to the processor and storing instructions configured to cause the processor to:

capture one or more images of a portion of a shelf with a camera;

detect and reading content of a shelf label on the portion of the shelf within the one or more images;

define one or more product facing bounding boxes that surround an surrounding one or more corresponding facings of a product within the one or more images;

associate the shelf label content with each of the one or more product facing bounding boxes [[and]]that includes and defines each of the one or more corresponding product facings;

cross-correlate the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;

build training data based on the association of the shelf label content with the cross-correlated product facing bounding boxes;

use the training data to build a product classifier; and

use the product classifier to perform one or more of: (1) an inventory management activity related to the product or (2) classifying an item as the product.

32. (Currently Amended) The system of claim 31, wherein instructions configured to capture one or more images of a portion of a shelf comprise instructions configured to capture one or more images of a portion of a shelf in a first store; and

further comprising instructions configured to:

capture one or more further images of a portion of another shelf in a second store;

read content of another shelf label on a portion of the other shelf within the one or more further images;

define one or more other product facing bounding boxes surrounding one or more other corresponding facings of another product within the one or more further images; and

associate the other shelf label content with each of the one or more other product facing bounding boxes [[and]]that includes and defines each of the one or more other corresponding product facings;

wherein instructions configured to cross-correlate the [[the]] one or more product facing bounding boxes and the one or more other product facing bounding boxes across the first store and the second store by matching the shelf label content with the other shelf label content; and

wherein instructions configured to build a training data comprising building the training data sent based on the association of the shelf label content and the other shelf label content with the cross-correlated product facing bounding boxes correlated across the first store and the second store.

33. (Previously Presented) The system of claim 31, wherein instructions configured to capture one or more further images comprise instructions configured to capture the one or more further images subsequent to capturing the one or more images.

34. (Previously Presented) The system of claim 31, wherein instructions configured to capture one or more further images of another portion of a shelf comprise instructions configured to capture the one or more further images.

35. (Currently Amended) The method of claim 1, wherein capturing one or more images of a portion of a shelf comprises capturing one or more images of a portion of a shelf in a first store; and

further comprising:

capturing one or more further images of portion of another shelf in a second store;

reading content of another shelf label on the portion of the other shelf within the one or more further images;

defining one or more other product facing bounding boxes surrounding one or more other corresponding facings of another product within the one or more further images; and

associating the other shelf label content with each of the one or more other product facing bounding boxes [[and]]that includes and defines each of the one or more other corresponding product facings;

wherein cross-correlating comprises cross-correlating the one or more product facing bounding boxes and the one or more other product facing bounding boxes across the [[the]] first store and the second store by matching the shelf label content with the other shelf label content; and

wherein building training data comprises building the training data based on the association of the shelf label content and the other shelf label content with the cross-correlated product facing bounding boxes correlated across the first store and the second store.

36. (Previously Presented) The method of claim 35, wherein capturing one or more further images comprises capturing the one or more further images subsequent to capturing the one or more images.

37. (Previously Presented) The method of claim 35, wherein capturing one or more further images comprises capturing the one or more further images prior to capturing the one or more images.

Examiner	DELIGI, VANESSA
Art Unit	3627
Serial #	15471722
Date Completed	3/3/2020
Assigned EIC	3600
Searcher	Euel K. Cowan, (Chickasaw)
Tracking #	627100

This document includes the following content:

Search Histories

Complete lists of all files searched within each database collection, along with all keyword/synonym strings and any applicable chemical structure or biosequence queries used by the Searcher in completing the prior art search are included in this report.

Search Results

Results related to your search request are included. While not all references may be useful for a rejection or other office action, they are included for the Examiner's review.

For 1600 Examiners

Your search results will be available in PE2E on the next business day at approximately noon. For detailed instructions on how to access your search results in PE2E, please see this guide.

If you have any questions about this search, or about how to interpret this search report, or if you need assistance retrieving the full text of any of the references contained in this report, please do not hesitate to contact your assigned EIC:

EIC	Phone	Email
1600	571-272-0473	STIC-EIC1600/2900@uspto.gov
1700	571-272-2530	STIC-EIC1700@uspto.gov
2100	571-272-4225	STIC-EIC2100@uspto.gov
2400	Art units 2430, 2440, 2450, 2490, see EIC 2100	
2400	Art units 2410, 2420, 2460, 2480, see EIC 2600	
2600	571-272-4235	STIC-EIC2600@uspto.gov
2800	571-272-2540	STIC-EIC2800@uspto.gov
2900	571-272-0473	STIC-EIC1600/2900@uspto.gov
3600	571-272-3488	STIC-EIC3600@uspto.gov
3700	571-272-4240	STIC-EIC3700@uspto.gov

Thank you for using the EIC, and we look forward to your next search!

Search Request

Effective Filing Date: 03/29/2016

Description Fast and Focus;

Limitation: "cross-correlating the one or more product facing bounding boxes and one or more other product facing bounding boxes across one or more stores by matching the shelf label content with other shelf label content associated with the one or more other product facing bounding boxes;"

Concept to be searched - matching the shelf label from Walmart located at farifax with a shelf label of Walmart located at Alexandria.

Dialog - Patents

Databases: Argentina Patents Fulltext, Australia Patents Fulltext, Austria Patents Fulltext, Belgium Patents Fulltext, Brazil Patents Fulltext, Canada Patents Fulltext, China Patents Fulltext, Denmark Patents Fulltext, Derwent Chemistry Resource, Derwent Patents Citation Index®, Derwent World Patents Index®, Eurasia Patents Fulltext, European Patents Fulltext, Finland Patents Fulltext, France Patents Fulltext, Germany Patents Fulltext, Global Patents Bibliographic, Great Britain Patents Fulltext, IFI CLAIMS® US Patents and Legal Status, IMS Patent Focus, India Patents Fulltext™, INPADOC / Family and Legal Status, Ireland Patents Fulltext, Italy Patents Fulltext, Japan Patents Fulltext, JAPIO - Patent Abstracts of Japan, Korea Patents Fulltext, LitAlert®, Luxembourg Patents Fulltext, Mexico Patents Fulltext, Monaco Patents Fulltext, Netherlands Patents Fulltext, Norway Patents Fulltext, Portugal Patents Fulltext, Russia Patents Fulltext, Spain Patents Fulltext, Sweden Patents Fulltext, Switzerland Patents Fulltext, United States Patents Fulltext, WIPO PCT Patents Fulltext

Set#	Searched for	Results
S1	(compar* or contrast* or analog* or juxtapos* or measur* or weigh* or balanc* or relat* or correlat* or interrelat*) n/5 (tag or label or mark or sticker*) n/5 (imag* or picture or pic or photograph or rendering)	103480
S2	(first$2 or 1st or anchor* or initial$2 or begin* or start* or primar* or main or principal or original or earl* or front$2 or opening or kickoff or new$2 or start* or premier$2 or instantiat*)	252590203
S3	(kiosk$1 or vending p/0 machine or store$1 or vendor$2 or vender$2 or merchant$1 or business$2 or seller$1 or retailer$2 or shop* or broker$2 or supplier$2 or wholesaler$2 or supermarket)	50548093
S4	(second* or additional$2 or added or 2nd or consecutive$2 or sequential$2 or subsequent$2 or another or alternat* or different* or disparate* or close or nearby)	170173723
S5	(location$1 or place$1 or coordinate$1 or where* or site$1 or loci or position$1 or local* or spot$1 or latitude$1 or longitude$1 or geo* or boundar* or city or town or state)	208792653
S6	cpc(G06Q10/087 or G06N20/00 or G05D1/0246 or G06K9/00201 or G06K9/00664 or G06K9/3216 or G06K9/3241 or G06K9/6267)	357743
S7	s2 n/2 s3	5366182
S8	s4 n/2 s3	4518395
S9	s4 n/1 s5	37100133
S10	s7 n/25 s8 n/25 s1	33
S11	s10 n/30 s9	4

S12	s11 and s6	0
S13	s11 and apd(<20160329)	1
S14	s10 and apd(<20160329)	24
S15	s8 n/15 s1	142
S16	s15 and apd(<20160329)	105
S17	s1 n/10 ((sister or related or companion or affiliate or branch) n/5 (store or merchant or kiosk or vendor or vender) or branch$2)	238
S18	s17 n/60 s8	7
S19	s18 and apd(<20160329)	7
S20	s1 n/25 (walmart or khols or sears or supermarket)	16
S21	s20 and s6	1
S22	s21 and apd(<20160329)	0
S23	s20 and apd(<20160329)	14

Reading device for statistics process and marking of each tag, and method thereof

Assignee: URINHANA CO LTD (URINNon-standard Company)

Inventor: Lee, G H

Publication info: Lee, G H (Inventor). URINHANA CO LTD (Assignee). KR 730008026 B1 . (Published 16 Jul 2007). 200754 (First update). 200834 (Last update). Drawing available.

Application number: KR 10200563855 A (14 July 2005)

First available: 2012-03-30

Publication number: KR 1020070009896 A (19 January 2007)

Keywords in context:

Abstract: ... discriminate an answer tag part. DescriptionAn input part(11) receives a target image including at least one display part and/or tag point. A storing part(12) stores the first/second comparison image and each tag display area information in a basic image of the target image. A comparator(15) compares an image of the target image according to tag display area information with the first comparison image. A controller(17) generates the display information including a tag display position representing a position of the tag ...

METHOD, SYSTEM AND COMPUTER-READABLE RECORDING MEDIUM FOR PROVIDING SERVICE USING ELECTRONIC MAP

Assignee: NHN CORPORATIONSeongnam-si, KRStandardized: NHN Corp KR (083905)

Inventor: LIM, Seung PhillYongin-si

Publication info: LIM, Seung Phill (Inventor). NHN CORPORATION; NHN Corp KR (Assignees). US 20100119121 A1 . (Published 13 May 2010).

Application number: US 2009618382 (13 November 2009)

First available: 2013-01-25

Publication number: US 20100119121 A1 (13 May 2010)

Keywords in context:

Specification: ... part 222 may recognize the shapes by comparing shapes detected from image data with the sample-shape data stored in the sample-shape database 240d.

Alternatively or additionally, image data stored in the image database 240b may be used for comparison since the image data may be associated with tag information in the image database 240b and the tag information can be recognized as identification information of a certain shape.

Here, since image matching with ...

Dialog - NPL

Databases: ABI/INFORM® Professional Advanced, Abstracts in New Technology & Engineering, AGRIS, Analytical Abstracts, British Library Inside Conferences, Business & Industry, CAB ABSTRACTS, Civil Engineering Abstracts, Current Contents® Search, Earthquake Engineering Abstracts, EconLit, Ei Compendex®, Ei EnCompassLIT, Embase®, EMCare®, ERIC, FSTA®, Gale Group Computer Database™, Gale Group New Product Announcements / Plus®, Gale Group Trade & Industry Database™, GEOBASE™, IMS Company Profiles, IMS New Product Focus, IMS R&D Focus, Inspec®, Mechanical & Transportation Engineering Abstracts, ProQuest Advanced Tech & Aerospace Professional, ProQuest Dissertations and Theses Professional, ProQuest Materials Research Professional, ProQuest Newsstand Professional, ProQuest Technology Research Professional, Transport Research International Documentation, Weldasearch®

Set#	Searched for	Results
S1	(compar* or contrast* or analog* or juxtapos* or measur* or weigh* or balanc* or relat* or correlat* or interrelat*) n/5 (tag or label or mark or sticker*) n/5 (imag* or picture or pic or photograph or rendering)	71929*
S2	(first$2 or 1st or anchor* or initial$2 or begin* or start* or primar* or main or principal or original or new$2 or start* or premier$2 or instantiat*)	667602087*
S3	(kiosk$1 or vending p/0 machine or store$1 or vendor$2 or vender$2 or merchant$1 or business$2 or seller$1 or retailer$2 or shop* or broker$2 or supplier$2 or wholesaler$2 or supermarket)	272679786*
S4	(second* or additional$2 or added or 2nd or consecutive$2 or sequential$2 or subsequent$2 or another or alternat* or different* or disparate* or close or nearby) n/3 (location$1 or place$1 or coordinate$1 or where* or site$1 or loci or position$1 or local* or spot$1 or latitude$1 or longitude$1 or geo* or boundar* or city or town or state)	30647164*
S5	s1 n/15 s2	3964°
S6	s5 n/25 s3	112°
S7	s6 n/35 s4	2°
S8	s7 and pd(<20160329)	0°
S9	(alternat* or different* or disparate* or close* or nearby) n/3 s3	5076776*
S10	s1 n/25 s9	8°
S11	s10 and pd(<20160329)	4°

S12	s1 n/60 (sister or related or companion or affiliate or branch) n/3 (stores or merchant or kiosk or vendor or vender)	2°
S13	s1 n/60 ((sister or related or companion or affiliate or branch or alternat* or different* or disparate* or close* or nearby or across) n/3 (stores or merchant or kiosk or vendor or vender) or branch$2)	188°
S14	s13 and pd(<20160329)	89°
S15	s1 n/25 (walmart or khols or sears or supermarket)	11°

Private labels

Author: Cristina Calvo Porral 1 ; Lang, Mark F 2 1 Department of Marketing, University of La Coruña, La Coruña, Spain 2 Department of Food Marketing, Saint Joseph's University, Philadelphia, Pennsylvania, USA

Publication info: British Food Journal 117.2: 506-522. Emerald Group Publishing Limited. (2015)

ProQuest document link

Databases: Abstracts in New Technology & Engineering, Civil Engineering Abstracts, ABI/INFORM® Professional Advanced, ProQuest Materials Research Professional, ProQuest Advanced Tech & Aerospace Professional, Mechanical & Transportation Engineering Abstracts, ProQuest Technology Research Professional

Keywords in context:

Full text: ... that retailers with a more positive store image have consumers perceive their private label offerings with a higher quality and a better product image: *H0*. Store image is positively related to private label image. *H1*. Store image is positively related to private label perceived quality. **2.1.2. Retailer corporate reputation** Consumers view retailers as companies, considering broader characteristics of their corporate reputation such as economic, legal, ethical, and social ... private label success in today's increasingly competitive marketplace, being the variable exerting higher positive influence on consumers' behavior. Important antecedent relationships hypothesized were that two store-related variables – store image and corporate reputation – influence private label image and perceived quality. The second contribution is that model estimation provides evidence that both store image and corporate reputation are impactful antecedents. Findings indicate ...

Value-for-money perceptions of supermarket and private labels

Author: Nenycz-Thiel, Magda; Romaniuk, Jenni.

Publication info: Australasian Marketing Journal 20.2: 171-177. Monash University. (May 2012)

First available: 2012-07-25

Keywords in context:

Full text: ... this research is to examine the relationship between the consumer's perceptions of the supermarket offering value-for-money, and the private labels of different tiers within the supermarket offering value-for-money. Additionally, this paper examines the impact of direct/non direct experience with the brand on the supermarket-private label value image relationship. The organization of this paper is as follows. The paper opens with the relevant literature, which forms the basis for the hypotheses. A description ... consumer memory (Nenycz-Thiel and Romaniuk, 2009). making value-formoney a key attribute to facilitate retrieval of private label brands from a consumer's memory. 2. 1. The supermarket-private label image relationship Similar to brand image, supermarket or retailer image is 'the complexity of consumer perceptions of a supermarket on different attributes' (Bloemer and Odekerken-Schroder, 2001, p. 1). The literature uses a range of attributes to describe supermarket image. For example. Doyle (1975) suggest ... personnel, while Merrilees and Miller (2010) name merchandise quality, store design, staff service, low prices and retailer brand attitudes. There are three reasons why the relationship between supermarket and brand image is more relevant for private labels than for national brands. The first reason is selective distribution; where one can encounter a particular private label only in conjunction with one supermarket. The second reason is that the majority of private labels include the supermarket name or logo in the brand or on the packaging (endorsed ... to develop their own identity independent of the supermarket. Therefore, consumers learn about private labels predominantly within the context of the supermarket environment or the supermarket image. Therefore, the supermarket image may act as a facilitator or inhibitor for private labels developing a particular image. Indeed, past studies show that store image...

US Patents, US Designs, US Applications, EPO Patents, EPO Applications, China Patents, China Applications, Japan Patents, Japan Applications, Korea Patents, Korea Applications, WIPO Applications, Argentina Patents, Argentina Applications, Brazil Patents, Brazil Applications, Canada Patents, Canada Applications, Chile Patents, Chile Applications, Colombia Applications, Costa Rica Applications, Cuba Patents, Cuba Applications, Dominican Republic Applications, Ecuador Patents, Ecuador Applications, El Salvador Applications, Guatemala Applications, Honduras Applications, Mexico Patents, Mexico Applications, Nicaragua Patents, Panama Applications, Peru Applications, Trinidad & Tobago Patents, Uruguay Applications, Austria Patents, Austria Applications, Belarus Patents, Belgium Patents, Belgium Applications, Bosnia & Herzegovina Patents, Bosnia & Herzegovina Applications, Bulgaria Patents, Bulgaria Applications, Croatia Patents, Croatia Applications, Czech Republic Patents, Czech Republic Applications, Czechoslovakia Patents, Czechoslovakia Applications, Denmark Patents, Denmark Applications, Estonia Patents, Estonia Applications, EUIPO Patents, Finland Patents, Finland Applications, France Patents, France Applications, Germany Patents, Germany Applications, Great Britain Patents, Great Britain Applications, Greece Patents, Greece Applications, Hungary Patents, Hungary Applications, Iceland Patents, Iceland Applications, Ireland Patents, Ireland Applications, Italy Patents, Italy Applications, Latvia Patents, Latvia Applications, Lithuania Patents, Lithuania Applications, Luxembourg Patents, Malta Patents, Monaco Patents, Montenegro Patents, Montenegro Applications, Netherlands Patents, Netherlands Applications, Norway Patents, Norway Applications, Poland Patents, Poland Applications, Portugal Patents, Portugal Applications, Republic of Moldova Patents, Republic of Moldova Applications, Romania Patents, Romania Applications, San Marino Patents, San Marino Applications, Serbia Patents, Serbia Applications, Slovakia Patents, Slovakia Applications, Slovenia Patents, Spain Patents, Spain Applications, Sweden Patents, Sweden Applications, Switzerland Patents, Switzerland Applications, Ukraine Patents, Yugoslavia/Serbia and Montenegro Patents, Yugoslavia/Serbia and Montenegro Applications, Armenia Patents, Australia Patents, Australia Applications, Cyprus Patents, Gulf Cooperation Council Patents, Hong Kong Patents, India Patents, India Applications, Indonesia Patents, Indonesia Applications, Israel Applications, Jordan Patents, Kyrgyzstan Patents, Macao Applications, Malaysia Patents, Mongolia Patents, New Zealand Patents, Philippines Patents, Philippines Applications, Saudi Arabia Patents, Singapore Patents, Singapore Applications, Taiwan Patents, Taiwan Applications, Tajikistan Patents, Tajikistan Applications, Thailand Applications, Uzbekistan Patents, Vietnam Patents, Algeria Patents, ARIPO Patents, ARIPO Applications, Egypt Patents, Kenya Patents, Malawi Patents, Morocco Patents, Morocco Applications, OAPI Patents, South Africa Patents, Tunisia Applications, Zambia Patents, Zimbabwe Patents, EAPO Patents, EAPO Applications, Georgia Patents, Georgia Applications, Kazakhstan Patents, Kazakhstan Applications, Russia Patents, Russia Applications, Turkey Patents, Turkey Applications

Main Concept Text

==========

matching the shelf label from a store at one location with a label from the same store at a different location.

Filters (2)

==========

Earliest Priority Date: To 2016-03-29

Classic Syntax limited to: (compar* or contrast* or analog* or juxtapos* or parallel* or collat* or measur* or weigh* or balanc* or relat* or correlat* or interrelat*) near10 (tag or label or mark or sticker*) with "same" near1 (store or merchant or vendor or supermarket or retailer) near5 (different or multiple or plurality or separate or disparate) near8 (location or city or state or town or locale or province or area or region)

Classic Syntax limited to: (compar* or contrast* or analog* or juxtapos* or parallel* or collat* or measur* or weigh* or balanc* or relat* or correlat* or interrelat*) near7 (tag or label or sticker* or item or commodity) near7 (image or pic or picture or photograph or rendering) with ((sister or related or companion or affiliate or branch or between) near2 (stores or merchant or kiosk or vendor or vender) or branch)

PUBLICATION NUMBER: US 8719100 B1	PUBLICATION DATE: 06-May-2014
APPLICATION NUMBER: US 13/210,349	FILING DATE: 15-Aug-2011
SIMPLE FAMILY: 50552914 (size 1)	EARLIEST PRIORITY DATE: 02-May-2011
TITLE: INTERACTIVE DELIVERY OF INFORMATION THROUGH IMAGES	

Abstract (English):
An image store including images from photo agencies is established by an image management system. Marketers interact with the image management system to review images in the image store and tag objects shown in the images. The object tags identify and provide information about the objects shown in the images. The marketers define campaigns having payment conditions indicating types of engagement with the images that trigger payments by the marketers. Publishers interact with the image management system to select images and publish the selected images to clients used by consumers. The publishers also provide the consumers with tag modules that execute on the clients to display the information about the objects shown in the published images. Consumer interactions with the displayed information are reported to the image management system, and the system accounts for payments by the marketers if the payment conditions are satisfied.

When the tag module **124** executes at a client **105**, the tag module identifies images in the same web page as the tag module **124**. The tag module **124** fingerprints these images using the same fingerprint technique used by the fingerprint generation module **311**. The tag module **124** then accesses the image fingerprints **120** in the data store **301** of the image management system **103** to determine which, if any, of the published images in the web page match images in the image management system. If one or

more images match, the tag module **124** obtains the object tags **121** for the matching images.

One embodiment of the tagging module **312** supports an auto-tagging process that automatically tags products in images based on a seed tag made by a marketer. In the auto-tagging process, the tagging module **312** uses the image metadata **304** to identify images related to each other, which may contain the same product. For example, the tagging module **312** may use metadata to identify images showing the same person at the same event. A marketer then tags the product in one image, called the seed image, in this group of related images. Next, the tagging module **312** propagates the seed tag—that is the object location information in the seed image—from the seed image to the group of related images. To propagate the seed tag to the related images, the tagging module **312** identifies visual features of the objects underneath or near the tagged locations in the seed image, and then tags the matching visual features—the matching objects—in the related images. The tagging module **312** uses this new tag information to create new object tags associated with the related images and stores them in the data store **301**.

PUBLICATION NUMBER: US 2013/0141585 A1	PUBLICATION DATE: 06-Jun-2013
APPLICATION NUMBER: US 13/690,766	FILING DATE: 30-Nov-2012
SIMPLE FAMILY: 48523736 (size 3)	EARLIEST PRIORITY DATE: 02-Dec-2011
TITLE: CHECKOUT SYSTEM AND METHOD FOR OPERATING CHECKOUT SYSTEM	

Abstract (English):
A checkout system of an embodiment of the present disclosure has an image pickup unit, a computing unit, a display control unit, a receiving unit, and a registering unit. The image pickup unit takes pictures of a commodity at a prescribed frame rate. The computing unit computes a similarity coefficient between standard images of each commodity and the acquired image to identify possible matches to the acquired image. The display control unit displays information corresponding to the candidate matches with a high similarity coefficient on a display unit. The similarity coefficient is determined on the basis of a comparison between images of the object acquired by the image pickup unit and a standard image. The receiving unit receives selection of the commodity information on the display unit. The registering unit executes a registration treatment according to the selected information.

[0022] The display control unit displays commodity information on the display unit for a candidate commodity corresponding to the standard image having a high similarity to the product item image the basis of the similarity coefficient between the image of the object, which is contained in the last picked up image and the preceding picked up image, and the standard image.

PUBLICATION NUMBER: US 9384214 B2	PUBLICATION DATE: 05-Jul-2016
APPLICATION NUMBER: US 12/533,475	FILING DATE: 31-Jul-2009
SIMPLE FAMILY: 43527982 (size 2)	EARLIEST PRIORITY DATE: 31-Jul-2009

Abstract (English):
A search engine determines a set of other images that are similar to a user-selected image, and presents those other images to the user. In determining whether two images are sufficiently similar to each other to merit presentation of one, the search engine determines a Euclidean distance between separate feature vectors that are associated with each of the images. Each such vector indicates diverse types of information that is known about the associated image. The types of information included within such a vector may include attributes that reflect visual characteristics that are visible in an image, verbal tags that have been associated with the image users in a community of users, concepts derived from those tags, coordinates that reflect a geographic location at which a camera that produced the image was when the camera produced the image, and concepts related to groups with which the image is associated.

FIG. 1 is a block diagram that illustrates an example of two highly inclusive feature vectors and how they might be compared to determine whether the images are similar enough for one image to be returned as a result to a user's request for images that are similar to the other image, according to

Web Search History

date, time	web site	search string
2/20/2021 8:35:22 AM	Google Scholar	associating product bounding box with a shelf label
2/20/2021 9:49:31 AM	Google Scholar	product bounding box and shelf label
2/20/2021 9:49:50 AM	Google Patents	Keyword Group 1 [bounding box; shelf label; inventory catalogue
2/26/2021 1:59:09 PM	Google Images	camera bounding box
2/26/2021 1:59:09 PM	Google	camera bounding box
3/2/2021 6:54:17 AM	Google	bounding box
3/2/2021 3:31:37 PM	Google	shelf stickers associated with product having a bounding box
3/3/2021 11:26:55 AM	Google Scholar	matching labels from different stores
3/3/2021 11:27:26 AM	Google Scholar	building product catalogue database matching label from different stores
3/3/2021 11:58:20 AM	Google Images	image planogram
3/3/2021 12:01:41 PM	Google Patents	Keyword Group 1 [planogram]
3/3/2021 12:02:51 PM	Google Patents	Keyword Group 1 [overlapping first store shelf image second store shelf image]
3/3/2021 3:53:04 PM	Google Images	associate label with product
3/3/2021 4:39:11 PM	Google Scholar	store product catalogy using machine learning
3/3/2021 4:43:27 PM	Google Scholar	image recognition dictionary
3/3/2021 4:43:51 PM	Google Patents	Keyword Group 1 [image recongnition dictinary]
3/3/2021 4:44:55 PM	Google Patents	Keyword Group 1 [product catalog machine learn]

date, time	web site	search string
3/3/2021 4:46:52 PM	Google Patents	Keyword Group 1 [product catalogue machine learn] Keyword Group 2 [G06F16/51]
3/3/2021 4:47:07 PM	Google Patents	Keyword Group 1 [product catalogue inventory] Keyword Group 2 [G06F16/51] Keyword Group 3 [G06Q10/087]
3/3/2021 4:47:09 PM	Google Patents	Keyword Group 1 [G06F16/51] Keyword Group 2 [G06Q10/087]
3/3/2021 4:47:15 PM	Google Patents	Keyword Group 1 [G06F16/51] Keyword Group 2 [G06Q10/087] Keyword Group 3 [product catalogue inventory shelf label location]
3/3/2021 4:47:20 PM	Google Patents	Keyword Group 1 [G06Q10/087] Keyword Group 2 [product catalogue]
3/3/2021 4:47:56 PM	Google Patents	Keyword Group 1 [G06Q10/087] Keyword Group 2 [realogram]
3/3/2021 4:48:05 PM	Google Patents	Keyword Group 1 [G06Q10/087]
3/3/2021 4:48:20 PM	Google Images	planogram
3/3/2021 4:49:49 PM	Google Scholar	shelf label and product inspection
3/3/2021 4:50:04 PM	Google Scholar	associate shelf label with product

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L212	9904283	((brick NEAR mortar) OR stores OR retail OR “physical store$1” OR warehouse)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L213	482314	(associat* OR relat* OR connect* OR index* OR link* OR affiliat* OR tie$4 OR join* OR correlat* OR match* OR combin*) WITH (label OR mark OR tag OR stickers*) WITH (item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L214	203429	L212 AND L213	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L215	76569	G06Q10/087	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L216	8396	L214 AND L215	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L217	224943	(associat* OR relat* OR connect* OR index* OR link* OR affiliat* OR tie$4 OR join* OR correlat* OR match* OR combin*) NEAR10 (label OR mark OR tag OR stickers*) NEAR10 (item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L219	2927	L215 AND (L217 SAME L212)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L220	7898	L215 AND L217	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM

L222	37174	(camera OR (imag$3 near2 device)) near5 (captur$3 OR scan$4 OR detect$3 OR par$3 OR sens$3 OR detect$3) near5 (label OR mark OR tag OR stickers*)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L223	471	L220 AND L222	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L224	462	L220 AND L222 AND L212	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L225	33027	(training OR build* OR construct* OR form* OR develop* OR creat* OR generat*) near10 (model OR catalog OR class$5 OR library$4 OR data$1base) near10 (label OR mark* OR tag OR stickers*) NEAR10 (item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L226	22	L224 AND L225	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 03:03 PM
L227	4083	(associat* OR relat* OR connect* OR index* OR link* OR affiliat* OR tie$4 OR join* OR correlat* OR match* OR combin*) NEAR10 (label OR mark OR tag OR stickers*) NEAR10 ((imag*) NEAR (item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 04:03 PM
L228	176	L227 AND L215	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 04:03 PM
L229	12029	G06K9/3241	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 04:03 PM

L230	37	L229 AND L227	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 04:03 PM
L231	2045	(associat* OR relat* OR connect* OR index* OR link* OR affiliat* OR tie$4 OR join* OR correlat* OR match* OR combin*) NEAR5 (label OR mark OR tag OR stickers*) NEAR5 ((imag*) NEAR (item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 05:03 PM
L232	1212011	G06K9$6	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 05:03 PM
L233	733	L232 AND L231	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 05:03 PM
L234	34	(G06Q10/087) AND L233	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 05:03 PM
L235	6	(G06Q10/087) AND ((G06K9$6) AND ((correlat* OR match*) NEAR5 ((imag*) NEAR (item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise))) near5 (label OR tag OR mark))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 05:03 PM
L236	325	((correlat* OR match*) NEAR5 ((imag*) NEAR (item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise))) near5 (label OR tag OR mark)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 05:03 PM
L237	1	("9097800").pn.	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/02 05:03 PM
L248	8	storing* near5 (imag* NEAR item) near5 tag	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 06:03 PM

L249	3	correlat* near5 (imag* NEAR item) near5 tag	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/02 06:03 PM
L250	44	((US-20080077511-A1 OR US-20160063699-A1 OR US-20090060259-A1).did. AND DWPI.dbnm.) OR ((US-7693757-B2 OR US-9097800-B1 OR US-9928438-B2 OR US-10318907-B1 OR US-10169677-B1 OR US-10417696-B2 OR US-8818609-B1 OR US-10007964-B1 OR US-10334050-B2 OR US-9280757-B2 OR US-9758305-B2 OR US-10198706-B2 OR US-10198710-B1 OR US-10265859-B2 OR US-10521844-B2).did. AND USPT.dbnm.) OR ((US-20080077511-A1 OR US-20150352721-A1 OR US-20170161529-A1 OR US-20170225891-A1 OR US-20160304280-A1 OR US-20150363758-A1 OR US-20170261993-A1 OR US-20170262724-A1 OR US-20160155011-A1 OR US-20160210533-A1 OR US-20160171707-A1 OR US-20200050893-A1 OR US-20150294143-A1 OR US-20150294483-A1 OR US-20120236334-A1 OR US-20160171336-A1 OR US-20130339679-A1 OR US-20150379601-A1 OR US-20130010103-A1 OR US-20100065634-A1 OR US-20160114488-A1 OR US-20160308997-A1 OR US-20170286901-A1 OR US-20120166410-A1 OR US-20150262116-A1 OR US-20160180533-A1).did. AND PGPB.dbnm.)	(USPAT ; US-PGPUB ; FPRS ; USOCR ; IBM_TDB ; EPO ; JPO ; DERWENT ; FIT (AU , AP , AT , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO))	OR	ON	ON	2021/03/02 06:03 PM

L258	4363	(associat* OR relat* OR connect* OR index* OR link* OR affiliat* OR tie$4 OR join* OR correlat* OR combin*) NEAR10 (tag OR label OR mark OR sticker*) near10 ((item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise) NEAR (imag* OR picture OR pic OR photograph OR rendering))	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/10 12:03 PM
L259	270020	(G06Q10/087 OR G06N20/00 OR G05D1/0246 OR G06K9/00201 OR G06K9/00664 OR G06K9/3216 OR G06K9/3241 OR G06K9/6267)	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/10 12:03 PM
L260	527	L259 AND L258	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/10 12:03 PM
L262	7572	((match* OR compar* OR contrast* OR analog* OR juxtapos* OR measur* OR weigh* OR balanc* OR relat* OR correlat* OR interrelat*) NEAR10 (tag OR label OR mark OR sticker*) near10 (tag OR label OR mark OR sticker*)) SAME (multiple OR plurality OR another OR other) near10 (store OR retailer OR shop OR warehouse)	(US-PGPUB ; USPAT ; USOCR ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/10 12:03 PM
L263	943	L262 AND L259	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/10 12:03 PM
L264	1823	(robot OR (autonomous NEAR vehicle)) near5 inventory	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/10 12:03 PM
L265	60	L264 AND L262	(US-PGPUB ; USPAT ; USOCR ; FIT (CN , FR , WO) ; FPRS ; EPO ; JPO ; DERWENT ; IBM_TDB)	OR	ON	ON	2021/03/10 12:03 PM

L271	7	((US-20080077511-A1 OR US-20160171707-A1 OR US-20150363758-A1 OR US-20130010103-A1 OR US-20160155011-A1).did. AND PGPB.dbnm.) OR ((US-9097800-B1 OR US-10169677-B1).did. AND USPT.dbnm.)	(USPAT ; US-PGPUB ; FPRS ; USOCR ; IBM_TDB ; EPO ; JPO ; DERWENT ; FIT (AU , AP , AT , CA , CH , CN , DD , DE , EA , EP , ES , FR , GB , JP , KR , OA , RU , SU , WO))	OR	ON	ON	2021/03/10 01:03 PM

L272	522	("3787842" | "4926174" | "5241481" | "6741363" | "7197388" | "7369229" | "7502688" | "7917320" | "8060271" | "8111924" | "8126642" | "8170787" | "8818609" | "20050285774" | "20060125680" | "20070040121" | "20080035789" | "20080059015" | "20080162027" | "20090237269" | "20100039318" | "20100063663" | "20100063664" | "20100066587" | "20100104199" | "20100118116" | "20100150431" | "20100198488" | "20100283637" | "20110040482" | "20110274343" | "20120008129" | "20120044476" | "20120176499" | "20130038681" | "20140032012" | "6164537" | "7225980" | "7693758" | "7949568" | "8009864" | "8175925" | "8189855" | "8423431" | "8473374" | "8630924" | "8688598" | "9120621" | "9152862" | "9245170" | "9367770" | "9367831" | "9473747" | "20030002712" | "20040181467" | "20080055087" | "20080077511" | "20080109114" | "20080306787" | "20090063307" | "20090121017" | "20090245573" | "20110011936" | "20120046044" | "20120140987" | "20120284132" | "20120323620" | "20130076898" | "20130253700" | "20140003729" | "20140279294" | "20150016712" | "20150019391" | "20150052029" | "20150055821" | "20150073907" | "20150262116" | "20150379366").pn. OR ("9097800" | "2016/0171707" | "2016/0155011" | "2015/0363758" | "2013/0010103" | "2008/0077511" |	(US-PGPUB ; USPAT ; USOCR)	OR	ON	ON	2021/03/10 01:03 PM

		"10169677").urpn. AND (PGPB | USPT | USOC).dbnm.					

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N60	1913	((associat* OR relat* OR connect* OR index* OR link* OR affiliat* OR tie$4 OR join* OR correlat* OR combin*) NEAR10 (tag OR label OR mark OR sticker*) near10 ((item OR product OR article OR object OR inventory OR inventories OR goods OR food OR commodit* OR merchandise) NEAR (imag* OR picture OR pic OR photograph OR rendering)))	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N61	80131	(G06Q10/087 OR G06N20/00 OR G05D1/0246 OR G06K9/00201 OR G06K9/00664 OR G06K9/3216 OR G06K9/3241 OR G06K9/6267)	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N62	328	N60 AND N61	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N63	6680	((match* OR compar* OR contrast* OR analog* OR juxtapos* OR measur* OR weigh* OR balanc* OR relat* OR correlat* OR interrelat*) NEAR10 (tag OR label OR mark OR sticker*) near10 (tag OR label OR mark OR sticker*)) SAME (multiple OR plurality OR another OR other) near10 (store OR retailer OR shop OR warehouse)	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N64	637	N61 AND N63	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N65	847	(robot OR (autonomous NEAR vehicle)) near5 inventory	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N66	39	N65 AND N63	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N67	7	N65 AND N60	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM
N68	7	L264 AND L258	(US-PGPUB ; USPAT)	OR	ON	ON	2021/03/10 12:03 PM

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Mar 24, 2021 03:54:47 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	NOA	03/24/2021	BOSS-01001
	EXIN	03/24/2021	BOSS-01001
	892	03/24/2021	BOSS-01001
	OA.APPENDIX	03/24/2021	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	03-28-2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

U.S. PATENTS					
Examiner Initials	Cite No.	Patent Number	Issue Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
	1				

U.S. PATENT APPLICATION PUBLICATIONS					
Examiner Initials	Cite No.	Publication Number	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
	1				
	2				
	3				
	4				

FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No.	Foreign Document Number	Country Code	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
	1	2014170431 A	JP	2014-09-18	Toshiyuki et al.	
	2	2014087725A1	WO	2014-06-12	宮川　博	
	3					

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	03-28-2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

NON-PATENT LITERATURE DOCUMENTS		
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.
	1	"Photographing an image of display shelfs while pausing" and "Thorough audit of store based on 3D map"

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	03-28-2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

CERTIFICATION STATEMENT	
[X]	That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).
OR	That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).
	See attached certification statement.
	The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
	A certification statement is not submitted herewith.

SIGNATURE			
Signature	/David R. Stevens/	Date (YYYY-MM-DD)	2021-05-17
Name/Print	David R. Stevens	Registration Number	38626

Patents jp2014170431 A

Information processing system, information processing apparatus, control method thereof, and control program

JP2014170431A
Japan

Download PDF Find Prior Art Similar

Other languages: Japanese

Inventor: Toshiyuki Nomura, 俊之 野村, Kota Iwamoto, 浩太 岩元, Kyota Higa, 恭太 比嘉, Hiroyuki Ohashi, 啓之 大橋, Wataru Hattori, 渉 服部

Worldwide applications

2013 JP

Application JP2013042446A events

2013-03-04	Application filed by Nec Corp, 日本電気株式会社
2013-03-04	Priority to JP2013042446A
2014-09-18	Publication of JP2014170431A
2017-04-05	Application granted
2017-04-05	Publication of JP6108159B2
Status	Active
2033-03-04	Anticipated expiration

Info: Patent citations (4), Non-patent citations (1), Cited by (7), Legal events, Similar documents, Priority and Related Applications

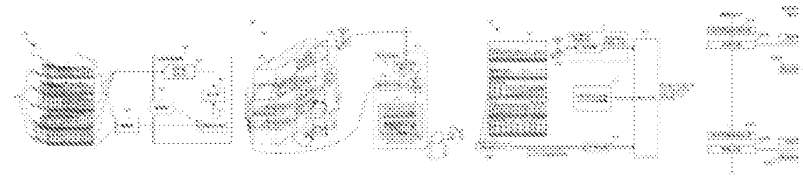
External links: Espacenet, Global Dossier, Discuss

Abstract

PROBLEM TO BE SOLVED: To effectively display the number of multiple kinds of articles displayed on a display rack.SOLUTION: An information processing apparatus includes: display quantity acquiring means which acquires information on the number of displayed article included in an article row, by means of an article presence/absence sensor arranged on

a display rack for placing the article row formed by arranging the same kind of articles from the front toward the back; article identification means which identifies the kind of the first article in the article row placed on the display rack, on the basis of an article image obtained by imaging means which captures a front face of the display rack; and display means which displays the information on the number of displayed article acquired by the display quantity acquiring means, on or adjacent to an image of the article of the kind identified by the article identification means.

Images (81)



Classifications

G06K9/4671 Extracting features based on salient regional features, e.g. Scale Invariant Feature Transform [SIFT] keypoints

View 2 more classifications

Claims (18)

Hide Dependent

1. Acquisition of display number for acquiring display number information of articles included in the article row using an article presence sensor provided on a display shelf for placing an article row in which articles of the same type are arranged from the front to the back Means,
An article identifying means for identifying the type of the first article in the article row placed on the display shelf, based on the article image acquired by the imaging means photographing the front surface of the display shelf;
Display means for displaying the number-of-displays information of the article obtained by the number-of-displays acquisition means superimposed on the image of the article of the type identified by the article identification means or arranged in the image of the article;
An information processing apparatus comprising:

2. The display means reads out and displays an image of the article of the type identified by the article identification means from an image database prepared in advance, and superimposes or arranges the images on the image. The information processing

apparatus according to claim 1, wherein the acquired display number information of the article is displayed.

3. 2. The image according to claim 1, wherein the display unit displays the display number information of the article acquired by the display number acquisition unit, superimposed on the image of the article captured by the imaging unit or arranged in the image. Processing equipment.

4. The imaging instruction means for transmitting an imaging instruction to the imaging means so as to image the display shelf in a state where the number of display of all the article rows is one or more. Information processing device.

5. Storage means for storing the number of items that are not displayed on the display shelf but can be displayed;
5. The information processing apparatus according to claim 1, wherein the display unit displays the stock quantity for each article together with the display number information of the article acquired by the display number acquisition unit.

6. The information according to claim 1, wherein the display means further displays a virtual display shelf image, and displays the image of the article in the same arrangement as the display shelf in the virtual display shelf image. Processing equipment.

7. The information processing apparatus according to claim 6, wherein the display unit has a reverse display function of displaying the virtual display shelf and the arrangement of the articles by reversing left and right.

8. The information processing apparatus according to claim 1, wherein the imaging unit is built in.

9. The article identification means includes
Local feature generating means for generating local feature quantities at a plurality of feature points from the image;
Region dividing means for clustering the plurality of feature points based on the coordinates of the plurality of feature points;
Collating means for identifying an article by collating the local feature quantity of the clustered feature points with a local feature quantity generated based on an image of the article;
The information processing apparatus according to claim 1, comprising:

10. Sensor arrangement storage means for storing the correspondence between each position of the plurality of article presence / absence sensors on the display shelf and sensor identification information;
The display number obtaining means obtains display number information of each article row from the plurality of article

presence / absence sensors together with the sensor identification information,
10. The apparatus according to claim 1, wherein the display number is associated with the type of the article obtained by the article identification unit with reference to the sensor arrangement storage unit, and the number of each display of the article is recognized. The information processing apparatus according to item.

11. A sensor sheet to which a plurality of the article presence / absence sensors are attached;
Each sensor sheet is attached with a unique sheet mark on the front surface of the display shelf,
The number-of-displays acquisition unit acquires the number-of-displays information of each article row from the plurality of article presence / absence sensors together with information on the sensor sheet,
The article identifying means further identifies the sheet mark included in the image taken by the imaging means to obtain information on the sensor sheet,
The information processing apparatus according to any one of claims 1 to 10, wherein the information on the sensor sheet is used to associate the display number information with the type of the article.

12. A plurality of the display shelves are prepared, and a unique shelf mark is attached to each front surface of the display shelves,
11. The article identification unit according to claim 10, further comprising: recognizing the shelf mark to link the display number information acquired by the display number acquisition unit and the type of article obtained by the article identification unit. Information processing device.

13. A plurality of the display shelves are prepared,
At least a part of the display shelf further includes article arrangement storage means for storing arrangements of the plurality of articles,
The information processing apparatus according to claim 10, wherein a display shelf is specified based on the arrangement of the articles, and the display number information is associated with the type of the article.

14. 11. The display number information and the type of the article are associated with each other by comparing the article presence / absence pattern identified based on the image captured by the imaging unit with the article presence / absence pattern received from the article presence / absence sensor. Information processing device.

15. Acquisition of display number for acquiring display number information of articles included in the article row using an article presence sensor

provided on a display shelf for placing an article row in which articles of the same type are arranged from the front to the back Steps,
An article identifying step for identifying the type of the first article in the article row placed on the display shelf, based on the article image acquired by the imaging means photographing the front surface of the display shelf;
A display step of displaying the display number information of the article obtained in the display number acquisition step, superimposed on the image of the article of the type identified in the article identification step or arranged in the image of the article;
A method for controlling an information processing apparatus comprising:

16. Acquisition of display number for acquiring display number information of articles included in the article row using an article presence sensor provided on a display shelf for placing an article row in which articles of the same type are arranged from the front to the back Steps,
An article identifying step for identifying the type of the first article in the article row placed on the display shelf, based on the article image acquired by the imaging means photographing the front surface of the display shelf;
A display step of displaying the display number information of the article obtained in the display number acquisition step, superimposed on the image of the article of the type identified in the article identification step or arranged in the image of the article;
Control program for information processing apparatus for causing computer to execute

17. An article presence sensor provided on a display shelf for placing an article row in which articles of the same type are arranged from the front toward the back;
Display number acquisition means for acquiring display number information of articles included in the article string using the article presence sensor;
Imaging means for photographing the front surface of the display shelf;
Article identifying means for identifying the type of the first article in the article row placed on the display shelf based on the article image acquired by the imaging means;
Display means for displaying the number-of-displays information of the article obtained by the number-of-displays acquisition means superimposed on the image of the article of the type identified by the article identification means or arranged in the image of the article;
Information processing system with

18. A tablet terminal comprising the imaging means, the article identification means, and the display means;
A server comprising the display number acquisition means;
The information processing system according to claim 17, comprising:

Description

The present invention relates to a technique for managing displayed articles.

In the above technical field, Patent Documents 1 and 2 disclose techniques for displaying the display status of products on a shelf.

JP 2012-173854 A JP 2012-174154 A

However, in the technique described in Patent Document 1, the shelf allocation situation is merely indicated by characters, and the display shelf cannot grasp the situation intuitively. In addition, the technique described in Patent Document 2 can be applied only to a special display shelf that can photograph the product status from diagonally above, and is not versatile. That is, in the above-described document description technology, the number of plural types of articles displayed on the display shelf cannot be effectively displayed.

The objective of this invention is providing the technique which solves the above-mentioned subject.

In order to achieve the above object, an information processing apparatus according to the present invention provides:
Acquisition of display number for acquiring display number information of articles included in the article row using an article presence sensor provided on a display shelf for placing an article row in which articles of the same type are arranged from the front to the back Means,
An article identifying means for identifying the type of the first article in the article row placed on the display shelf, based on the article image acquired by the imaging means photographing the front surface of the display shelf;
Display means for displaying the number-of-displays information of the article obtained by the number-of-displays acquisition means superimposed on the image of the article of the type identified by the article identification means or arranged in the image of the article;
Equipped with.

In order to achieve the above object, a method for controlling an information processing apparatus according to the present invention includes:
Acquisition of display number for acquiring display number information of articles included in the article row using an article presence sensor provided on a display shelf for placing an article row in which articles of the same type are arranged from the front to the back Steps,
An article identifying step for identifying the type of the first article in the article row placed on the display shelf, based on the article image

acquired by the imaging means photographing the front surface of the display shelf;
A display step of displaying the display number information of the article obtained in the display number acquisition step, superimposed on the image of the article of the type identified in the article identification step or arranged in the image of the article;
Equipped with.

In order to achieve the above object, a control program for an information processing apparatus according to the present invention provides:
Acquisition of display number for acquiring display number information of articles included in the article row using an article presence sensor provided on a display shelf for placing an article row in which articles of the same type are arranged from the front to the back Steps,
An article identifying step for identifying the type of the first article in the article row placed on the display shelf, based on the article image acquired by the imaging means photographing the front surface of the display shelf;
A display step of displaying the display number information of the article obtained in the display number acquisition step, superimposed on the image of the article of the type identified in the article identification step or arranged in the image of the article;
Is executed on the computer.

In order to achieve the above object, an information processing system according to the present invention provides:
An article presence sensor provided on a display shelf for placing an article row in which articles of the same type are arranged from the front toward the back;
Display number acquisition means for acquiring display number information of articles included in the article string using the article presence sensor;
Imaging means for photographing the front surface of the display shelf;
Article identifying means for identifying the type of the first article in the article row placed on the display shelf based on the article image acquired by the imaging means;
Display means for displaying the number-of-displays information of the article obtained by the number-of-displays acquisition means superimposed on the image of the article of the type identified by the article identification means or arranged in the image of the article;
Equipped with.

ADVANTAGE OF THE INVENTION According to this invention, the number of the multiple types of articles | goods displayed on the display shelf can be displayed effectively.

It is a block diagram which shows the structure of the information processing apparatus which concerns on 1st Embodiment of this invention. It is a figure which shows the outline | summary of the article | item management system containing the information processing

apparatus which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the structure of the article | item management system containing the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a sequence diagram which shows the operation | movement procedure of the article | item management system containing the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a timing diagram which shows the example of the operation | movement timing of the article | item management system containing the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a timing diagram which shows the other example of the operation timing of the article | item management system containing the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a timing diagram which shows the further another example of the operation | movement timing of the article | item management system containing the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the function structure of the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the local feature-value database which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the sensor database which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the goods kind arrangement | sequence table which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the article presence / absence arrangement | sequence table which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the article | item management table which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the structure of the articles | goods identification part which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the structure of the area | region division part in the goods identification part of FIG. 6A which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the other structure of the articles | goods identification part which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the structure of the area | region division part in the goods identification part of FIG. 6C which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the further another structure of the articles | goods identification part which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the structure of the area | region division part in the article identification part of FIG. 6E which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the other structure of the area | region division part in the article identification part of FIG. 6E which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the structure of the local feature-value production | generation part which concerns on 2nd Embodiment of this invention. It is a figure explaining the procedure of the local feature-value production | generation which concerns on 2nd

Embodiment of this invention. It is a figure explaining the procedure of the local feature-value production | generation which concerns on 2nd Embodiment of this invention. It is a figure which shows the selection order of the sub area | region in the local feature-value production | generation part which concerns on 2nd Embodiment of this invention. It is a figure which shows the selection order of the feature vector in the local feature-value production | generation part which concerns on 2nd Embodiment of this invention. It is a figure which shows hierarchization of the feature vector in the local feature-value production | generation part which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the structure of the articles | goods arrangement | sequence production | generation part which concerns on 2nd Embodiment of this invention. It is a sequence diagram which shows the operation | movement procedure of the article presence / absence data acquisition which concerns on 2nd Embodiment of this invention. It is a sequence diagram which shows the communication procedure at the time of the article presence / absence data acquisition which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the sensor database which concerns on 2nd Embodiment of this invention. It is a figure which shows the other structure of the sensor database which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the article presence / absence sensor which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the reader antenna in the article presence sensor which concerns on 2nd Embodiment of this invention. It is a figure which shows arrangement | positioning of the articles | goods in the article presence sensor which concerns on 2nd Embodiment of this invention. It is a figure which shows the structure of the RFID tag in the article presence sensor which concerns on 2nd Embodiment of this invention. It is a figure which shows the positional relationship in the article presence sensor which concerns on 2nd Embodiment of this invention. It is a block diagram which shows the hardware constitutions of the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a figure which shows the output of the process result of the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a flowchart which shows the process sequence of the information processing apparatus which concerns on 2nd Embodiment of this invention. It is a flowchart which shows the procedure of the recognition process of the shelf surface article arrangement | sequence which concerns on 2nd Embodiment of this invention. It is a flowchart which shows the procedure of the article presence detection process which concerns on 2nd Embodiment of this invention. It is a flowchart which shows the procedure of the article arrangement | positioning which concerns on 2nd Embodiment of this invention, and a remaining number determination process. It is a figure which shows the outline | summary of the article | item management system containing the information processing apparatus which concerns on 3rd Embodiment of this invention. It is a sequence diagram which shows the operation | movement procedure of the article | item

management system containing the information processing apparatus which concerns on 3rd Embodiment of this invention. It is a block diagram which shows the function structure of the information processing apparatus which concerns on 3rd Embodiment of this invention. It is a figure which shows the structure of the local feature-value database which concerns on 3rd Embodiment of this invention. It is a figure which shows the structure of the sheet | seat management database which concerns on 3rd Embodiment of this invention. It is a figure which shows the structure of the goods kind arrangement | sequence table which concerns on 3rd Embodiment of this invention. It is a flowchart which shows the process sequence of the information processing apparatus which concerns on 3rd Embodiment of this invention. It is a flowchart which shows the procedure of the sheet mark identification process which concerns on 3rd Embodiment of this invention. It is a figure which shows the outline | summary of the article | item management system containing the information processing apparatus which concerns on 4th Embodiment of this invention. It is a sequence diagram which shows the operation | movement procedure of the article | item management system containing the information processing apparatus which concerns on 4th Embodiment of this invention. It is a block diagram which shows the function structure of the information processing apparatus which concerns on 4th Embodiment of this invention. It is a figure which shows the structure of the local feature-value database which concerns on 4th Embodiment of this invention. It is a figure which shows the structure of the shelf management database which concerns on 4th Embodiment of this invention. It is a figure which shows the structure of the goods kind arrangement | sequence table which concerns on 4th Embodiment of this invention. It is a flowchart which shows the process sequence of the information processing apparatus which concerns on 4th Embodiment of this invention. It is a flowchart which shows the procedure of the shelf mark identification process which concerns on 4th Embodiment of this invention. It is a figure which shows the outline | summary of the article | item management system containing the information processing apparatus which concerns on 5th Embodiment of this invention. It is a sequence diagram which shows the operation | movement procedure of the article | item management system containing the information processing apparatus which concerns on 5th Embodiment of this invention. It is a block diagram which shows the function structure of the information processing apparatus which concerns on 5th Embodiment of this invention. It is a figure which shows the structure of the goods row management database which concerns on 5th Embodiment of this invention. It is a flowchart which shows the process sequence of the information processing apparatus which concerns on 5th Embodiment of this invention. It is a flowchart which shows the procedure of the goods row | line | column identification process which concerns on 5th Embodiment of this invention. It is a figure which shows the outline | summary of the article | item management system containing the information processing apparatus which concerns on 6th Embodiment of

this invention. It is a figure which shows the outline | summary of the article | item management system containing the information processing apparatus which concerns on 6th Embodiment of this invention. It is a block diagram which shows the function structure of the information processing apparatus which concerns on 6th Embodiment of this invention. It is a figure explaining the article display determination process which concerns on 6th Embodiment of this invention. It is a flowchart which shows the process sequence of the information processing apparatus which concerns on 6th Embodiment of this invention. It is a flowchart which shows the procedure of the article display determination process which concerns on 6th Embodiment of this invention. It is a figure which shows the outline | summary of the article | item management system containing the information processing apparatus which concerns on 7th Embodiment of this invention. It is a block diagram which shows the function structure of the information processing apparatus which concerns on 7th Embodiment of this invention. It is a flowchart which shows the process sequence of the information processing apparatus which concerns on 7th Embodiment of this invention. It is a flowchart which shows the procedure of the adjustment process of the article presence detection which concerns on 7th Embodiment of this invention, and an article identification. It is a figure which shows the outline | summary of the article | item management system containing the information processing apparatus which concerns on 8th Embodiment of this invention. It is a sequence diagram which shows the operation | movement procedure of the article | item management system containing the information processing apparatus which concerns on 8th Embodiment of this invention. It is a block diagram which shows the function structure of the information processing apparatus which concerns on 8th Embodiment of this invention. It is a figure explaining the article presence / absence sequence collation which concerns on 8th Embodiment of this invention. It is a flowchart which shows the process sequence of the information processing apparatus which concerns on 8th Embodiment of this invention. It is a flowchart which shows the procedure of the presence or absence sequence collation process which concerns on 8th Embodiment of this invention. It is a figure which shows the structure of the article | item management system which concerns on 9th Embodiment of this invention.

Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the drawings. However, the constituent elements described in the following embodiments are merely examples, and are not intended to limit the technical scope of the present invention only to them.

[First Embodiment]

An information processing apparatus 100 as a first embodiment of the present invention will be described with reference to FIG. The information processing apparatus 100 is an apparatus for managing displayed items.

As illustrated in FIG. 1, the information processing apparatus 100 includes a display number acquisition unit 101, an image reception unit 102, an article identification unit 103, and a display unit 104.

The display number acquisition unit 101 uses the article presence / absence sensor 130 provided on a display shelf on which an article row in which articles of the same type are arranged from the front to the back is used to display the articles included in the article row 110. Get number information.

The article identifying unit 103 identifies the type of the first article in the article row placed on the display shelf 110 based on the article image acquired by the imaging unit 120 photographing the front surface of the display shelf 110.

The display unit 104 displays the display number information of the article acquired by the display number acquisition unit 101, superimposed on the image of the article of the type identified by the article identification unit 103 or arranged on the image of the article.

According to the present embodiment, since an image of an article and the number of articles displayed are displayed at the same time, an image that intuitively shows the status of a plurality of types of articles displayed on a display shelf is generated and displayed in a very simple and real-time manner. can do.

[Second Embodiment]
Next, an article management system will be described as an example of an information processing system including an information processing apparatus according to the second embodiment of the present invention. In the present embodiment, an article is identified based on a local feature amount from a captured image, and is displayed in the depth direction on the display shelf by being associated with the article presence / absence information from the article presence / absence sensor installed on the article display shelf. A large number of multiple types of articles are counted at high speed for each type.

《Goods management system》
With reference to FIG. 2A-FIG. 3D, the structure and operation | movement of the article | item management system 200 of this embodiment are demonstrated.

(System overview)
FIG. 2A is a diagram illustrating an overview of an article management system 200 including the information processing apparatus 210 according to the present embodiment. In FIG. 2A, a merchandise display shelf in a store will be described as an example, but the present invention is not limited to this. Any display shelf in which a plurality of articles are arranged in the depth direction may be used.

The article management system 200 includes an information processing apparatus 210, an imaging unit 220 that is a camera, and an article presence / absence sensor 230. The imaging unit 220 captures an image in the front row of the display shelf 201. On the other hand, each of the plurality of article presence / absence sensors 230 arranged at the bottom of each stage of each display shelf 201 determines the presence / absence of an article placed on the article presence / absence sensor 230.

The information processing apparatus 210 includes an article identification unit 211, a display number acquisition unit 212, a display recognition unit 213, and a display unit 214. The article identifying unit 211 identifies the type and arrangement of the displayed articles based on the image in the front row of the display shelf 201 from the imaging unit 220. The article identifying unit 211 identifies the type, manufacturer, and article name of the article. The display number acquisition unit 212 uses the article presence / absence sensor 230 provided on the display shelf 201 on which the article row in which the same type of articles are arranged from the front to the back is used to display the articles included in the article row. Get number information. The display recognizing unit 213 recognizes the display number of each item on the display shelf 201 by associating the front row of the product array of the display shelf 201 from the product identification unit 211 with the display number information from the display number acquisition unit 212. To do.

The display unit 214 displays the acquired number-of-displays information of each article superimposed on the image of the identified type of article or arranged on the article image. Thereby, inventory management of the display shelf 201 becomes possible, and the store clerk can grasp very easily what and where the goods with a small display quantity should be replenished.

(System configuration)
FIG. 2B is a block diagram illustrating a configuration of the article management system 200 including the information processing apparatus 210.

In order to recognize the number of display shelves 201 of each article, the display recognizing unit 213 links the front-row article arrangement of the display shelves 201 from the article identification unit 211 with the display number information from the display number acquiring unit 212. wear. By associating the type information of each item from the item identification unit 211 with the display number information from the display number acquisition unit 212, the number of items displayed on the display shelf can be determined.

The position information 215 of the article presence / absence sensor 230 in the image shown in FIG. 2B is information that associates each article identification information from the article identification unit 211 with the display number information from the display number acquisition

unit 212. In the present embodiment, a case will be described in which the information processing apparatus 210 has the position information 215 of the article presence / absence sensor 230 in advance.

(Operation procedure)
FIG. 3A is a sequence diagram illustrating an operation procedure of the article management system 200 including the information processing apparatus 210.

The imaging unit 220 acquires a front image of the display shelf in step S301, and transmits the front image to the information processing apparatus 210 in step S303. On the other hand, the article presence / absence sensor 230 including the detection sensor group detects the article presence / absence on each sensor in step S305, and transmits the article presence / absence information to the information processing apparatus 210 in step S307.

In step S309, the article identification unit 211 performs individual article identification based on the front image of the display shelf.

Next, the display recognizing unit 213 specifies a position in the image of the sensor sheet in step S311. Here, the sensor sheet is a sheet having at least one sensor row, and a plurality of depth sensors for the presence / absence of articles in each row. Regarding the sensor sheet, the relationship between the sensor sheet ID and the absolute position (which position of which shelf of which shelf is disposed) is stored in advance in a table. For this reason, as long as the imaging position is known, the position of the sensor sheet in the image can be derived.

In step S313, the display recognizing unit 213 associates the position of the identified article with the number in the depth direction. Thereby, the number of displays of each article on the display shelf is counted. In step S315, the information processing apparatus 210 performs inventory management processing based on the number of display items on the display shelf.

(Operation timing)
FIG. 3B is a timing chart showing the operation timing 310 of the information processing apparatus 210.

The article identification process 311 for identifying each article displayed from the image on the front surface of the display shelf photographed by the imaging unit 220 is realized in about 10 seconds, for example. On the other hand, the article presence / absence processing 312 for collecting and organizing article presence / absence information from the article presence / absence sensor 230 is realized in about 1 second, for example. Here, the article identification process 311 and the article presence / absence process 312 are not associated with each other and are performed at independent timings. The article display number determination process 313 for specifying the arrangement and

number of articles on the display shelf is performed following the end of the article presence / absence process 312.

FIG. 3C is a timing diagram showing another example 320 of the operation timing of the information processing apparatus 210. In FIG. 3C, for example, adjustment is made so that each article presence / absence process 322 ends in accordance with the completion timing of the article identification process 311 that requires a processing time of about 10 seconds. The article display number determination process 323 is performed in response to the article identification completion by the article identification process 311 and the article presence / absence detection completion by the article presence / absence process 322. According to the operation timing 320, the number of article presence / absence processes 322 can be reduced to the number of article identification processes 311 and the article display number determination process 323 can be effectively performed.

FIG. 3D is a timing diagram showing still another example 330 of the operation timing of the information processing apparatus 210. In this example, when there is a change in the article presence / absence information by the article presence / absence process 312 (335), the article identification process 331 is started. Then, upon completion of article identification by the article identification process 331, a display number calculation process 333 is performed. In this case, since the article identification process 331 is performed at the timing when the number of articles is changed by the article presence / absence process 312 (whether the customer has picked up or the store clerk replenished), the number of the article identification process 331 is reduced, and the display number calculation process 333 can be performed effectively.

Note that the timing may be controlled to start the article presence / absence process when a change in the article is recognized from the front image of the display shelf.

<< Functional configuration of information processing device >>
FIG. 4 is a block diagram illustrating a functional configuration of the information processing apparatus 210. Components similar to those in FIGS. 2A and 2B are denoted by the same reference numerals.

The information processing apparatus 210 includes a communication control unit 401 that communicates via a WAN (Wide Area Network) or a LAN (Local Area Network). The image reception unit 402 receives an image of the front surface of the display shelf captured by the imaging unit 220 via the communication control unit 401. The article identifying unit 211 collates the local feature quantity generated from the article image stored in the local feature quantity database 403 with the local feature quantity generated from the image on the front side of the display shelf, and the image on the front side of the display shelf. Identify the type of article contained within. On the other hand, the article presence / absence information receiving unit 405 receives the article presence /

absence information from the article presence / absence sensor 230 via the communication control unit 401.

The article arrangement generation unit 407 refers to the arrangement information of the article presence / absence sensors 230 in the display shelf stored in the sensor database 406, and generates an article presence / absence arrangement table indicating the article arrangement of the display shelf from the article presence / absence information. The display recognition unit 213 associates the product identification information identified by the product identification unit 211 with the product presence / absence information generated by the product array generation unit 407, determines the shelf allocation of the display shelf, and stores the product on the display shelf. Calculate the number of displays for each type. The number of displays is calculated by accumulating the number of articles linked to the article series having the same article identification information.

The store inventory management unit 410 refers to an inventory management database 409 that stores store inventory information based on the number of displays derived by the display recognition unit 213, and performs inventory management processing of articles displayed at the store like a display shelf. . The result of inventory management is displayed on the display unit 214 or is notified to the outside from the display information transmission unit 411 via the communication control unit 401. In addition, each function unit operates according to an operation instruction received by the operation information reception unit 412 from the operation unit or via the communication control unit 401.

(Local feature database)
FIG. 5A is a diagram illustrating a configuration of the local feature database 403. The local feature amount database 403 stores local feature amounts generated in advance from the sample images of each article, and is used to identify the article in comparison with the local feature amounts generated from the input image. The local feature quantity database 403 stores an article name / type 512, a local feature quantity group 513 generated from the article, and sample image data (front image data) 514 of each type of article in association with the article ID 511. That is, a part of the local feature database 403 functions as an image database prepared in advance.

(Sensor database)
FIG. 5B is a diagram showing the configuration of the sensor database 406a. The sensor database 406a is a part of the sensor database 406. The sensor database 406a stores the positions of the sensor sheets arranged on the display shelf in the display shelf, the article arrangement in the front row of the display shelf, and the article presence / absence from the article presence / absence sensor. Used to link information. The configuration of the sensor database 406a is not limited to that shown in FIG. 5B as long as the article presence / absence sensor is information associated with the position on the display shelf.

The sensor database 406a stores a shelf position 522 and a plurality of steps 523 in association with the shelf ID 521 of the display shelf. In association with each step 523, the total number of rows 524, the total number of articles 525, and sensor sheet IDs 526 of a plurality of sensor sheets arranged in that step are stored. The sensor sheet configuration 527 is stored in association with each sensor sheet ID 526. The sensor sheet configuration 527 includes the number of columns, the column width, the depth number, the depth width, and the number of articles on the sensor sheet.

(Article type arrangement table)
FIG. 5C is a diagram showing the configuration of the article type arrangement table 530. The article type arrangement table 530 is a table that stores articles identified by the article identifying unit 211 from the front image of the display shelf.

The article type arrangement table 530 stores a shelf position 532 and a plurality of steps 533 in association with the shelf ID 531. The identified item ID 534, the item name / type 535, and the item image 536 are stored in association with each step 533. The article image 536 may be a local feature amount.

(Article presence / absence arrangement table)
FIG. 5D is a diagram showing a configuration of the article presence / absence arrangement table 540. The article presence / absence array table 540 is a table that stores the article presence / absence results received by the article array generation unit 407 from the article presence / absence sensor.

The article presence / absence arrangement table 540 stores a column 542 included in the sensor sheet, a display number 543 of the column, and an article arrangement 544 in association with the sensor sheet ID 541. The article arrangement 544 stores the total number of depths and the presence / absence of articles in the column. In FIG. 5D, the presence of an article is indicated by ●, and the absence of an article is indicated by ○. By storing in this way, it is possible to detect an error such as the absence of an article while the article is present.

(Goods management table)
FIG. 5E is a diagram showing the configuration of the article management table 550. The article management table 550 is a table that stores the article display position and the number of displays calculated after the display recognition unit 213 links the article type arrangement table 530 and the article presence / absence arrangement table 540. In FIG. 5E, the same reference numerals are assigned to the same items as in FIGS. 5C and 5D.

The article management table 550 stores a shelf position 532 and a plurality of steps 533 in association with the shelf ID 531. The face ID 551 is stored in association with each step 533 in order from the left to the right of the step. Then, in association with each face ID 551, the item

ID 534, the item name / type 535, the item image 536, the display number 543, and the item arrangement 544 of the face (item column) are stored.

A replenishment flag 552 is stored from the display number 543 of each face. In the article management table 550, "◯" indicates that replenishment is required, "Δ" indicates replenishment caution, and "×" indicates that replenishment is not necessary. Also, a warning flag 553 is stored from the article arrangement 544 in each column. In the article management table 550, "◯" indicates that warning is required, and "×" indicates that warning is not required. In the article management table 550, as shown in FIG. 5D, in the fifth column, an error in which no article is caught while there is an article is determined.

<Article identification part>
(Configuration example)
FIG. 6A is a block diagram illustrating a configuration example of the article identification unit 211a. The article identifying unit 211a is an example of the article identifying unit 211 in FIG. 4, and includes a captured image local feature generation unit 601, an area dividing unit 602, and a matching unit 603.

The captured image local feature value generation unit 601 detects a large number of feature points from the captured image in front of the display shelf, and divides the coordinate position information group of the captured image formed by the coordinate positions of the large number of feature points into a region dividing unit 602. To output. Also, the local feature value generation unit 601 of the captured image compares a local feature amount group of the captured image configured by local feature amounts of the peripheral region (neighboring region) including the feature point from the coordinate position of each feature point. To output.

The region dividing unit 602 clusters the feature points of the photographed image using the coordinate position information group of the photographed image output from the local feature amount generation unit 601 of the photographed image. Then, the area dividing unit 602 outputs a cluster information group including a plurality of pieces of cluster information related to a plurality of clusters including one or more feature points to the collating unit 603.

The collation unit 603 outputs the local feature amount group of the captured image output from the local feature amount generation unit 601 of the captured image, the local feature amount group of the article image stored in the local feature amount database 403, and the region dividing unit 602 outputs Cluster information group. Then, the collation unit 603 collates the local feature amount group of the captured image with the local feature amount group of the article image for each cluster, thereby determining the identity or similarity for each feature point. As a result, the collation unit 603 identifies the same or similar subject between the captured image and the article image, and outputs the

article ID as the identification result (collation result). Furthermore, the collation unit 503 may output information on regions determined to be the same or similar in the captured image based on the coordinate position information of the feature points belonging to the cluster for the feature points determined to be the same or similar. .

FIG. 6B is a block diagram illustrating a configuration of the area dividing unit 602 in the article identifying unit 211a of FIG. 6A. The area dividing unit 602 includes a similarity calculation unit 611 and a feature point clustering unit 612.

The similarity calculation unit 611 calculates the similarity between any two local feature amounts in the local feature amount group of the captured image output by the captured image local feature amount generation unit 601 and also calculates the calculated multiple similarities. And output to the feature point clustering unit 612 as a similarity information group. As a method for calculating the similarity of local feature amounts, for example, a feature distance between two arbitrary local feature amounts (for example, Euclidean distance) is calculated, and similarity is calculated based on the distance. It is done. At this time, for example, the similarity may be increased when the distance value is small, and the similarity may be decreased when the distance value is large. It is also conceivable to use a method of normalizing the distance between feature amounts with a predetermined value and calculating the degree of similarity from the normalized value.

The feature point clustering unit 612 uses the coordinate position information group of the photographed image output by the local feature amount generation unit 601 of the photographed image and the similarity information group output by the similarity calculation unit 611 to use the feature points of the photographed image. Are clustered. Then, the feature point clustering unit 612 outputs a cluster information group indicating the clustering result to the matching unit 603. Here, the feature point clustering unit 612 may perform clustering so that the local feature amounts are classified into clusters having different degrees of similarity (small distance values), for example. For clustering of feature points, for example, it is conceivable to use a method of calculating the distance between an arbitrary feature point of a captured image and the center of gravity of each cluster and classifying the feature point into a cluster having the smallest calculated distance. . At this time, when a feature point having a similarity equal to or higher than a threshold is included in an arbitrary cluster, for example, a feature point having a long distance to the cluster centroid may be excluded from the cluster and classified into another cluster. . Here, for the distance between each feature point and the cluster centroid, for example, the Euclidean distance may be used, the Mahalanobis distance may be used, or the urban area distance (Manhattan distance) may be used.

Further, clustering may be performed using a graph cut. For example, a graph cut may be provided for a graph obtained by calculating an edge

value based on the distance between feature points and the similarity between the local feature amounts, using the feature points as nodes. For example, the edge value between two nodes may be increased as the distance between feature points is smaller and the similarity between local feature amounts is larger. For the graph cut, for example, a normalized cut may be used, or a Markov cluster algorithm may be used.

(Another configuration example of the article identification unit)
FIG. 6C is a block diagram illustrating another configuration example of the article identification unit 211b. The article identification unit 211b includes a local feature amount generation unit 601 of a captured image, an area division unit 622, and a collation unit 603. Here, the operations of the local feature quantity generation unit 601 and the collation unit 603 of the captured image are the same as those in FIG. Hereinafter, the operation of the area dividing unit 622 will be mainly described.

The area dividing unit 622 includes a local feature amount group of the captured image and a coordinate position information group of the captured image output from the local feature amount generation unit 601 of the captured image, and a local feature amount group of the article image output from the local feature amount database 403. And are used. The area dividing unit 622 clusters the feature points of the captured image and outputs a cluster information group related to the clustering result to the matching unit 603.

FIG. 6D is a block diagram illustrating a configuration of the area dividing unit 622 in the article identifying unit 211b. The area dividing unit 622 includes a corresponding point searching unit 631 and a feature point clustering unit 632.

The corresponding point search unit 631 uses the local feature amount group of the captured image output from the local feature amount generation unit 601 of the captured image and the local feature amount group of the article image output from the local feature amount database 403. Then, the corresponding point search unit 631 determines which local feature amount included in the local feature amount group of the photographed image matches which local feature amount of the local feature amount group of the article image, that is, any arbitrary feature of the captured image. Correspondence information that is information regarding which feature point of the article image corresponds to the feature point is generated. Furthermore, the corresponding point search unit 631 outputs the generated large number of corresponding information to the feature point clustering unit 632 as a corresponding information group.

For example, the correspondence information may be generated using a method similar to that of the collation unit 603 in FIG. 6A. Here, as for the correspondence relationship, a certain feature point of the article image may correspond to a plurality of feature points of the captured image.

Furthermore, the feature points of the captured image may correspond to the feature points of the article image on a one-to-one basis.

The feature point clustering unit 632 uses the coordinate position information group output by the local feature amount generation unit 601 of the captured image and the correspondence information group output by the corresponding point search unit 631. Then, the feature point clustering unit 632 selects feature points corresponding to the feature points of the article image from among the feature points of the captured image, and then selects the feature points of the selected captured image based on their coordinate positions. Clustering. Further, the feature point clustering unit 632 outputs a cluster information group indicating the result of clustering to the matching unit 603. For clustering of feature points, it may be possible to use a known method.

Further, the feature point clustering unit 632 may perform clustering so that the feature points of the photographed image are classified into different clusters when the feature points of the article image correspond to a plurality of feature points of the photographed image. . For this purpose, for example, the feature point clustering unit 632 may use clustering by graph cut. In this case, when the feature points of the article image correspond to a plurality of feature points of the captured image, the plurality of feature points of the captured image are used as nodes so that the edge value between those nodes is small. Generate a graph. In that case, a graph cut is applied so as to divide between nodes having small edge values. For the graph cut, for example, a normalized cut or a Markov cluster algorithm may be used.

The feature point clustering unit 632 also determines that the distance between any two feature points of the first image is less than the threshold value, and the distance between feature points of the article image corresponding to those feature points is greater than another threshold value. The two feature points of the captured image may be classified into different clusters. For this reason, it is also conceivable to use clustering by graph cut as described above.

Further, the feature point clustering unit 632 counts feature points included in the region for each analysis region of an arbitrary size, for example, and if the count value is equal to or greater than a predetermined threshold, the feature points included in the region are the same. You may use the method of classifying into a cluster. By clustering the feature points in this way, there is an effect that processing can be performed at higher speed.

(Still another configuration example of the article identification unit)
FIG. 6E is a block diagram showing still another configuration of the article identification unit 211c. The article identifying unit 211c includes a captured image local feature amount generating unit 601, an area dividing unit 642, and a matching unit 603. Here, the operations of the

local feature quantity generation unit 601 and the collation unit 603 of the captured image are the same as those in FIGS.

The region dividing unit 642 includes a local feature amount group of the captured image and a coordinate position information group of the captured image output by the local feature amount generation unit 601 of the captured image, and a local feature of the article image output by the local feature amount database 403. The quantity group and the coordinate position information group of the article image are used. The area dividing unit 642 clusters the feature points of the captured image and outputs a cluster information group indicating the clustering result to the matching unit 603.

FIG. 6F is a block diagram illustrating a configuration of the area dividing unit 642a in the article identifying unit 211c. The area dividing unit 642a is an example of the area dividing unit 642 in FIG. 6E and includes a corresponding point searching unit 631, a ratio calculating unit 652, and a feature point clustering unit 653.

The corresponding point search unit 631 generates a corresponding information group by the same operation as in FIG. 6D, and outputs the generated corresponding information group to the ratio calculation unit 652 and the feature point clustering unit 653.

The ratio calculation unit 652 includes a local feature amount group of the captured image output from the local feature amount generation unit 601 of the captured image, a local feature amount group of the article image output from the local feature amount database 403, and a corresponding point search unit 631. The output correspondence information group is used. The ratio calculation unit 652 then compares the distance between any two feature points of the captured image (hereinafter referred to as the feature point distance) and the distance between the feature points of the second image corresponding to those feature points. Is calculated. The ratio calculation unit 652 further outputs the calculated numerous ratios to the feature point clustering unit 653 as a ratio information group. Here, it is conceivable to use, for example, the Euclidean distance, the Mahalanobis distance, and the city area distance as the distance between the feature points.

The feature point clustering unit 653 includes the coordinate position information group of the captured image output from the local feature amount generation unit 601 of the captured image, the correspondence information group output from the corresponding point search unit 631, and the ratio information output from the ratio calculation unit 652. Use groups. Then, the feature point clustering unit 653 clusters the feature points of the captured image and outputs a cluster information group indicating the result to the matching unit 603. Here, for example, it is conceivable to perform clustering so that feature points having a small calculated ratio difference are classified into the same cluster (feature points having a large ratio difference are classified into different

clusters). At this time, for example, clustering may be performed using a graph cut. More specifically, for example, a graph cut may be performed on a graph obtained by using feature points as nodes and increasing the edge value between nodes based on the distance between the feature points and the difference in ratio. It is done. For the graph cut, for example, a normalized cut may be used, or a Markov cluster algorithm may be used.

The feature point clustering unit 653 may use the coordinate position information group, the correspondence information group, and the ratio information group to cluster the feature points of the captured image as follows, for example. In this case, by using a ratio information group of a certain feature point and a plurality of surrounding feature points, a belonging probability that the feature point belongs to an arbitrary cluster is calculated. In this case, the feature point clustering unit 653 performs clustering based on the calculated affiliation probability and the coordinate position information of the feature point. For example, a feature point of a captured image corresponding to an arbitrary feature point of the article image may be selected based on the correspondence information group. Further, the distance between the feature point and each cluster centroid may be calculated based on the coordinate position information and the affiliation probability. Further, a method of classifying the feature points into clusters having the smallest calculated distance may be used.

FIG. 6G is a block diagram illustrating a configuration of the area dividing unit 642b in the article identifying unit 211c. The area dividing unit 642b is another example of the area dividing unit 642 in FIG. 6E, and includes a corresponding point searching unit 631, a ratio calculating unit 652, a rotation amount calculating unit 661, and a feature point clustering unit 662. Here, the operation of the ratio calculation unit 652 is the same as that in FIG.

Corresponding point search unit 631 generates a corresponding information group by the same operation as in FIG. 6D, and outputs the generated corresponding information group to ratio calculation unit 652, rotation amount calculation unit 661, and feature point clustering unit 662.

The rotation amount calculation unit 661 includes the coordinate position information group of the captured image output from the local feature amount generation unit 601 of the captured image, the correspondence information group output from the corresponding point search unit 631, and the article output from the local feature amount database 403. An image coordinate position information group is used. Then, the rotation amount calculation unit 661 calculates the direction of the vector composed of the two feature points of the captured image and the direction of the vector composed of the two feature points of the article image. Further, the rotation amount calculation unit 661 calculates the rotation amount of the subject of the captured image from the

calculated vector direction, and outputs the calculated many rotation amounts to the feature point clustering unit 662 as a rotation amount information group.

The feature point clustering unit 662 includes a coordinate position information group of the captured image output from the local feature amount generation unit 601 of the captured image, a correspondence information group output from the corresponding point search unit 631, and ratio information output from the ratio calculation unit 652. The group and the rotation amount information group output by the rotation amount calculation unit 661 are used. Then, the feature point clustering unit 662 clusters feature points of the captured image. Then, the feature point clustering unit 662 outputs a cluster information group, which is information related to each cluster obtained as a result of clustering, to the matching unit 603.

Here, for example, feature points having a small difference in calculated ratio and difference in rotation amount are classified into the same cluster (feature points having a large difference in ratio and difference in rotation amount are classified into different clusters). Also good. For example, clustering using a graph cut can be considered. For example, a graph cut may be provided for a graph obtained by calculating edge values based on a distance between feature points, a difference in ratio, and a difference in rotation amount, using the feature points as nodes. For example, the edge value between two nodes may be increased as the distance value between feature points is smaller and the difference in ratio and the difference in rotation amount are smaller. Here, for the graph cut, for example, a normalized cut or a Markov cluster algorithm may be used.

In FIG. 6G, a relative coordinate position database having a table indicating the relative coordinate position between the reference point (for example, the subject center) of the article image and each feature point of the article image may be further provided. Here, the reference point is a predetermined coordinate position in the second image. As described above, the reference point may be the center of the subject or the upper left coordinate position of the article image. In the following description, it is assumed that the reference point indicates the subject center.

The feature point clustering unit 662 includes a coordinate position information group of the captured image output from the local feature amount generation unit 601 of the captured image, a correspondence information group output from the corresponding point search unit 631, and ratio information output from the ratio calculation unit 652. And a group. Further, the feature point clustering unit 662 further uses the rotation amount information group output from the rotation amount calculation unit 661 and the relative coordinate position stored in the relative coordinate position database. Then, the feature point clustering unit 662 clusters feature points of the captured image. Further, the

feature point clustering unit 662 outputs a cluster information group indicating the result of the clustering to the matching unit 107.

Here, in the clustering of feature points, for example, among the feature points of the captured image, a large number of feature points corresponding to arbitrary feature points of the article image are selected based on the correspondence information group, and the selected feature points The subject center point of the photographed image is estimated based on the coordinate position. Furthermore, it is possible to use a method of clustering estimated subject center points based on their coordinate positions. For clustering of subject center points, for example, the subject center points included in each analysis area of an arbitrary size are counted, and if the counted value is equal to or greater than a predetermined threshold, the subject center points included in the region are counted. You may use the method of classifying into the same cluster. By clustering the subject center points in this way, there is an effect that processing can be performed at higher speed.

<< Local feature generator >>
FIG. 7A is a block diagram illustrating a configuration of the local feature value generation unit 601. The local feature quantity generation unit 601 includes a feature point detection unit 711, a local region acquisition unit 712, a sub region division unit 713, a sub region feature vector generation unit 714, and a dimension selection unit 715.

The feature point detection unit 711 detects many characteristic points (feature points) from the image data, and outputs the coordinate position, scale (size), and angle of each feature point. The local region acquisition unit 712 acquires a local region where feature amount extraction is performed from the coordinate value, scale, and angle of each detected feature point. The sub area dividing unit 713 divides the local area into sub areas. For example, the sub-region dividing unit 713 can divide the local region into 16 blocks (4 × 4 blocks) or divide the local region into 25 blocks (5 × 5 blocks). The number of divisions is not limited. In the present embodiment, the case where the local area is divided into 25 blocks (5 × 5 blocks) will be described below as a representative.

The sub-region feature vector generation unit 714 generates a feature vector for each sub-region of the local region. As the feature vector of the sub-region, for example, a gradient direction histogram can be used. The dimension selection unit 715 selects a dimension to be output as a local feature amount based on the positional relationship between the sub-regions so that the correlation between feature vectors of adjacent sub-regions becomes low (for example, deletes or thins out the dimensions).). In addition, the dimension selection unit 715 can not only simply select a dimension but also determine a selection priority. That is, the dimension selection unit 715 can select dimensions with priorities so that, for example, dimensions in the same gradient direction are not selected between adjacent sub-regions. Then, the dimension selection

unit 715 outputs a feature vector composed of the selected dimensions as a local feature amount. Note that the dimension selection unit 715 can output the local feature amount in a state where the dimensions are rearranged based on the priority order.

<< Processing of local feature generator >>
7B to 7F are diagrams illustrating processing of the local feature value generation unit 601.

First, FIG. 7B is a diagram showing a series of processing of feature point detection / local region acquisition / sub-region division / feature vector generation in the local feature quantity generation unit 601. Such a series of processing is described in US Pat. No. 6,711,293, David G. Lowe, "Distinctive image features from scale-invariant key points" (US), International Journal of Computer Vision, 60 (2), 2004. See Years, p. 91-110.

(Feature point detector)
An image 721 in FIG. 7B is a diagram illustrating a state in which feature points are detected from an image in the video in the feature point detection unit 711 in FIG. 7A. Hereinafter, the generation of local feature amounts will be described by using one feature point data 721a as a representative. The starting point of the arrow of the feature point data 721a indicates the coordinate position of the feature point, the length of the arrow indicates the scale (size), and the direction of the arrow indicates the angle. Here, as the scale (size) and direction, brightness, saturation, hue, and the like can be selected according to the target image. Further, in the example of FIG. 7B, the case of six directions at intervals of 60 degrees will be described, but the present invention is not limited to this.

(Local area acquisition unit)
For example, the local region acquisition unit 712 in FIG. 7A generates a Gaussian window 722a around the starting point of the feature point data 721a, and generates a local region 722 that substantially includes the Gaussian window 722a. In the example of FIG. 7B, the local region acquisition unit 712 generates a square local region 722, but the local region may be circular or have another shape. This local region is acquired for each feature point. If the local area is circular, there is an effect that the robustness is improved with respect to the imaging direction.

(Sub-region division part)
Next, a state in which the scale and angle of each pixel included in the local region 722 of the feature point data 721a is divided into sub regions 723 in the sub region dividing unit 713 is shown. FIG. 7B shows an example in which 4 × 4 = 16 pixels are divided into 5 × 5 = 25 subregions. However, the sub-region may be 4 × 4 = 16, other shapes, or the number of divisions.

(Sub-region feature vector generator)
The sub-region feature vector generation unit 714 generates a histogram with the scale of each pixel in the sub-region in units of angles in six directions and quantizes it to obtain a sub-region feature vector 724. That is, the direction is normalized with respect to the angle output by the feature point detection unit 711. Then, the sub-region feature vector generation unit 714 aggregates the frequencies in the six directions quantized for each sub-region, and generates a histogram. In this case, the sub-region feature vector generation unit 714 outputs a feature vector constituted by a histogram of 25 sub-region blocks × 6 directions = 150 dimensions generated for each feature point. In addition, the gradient direction is not limited to 6 directions, but may be quantized to an arbitrary quantization number such as 4 directions, 8 directions, and 10 directions. When the gradient direction is quantized in the D direction, if the gradient direction before quantization is G (0 to 2π radians), the quantized value Qq (q = 0,..., D−1) in the gradient direction is For example, although it can obtain | require by Formula (1), Formula (2), etc., it is not restricted to this.

Qq = floor (G × D / 2π) (1)
Qq = round (G × D / 2π) mod D (2)
Here, floor () is a function for rounding off the decimal point, round () is a function for rounding off, and mod is an operation for obtaining a remainder. Further, when generating the gradient histogram, the sub-region feature vector generation unit 714 may add up the magnitudes of the gradients instead of adding up the simple frequencies. Further, when the sub-region feature vector generation unit 714 aggregates the gradient histogram, the sub-region feature vector generation unit 714 assigns weight values not only to the sub-regions to which the pixels belong, but also to sub-regions (such as adjacent blocks) that are close to each other according to the distance between the sub-regions. You may make it add. Further, the sub-region feature vector generation unit 714 may add weight values to gradient directions before and after the quantized gradient direction. Note that the feature vector of the sub-region is not limited to the gradient direction histogram, and may be any one having a plurality of dimensions (elements) such as color information. In the present embodiment, it is assumed that a gradient direction histogram is used as the feature vector of the sub-region.

(Dimension selection part)
Next, processing will be described in the dimension selection unit 715 in the local feature quantity generation unit 601 with reference to FIGS. 7C to 7F.

The dimension selection unit 715 selects (decimates) a dimension (element) to be output as a local feature amount based on the positional relationship between the sub-regions so that the correlation between feature vectors of adjacent sub-regions becomes low. More specifically, the dimension selection unit 715 selects dimensions so that at least one gradient direction differs between adjacent sub-regions, for example. In

the present embodiment, the dimension selection unit 715 mainly uses adjacent subregions as adjacent subregions. However, the adjacent subregions are not limited to adjacent subregions, for example, from the target subregion. A sub-region within a predetermined distance may be a nearby sub-region.

FIG. 7C shows an example of selecting a dimension from a feature vector 731 of a 150-dimensional gradient histogram generated by dividing a local region into 5 × 5 block sub-regions and quantizing gradient directions into six directions 731a. FIG. In the example of FIG. 7C, dimensions are selected from feature vectors of 150 dimensions (5 × 5 = 25 sub-region blocks × 6 directions).

(Dimension selection of local area)
FIG. 7C is a diagram showing a state of feature vector dimension number selection processing in the local feature value generation unit 601.

As illustrated in FIG. 7C, the dimension selection unit 715 selects a half 75-dimensional gradient histogram feature vector 732 from the 150-dimensional gradient histogram feature vector 731. In this case, dimensions can be selected so that dimensions in the same gradient direction are not selected in adjacent left and right and upper and lower sub-region blocks.

In this example, when the quantized gradient direction in the gradient direction histogram is q (q = 0, 1, 2, 3, 4, 5), a block for selecting elements of q = 0, 2, 4 and , Q = 1, 3, and 5 are alternately arranged with sub-region blocks for selecting elements. In the example of FIG. 7C, when the gradient directions selected in the adjacent sub-area blocks are combined, there are six directions.

The dimension selection unit 715 selects a feature vector 733 of a 50-dimensional gradient histogram from the feature vector 732 of the 75-dimensional gradient histogram. In this case, the dimension can be selected so that only one direction is the same (the remaining one direction is different) between the sub-region blocks positioned at an angle of 45 degrees.

In addition, when the dimension selection unit 715 selects the feature vector 734 of the 25-dimensional gradient histogram from the feature vector 733 of the 50-dimensional gradient histogram, the gradient direction selected between the sub-region blocks located at an angle of 45 degrees. Select dimensions so that does not match. In the example shown in FIG. 7C, the dimension selection unit 715 selects one gradient direction from each sub-region from the first dimension to the 25th dimension, selects two gradient directions from the 26th dimension to the 50th dimension, and starts from the 51st dimension. Three gradient directions are selected up to 75 dimensions.

In this way, it is desirable that the gradient directions are selected uniformly so that the gradient directions do not overlap between adjacent

sub-region blocks. At the same time, as in the example shown in FIG. 7C, it is desirable that dimensions be selected uniformly from the entire local region. Note that the dimension selection method illustrated in FIG. 7C is an example, and is not limited to this selection method.

(Local area priority)
FIG. 7D is a diagram illustrating an example of a selection order of feature vectors from sub-regions in the local feature value generation unit 601.

The dimension selection unit 715 can determine the priority of selection so as to select not only the dimension but also the dimension that contributes to the feature point feature in order. That is, the dimension selection unit 715 can select dimensions with priorities so that, for example, dimensions in the same gradient direction are not selected between adjacent sub-area blocks. Then, the dimension selection unit 715 outputs a feature vector composed of the selected dimensions as a local feature amount. Note that the dimension selection unit 715 can output the local feature amount in a state where the dimensions are rearranged based on the priority order.

That is, the dimension selection unit 715 adds dimensions in the order of the sub-region blocks as shown in the matrix 741 in FIG. 7D, for example, between 1 to 25 dimensions, 26 dimensions to 50 dimensions, and 51 dimensions to 75 dimensions. It may be selected. When the priority order shown in the matrix 741 in FIG. 7D is used, the dimension selection unit 715 can select the gradient direction by increasing the priority order of the sub-region blocks close to the center.

A matrix 751 in FIG. 7E is a diagram illustrating an example of element numbers of 150-dimensional feature vectors in accordance with the selection order in FIG. 7D. In this example, 5 × 5 = 25 blocks are represented by numbers p (p = 0, 1,..., 25) in raster scan order, and the quantized gradient direction is represented by q (q = 0, 1, 2, 3). , 4, 5), the element number of the feature vector is 6 × p + q.

A matrix 761 in FIG. 7F is a diagram showing that the 150-dimensional order according to the selection order in FIG. 7E is hierarchized in units of 25 dimensions. That is, the matrix 761 in FIG. 7F is a diagram illustrating a configuration example of local feature amounts obtained by selecting the elements illustrated in FIG. 7E according to the priority order illustrated in the matrix 741 in FIG. 7D. The dimension selection unit 715 can output dimension elements in the order shown in FIG. 7F. Specifically, for example, when outputting a 150-dimensional local feature amount, the dimension selection unit 715 can output all 150-dimensional elements in the order shown in FIG. 7F. When the dimension selecting unit 715 outputs, for example, a 25-dimensional local feature amount, the element 771 in the first row (76th, 45th, 83rd,..., 120th) shown in FIG. Can be output in the order shown in (from left to right). For example, when outputting a 50-dimensional local feature amount, the dimension

selection unit 715 adds the element 772 in the second row shown in FIG. 7F to the first row shown in FIG. 7F in the order shown in FIG. To the right).

By the way, in the example shown in FIG. 7F, the local feature amount has a hierarchical structure arrangement. That is, for example, in the 25-dimensional local feature value and the 150-dimensional local feature value, the arrangement of the elements 771 to 776 in the first 25-dimensional local feature value is the same. As described above, the dimension selection unit 715 selects a dimension hierarchically (progressively), and thereby, depending on the application, communication capacity, terminal specification, and the like, local features of an arbitrary number of dimensions, that is, local of an arbitrary size. Feature quantities can be extracted and output. Further, the dimension selection unit 715 can hierarchically select dimensions, rearrange the dimensions based on the priority order, and output them, thereby performing image matching using local feature quantities of different dimensions. . For example, when images are collated using a 75-dimensional local feature value and a 50-dimensional local feature value, the distance between the local feature values can be calculated by using only the first 50 dimensions.

Note that the priorities shown in the matrix 741 to FIG. 7F in FIG. 7D are merely examples, and the order of selecting dimensions is not limited to this. For example, the order of blocks may be the order shown in the matrix 742 in FIG. 7D or the matrix 743 in FIG. 7D in addition to the example of the matrix 741 in FIG. 7D. Further, for example, the priority order may be determined so that dimensions are selected from all the sub-regions. Also, the vicinity of the center of the local region may be important, and the priority order may be determined so that the selection frequency of the sub-region near the center is increased. Further, the information indicating the dimension selection order may be defined in the program, for example, or may be stored in a table or the like (selection order storage unit) referred to when the program is executed.

In addition, the dimension selection unit 715 may select a dimension by skipping one sub-region block. That is, 6 dimensions are selected in a certain sub-region, and 0 dimensions are selected in other sub-regions close to the sub-region. Even in such a case, it can be said that the dimension is selected for each sub-region so that the correlation between adjacent sub-regions becomes low.

Further, the shape of the local region and the sub-region is not limited to a square, and can be an arbitrary shape. For example, the local region acquisition unit 712 may acquire a circular local region. In this case, the sub-region dividing unit 713 can divide the circular local region into, for example, nine or seventeen sub-regions into concentric circles having a plurality of local regions. Even in this case, the dimension selection unit 715 can select a dimension in each sub-region.

As described above, as illustrated in FIGS. 7B to 7F, according to the local feature value generation unit 601 of the present embodiment, the dimension of the feature vector generated while maintaining the information amount of the local feature value is hierarchically selected. The This process enables real-time landscape element recognition and recognition result display while maintaining recognition accuracy. Note that the configuration and processing of the local feature generation unit 601 are not limited to this example. Naturally, other processes that enable real-time landscape element recognition and recognition result display while maintaining recognition accuracy can be applied.

<Article arrangement generation unit>
FIG. 8A is a block diagram illustrating a configuration of the article arrangement generation unit 407.

The article arrangement generation unit 407 includes an RFID (Radio Frequency IDentification: individual identifier by radio wave) acquisition unit 801, a sensor sheet determination unit 802, an article position determination unit 803, and an article arrangement determination 804.

The RFID acquisition unit 801 acquires the ID of the RFID tag indicating the presence of an article received by the article presence / absence information receiving unit 405. The sensor sheet determination unit 802 specifies the sensor sheet position on the display shelf based on the sensor sheet ID for identifying the sensor sheet detected from the sensor sheet for detecting the presence or absence of the article. The article position determination unit 803 specifies the article position on the display shelf based on the article position ID (sensor identification information) for identifying the article position detected from each article presence / absence determination tag of the sensor sheet.

The article arrangement determination 804 is performed on the display shelf including the number of depths based on the arrangement of the sensor sheet on the display shelf from the sensor sheet determination unit 802 and the item position on the display shelf from the article position determination unit 803. The article arrangement is determined. Note that the article arrangement output from the article arrangement determination 804 is an article presence / absence arrangement, and it is not known what the articles in each row are.

(Operation procedure)
FIG. 8B is a sequence diagram illustrating an operation procedure for acquiring article presence / absence data. In the present embodiment, when the RFID reader transmits a tag information read signal including an ID to the RFID tag placed at each article placement position, and the RFID tag responds with a signal strength stronger than the threshold, there is no article. When there is a response with a signal strength weaker than the threshold, the product is present.

In step S801, the information processing apparatus 210 sets a threshold for determining the presence / absence of an article based on the

strength of the RFID response signal. This threshold setting may be performed based not only on the initial setting but also on the history of the occurrence of an error in the presence / absence detection of an article.

In step S803, the RFID reader transmits a command including the sensor sheet ID to the RFID tag that identifies the sensor sheet. The RFID tag for the sensor sheet that matches the sensor sheet ID returns a response signal in step S805. In step S807, the RFID reader receives a reply from the RFID tag for the sensor sheet, and notifies the information processing apparatus 210 that the sensor sheet is arranged on the display shelf targeted by the RFID reader. The information processing apparatus 210 notifies the article position ID of the article detection tag on the sheet from the sensor sheet ID. The RFID reader may find the article position ID of the article detection tag on the sheet. This process is for shortening the RFID tag operation process, and the article position ID may be scanned over all bits.

In step S811, the RFID reader transmits a command including the sensor ID to the article detection tag on the sheet. The article presence / absence tag that matches the sensor ID returns a response signal in step S813. The RFID reader receives a response from the article presence / absence tag as a response, and compares the signal strength of the response signal with a threshold value in step S815, and determines that there is an article if it is weaker than the threshold value and that there is no article if it is stronger than the threshold value. Then, the information processing apparatus 210 is notified of the article position ID with the article.

In step S817, the information processing apparatus 210 receives the article position ID with the article, refers to the sensor database 406, and determines the article arrangement on the display shelf as illustrated in FIG. 5D.

(Communication procedure)
FIG. 8C is a sequence diagram illustrating a communication procedure when acquiring article presence / absence data.

A message 810 for transmitting the ID of the sensor sheet on the display shelf from the RFID reader to the information processing apparatus 210 is a header 811, a transmission destination 812, a transmission source 813, a sensor sheet ID string 814 in response to the RFID reader, and error correction. CRC815. A message 820 for transmitting the article position ID for article presence / absence detection on the sensor sheet from the information processing apparatus 210 to the RFID reader is a header 821, a transmission destination 822, a transmission source 823, an article presence / absence detection RFID column 824, and error correction. CRC825. A message 830 for transmitting an article position ID with an article from the RFID reader to the information processing apparatus 210 includes a header 831, a

transmission destination 832, a transmission source 833, an RFID string 834 whose response signal strength to the RFID reader is weaker than a threshold, an error CRC 835, which is a correction.

(Sensor database)
FIG. 8D is a diagram showing a configuration of a sensor database 406b as sensor arrangement storage means. The sensor database 406b represents a part of the sensor database 406, and stores where on which display shelf a sensor sheet is arranged. The sensor database 406b stores the determined position on the display shelf for each of the article arrangement positions of the sensor sheet in association with the sensor sheet ID 841. That is, the display shelf 843, the stage 844, the column 845, and the depth 846 are stored corresponding to each article position ID 842. By associating the article position with the article from the front image of the display shelf, the number of displays for each article type can be calculated.

FIG. 8E is a diagram showing a configuration of the sensor database 406c. The sensor database 406c represents another example of a part of the sensor database 406 of FIG. 4 and stores where the display shelf is arranged in which stage of the display shelf corresponding to the article position ID without having the sensor sheet ID. To do. In this way, if all the article position IDs arranged on the display shelf are stored, the article arrangement can be determined. After that, the articles from the front image of the display shelf are linked, so that the number of articles displayed Can be calculated.

<Article presence / absence sensor>
FIG. 9A is a diagram illustrating a configuration of the article presence / absence sensor 230. Although FIG. 9A shows an example in which two sensor sheets are arranged on a display shelf, the present invention is not limited to this.

The sensor sheet 910 has a management object article non-arrangement area 911 and a management object article arrangement area 913. An RFID tag 912 for sheet recognition is arranged in the management object non-arrangement area 911. In addition, an RFID tag 914 for sensing presence / absence of an article is arranged in the management target article arrangement area 913. The sensing RFID tag 914 can detect the presence or absence of a total of six articles in two rows and three depths.

The sensor sheet 920 includes a management target article non-arrangement area 921 and a management target article arrangement area 923. An RFID tag 922 for sheet recognition is arranged in the management object non-arrangement area 921. In addition, an RFID tag 924 for sensing presence / absence of an article is arranged in the management target article arrangement area 913. The sensing RFID tag 924 can detect the presence / absence of a total of twelve articles with four rows and three rows.

Each of the sensor sheets 910 and 920 is disposed on the spacer 931, and a reader antenna 932 is wired on the lower surface of the spacer 931. The reader antenna 932 is connected to the RFID reader 940 via a connection line 941. As will be described later, the thickness of the spacer 931 affects the change in electromagnetic coupling when an article is placed in the vicinity of the sensing RFID tag 924. Although not shown, it is desirable to stabilize the distance by arranging a spacer between the sensor sheets 910 and 920 and the bottom of the article in order to stabilize the influence on the electromagnetic field coupling. It is determined that an article is placed on the sensing RFID tag 924 whose response signal to the RFID reader 940 is weaker than a threshold value, and is notified to the information processing apparatus 210 via a communication line. The communication line may be wireless communication.

According to the article presence / absence sensor 230, since the sensing RFID tag 914 is not affixed to the article, an increase in cost due to tag affixing can be prevented. In addition, there is no problem of privacy infringement, information security problems or anxiety given to buyers due to illegal reading of information from sensing RFID tags 914 attached to purchased items. That is, there is no problem of illegal reading of tag information by a third party.

(Reader antenna)
FIG. 9B is a diagram showing a configuration of the reader antenna 932 in the article presence / absence sensor 230. Although various configurations are conceivable for the reader antenna 932 wired with at least one sensor sheet and the spacer 931, FIG. 9B shows two examples.

The reader antenna 953 is a parallel two-line antenna. The two lines in each column are connected to the RFID reader 940 through a distributor 951 with a connection line 941.

The reader antenna 954 is a microstrip line antenna. The microstrip lines in each column are connected to the RFID reader 940 through a distributor 952 and a connection line 941. In the case of a microstrip line, a ground conductor 955 is connected via a matching termination resistor (not shown).

A sensor sheet having an RFID tag is disposed across the two lines or the microstrip line and the spacer 931.

(Article arrangement)
FIG. 9C is a diagram showing the arrangement of articles in the article presence / absence sensor 230. In addition, the same reference number is attached | subjected to the element similar to FIG. 9A, and description is abbreviate | omitted.

FIG. 9C shows a case where the article 961 is placed in the vicinity of the sensing RFID tag 914 of the sensor sheet 910. In the present

embodiment, it is assumed that the articles 961 in the depth direction in the same row are the same.

Hereinafter, the principle in which the RFID reader 940 detects the presence or absence of an article in the vicinity of the sensing RFID tag 914 via the reader antenna 932 will be described below.

(RFID tag)
FIG. 9D is a diagram illustrating a configuration of the RFID tag 914 in the article presence / absence sensor 230.

FIG. 9D shows a top view of the display shelf. FIG. 9D shows an enlarged view of a region where one article 961 is placed as a top view. As shown in FIG. 9D, a reader antenna 954 of a microphone strip line is formed on the article management plate 900. An RFID tag 914 is installed above the reader antenna 954. Further, an article arrangement area where the article 961 is placed is set above the RFID tag 914 and at a position where the RFID tag 914 is covered. The RFID tag 914 includes an RFID chip 971 and a tag antenna 972.

(Position relationship)
FIG. 9E is a diagram showing a positional relationship in the article presence / absence sensor 230. In the article presence / absence sensor 230, the presence / absence of an article is determined based on the intensity of the response signal of the sensing RFID tag 914 that responds by matching the ID to a command including an ID transmitted from the RFID reader 940 via the reader antenna 932. Determine. If there is no article and the electromagnetic coupling between the reader antenna 932 and the sensing RFID tag 914 is strong, a strong response signal is returned to the reader antenna 932. The intensity of this response signal is compared with a threshold value, and since it is stronger than the threshold value, it is determined that there is no article. On the other hand, if there is an article and the electromagnetic coupling between the reader antenna 932 and the sensing RFID tag 914 becomes weak, a weak response signal is returned to the reader antenna 932. The intensity of the response signal is compared with a threshold value, and since it is weaker than the threshold value, it is determined that there is an article.

Hereinafter, the structure of the article presence / absence sensor 230 suitable for determining the strength of the response signal will be briefly described. In FIG. 9E, a distance L1 is a distance between the tag antenna 972 of the sensing RFID tag 914 and the bottom of the article 961. The distance L2 is the distance between the tag antenna 972 of the sensing RFID tag 914 and the reader antenna 954 of the microphone strip line. Since the distance L1 and the distance L2 are desirably stable distances, it is possible to cover the RFID tag 914 with a plastic plate or the like and use the thickness of the plastic plate, or other methods can be used. Is possible.

The article presence / absence sensor 230 adjusts the coupling coefficient k2 between the article 961 and the tag antenna 972 and the coupling coefficient k1 between the tag antenna 972 and the reader antenna 954 by adjusting the distance L1 and the distance L2. Then, the signal strength between the tag antenna 972 and the reader antenna 954 is changed according to the coupling coefficient k2 that changes depending on the presence / absence of the article 961, and the presence / absence of the article 961 is determined based on the change in signal strength. Here, since the coupling coefficient k1 and the coupling coefficient k2 satisfy the relationship of k1 <k2, it is due to the change in the frequency characteristics of the tag antenna 972 due to the presence / absence of an article, rather than maintaining the communication between the reader antenna 954 and the tag antenna 972. The change in reflected signal intensity increases. That is, since the presence or absence of the article 961 can be reliably captured, erroneous detection can be suppressed.

Further, in the article presence / absence sensor 230, if the wavelength of the radio signal between the tag antenna 972 and the reader antenna 954 is λ, the distance L1 ≦ λ and the distance L2 ≦ λ can be set. As described above, since the communication range between the tag antenna 972 and the reader antenna 954 is narrow and is not affected by disturbance or noise, the presence / absence of a stable article can be determined. Furthermore, it is easy to arrange them so as to satisfy the relationship of L2 ≦ λ / 2π. As described above, by satisfying the relationship of L2 ≦ λ, the wireless communication between the reader antenna 954 and the tag antenna 972 is centered on the direct wave, and radio wave interference due to the multipath phenomenon reflecting the surrounding environment hardly occurs. Therefore, erroneous detection can be suppressed. In particular, when managing the presence / absence of articles on a shelf, the shelf is often made of metal or a metal refrigerated case, but the system can be stably operated even in such an environment.

Further, according to the article presence / absence sensor 230, it is not necessary for the article 961 to block the line of sight of the RFID tag 914 and the RFID reader 940 for detecting the presence / absence of the article 961. Further, since the article 961 may be provided with a place where the article 961 is placed apart from the tag antenna 972 (or the RFID tag 914) so that the article 961 is electromagnetically coupled to the tag antenna 972, free placement is possible. .

According to the article presence / absence sensor 230, the quasi-electrostatic magnetic field, the induction electromagnetic field, and the electromagnetic field component of the radiated electromagnetic field are mixed with sufficient strength, and the vector direction also varies with time. The degree of freedom of the relative orientation of the tag antenna 972 can be improved.

<< Hardware configuration of information processing equipment >>
FIG. 10A is a block diagram illustrating a hardware configuration of the information processing apparatus 210.

In FIG. 10A, a CPU (Central Processing Unit) 1010 is a processor for arithmetic control, and implements each functional configuration shown in FIG. 4 by executing a program. A ROM (Read Only Memory) 1020 stores fixed data and programs such as initial data and programs. The communication control unit 401 communicates with other communication terminals and servers via a network, and also communicates with the imaging unit 220a and the article presence / absence sensor 230.

Note that the number of CPUs 1010 is not limited to one, and may be a plurality of CPUs or may include a GPU for image processing. Further, it is desirable that the communication control unit 401 has a CPU independent of the CPU 1010 and writes or reads transmission / reception data in a RAM (Random Access Memory) 1040 area. In addition, it is desirable to provide a DMAC for transferring data between the RAM 1040 and the storage 1050 (not shown). Further, the input / output interface 1060 preferably includes a CPU independent of the CPU 1010 and writes or reads input / output data in the RAM 1040 area. Accordingly, the CPU 1010 recognizes that the data has been received or transferred to the RAM 1040 and processes the data. Further, the CPU 1010 prepares the processing result in the RAM 1040, and leaves the subsequent transmission or transfer to the communication control unit 401, the DMAC, or the input / output interface 1060.

The RAM 1040 is a random access memory that the CPU 1010 uses as a work area for temporary storage. The RAM 1040 has an area for storing data necessary for realizing the present embodiment. The image data 1041 is data on the front image of the display shelf acquired from the imaging unit 220. The article identification result 1042 is article information identified from the image data 1041 based on the local feature amount. The article presence / absence data 1043 is data on the presence / absence of articles on the display shelf collected from the article presence / absence sensor 230. The article presence / absence processing result 1044 is article arrangement information generated based on the article presence / absence data 1043. The display count calculation result 1045 is a result of calculating the shelf allocation of articles and the number of displays by associating the article identification result 1042 with the article presence / absence processing result 1044. The display number display data 1046 is display data generated to notify the store clerk of the display number calculation result 1045. The input / output data 1047 is data input / output via the input / output interface 1060. Transmission / reception data 1048 is data transmitted / received via the communication control unit 401.

The storage 1050 stores a database, various parameters, or the following data or programs necessary for realizing the present

embodiment. The local feature database 403 is a database that stores the data shown in FIG. 5A. The sensor database 406 is a database that stores the data shown in FIG. 5B, FIG. 8D, or FIG. 8E. The article identification algorithm / parameter 1051 is an algorithm and parameters used to identify an article from the front image of the display shelf shown in FIGS. 6A to 6G and FIGS. 7A to 7F. The inventory management database 409 is a database used for inventory management (not shown). The storage 1050 stores the following programs. The information processing device control program 1052 is a control program that controls the entire information processing device 210. The article identification module 1053 is a module for identifying articles from the front image of the display shelf. The article arrangement generation module 1054 is a module that generates an article arrangement by referring to the sensor database 406 from the article presence / absence data. The display number calculation module 1055 is a module that links the article identification information identified by the article identification module 1053 and the article arrangement information generated by the article arrangement generation module 1054 to calculate the shelf allocation and the number of displays of the display shelf.

The input / output interface 1060 interfaces input / output data with input / output devices. A display unit 214 and a touch panel / keyboard operation unit 1061 are connected to the input / output interface 1060. In addition, a voice input / output unit 1062 such as a speaker or a microphone is connected. Furthermore, the imaging unit 220 and the article presence / absence sensor 230a are also connected. The imaging unit and the article presence / absence sensor may be connected to the LAN via the communication control unit 401 or may be connected as I / O via the input / output interface 1060. In FIG. 10A, the imaging unit 220 is connected to the input / output interface 1060, and the article presence / absence sensor 230 is connected to the LAN. Therefore, the imaging unit 220a and the article presence / absence sensor 230a are indicated by broken lines.

Note that the RAM 1040 and the storage 1050 in FIG. 10 do not show programs and data related to general-purpose functions and other realizable functions that the information processing apparatus 210 has.

(Processing result output)
FIG. 10B is a diagram illustrating an example of the output of the display unit 214 of the information processing apparatus 210. On the display screen (viewer) 1071 of the display unit 214, a display shelf 1072 to be managed and an article table 1073 are displayed. In the virtual display shelf image 1072, each article image is arranged in the same manner as the actual shelf allocation, and the number of displays for each face (article row) is displayed superimposed on each article image. These display number data are read from the article management table 550 shown in FIG. 5E. Here, the inventory quantity for each article type may be read from an inventory database (not shown) that stores the inventory quantity of articles that can be displayed, and displayed together with the

display quantity (for example, in parentheses). In the virtual display shelf image 1072, the face article image having the display number of 0 is colored (or changed in brightness) so as to stand out.

The article table 1073 displays the article name, the number of faces (the number of article columns corresponding to one article type), the number of articles displayed, and the number of inventory. The number of faces can be obtained by counting the face ID of the article management table 550 for each article type. The number of articles to be displayed is also obtained by counting the number of displays 543 in the article management table 550 for each article ID.

The article table 1073 needs to be purchased because there is no warning mark 1074 for notifying the store clerk that the number of displays is low and replenishment is required, the attention mark 1075 for notifying the store clerk that the number of displays is small and need to be replenished, and stock is out An alarm mark 1076 for notifying the store clerk is displayed.

Each article image in the virtual display shelf image 1072 is a sample image of an article included in the local feature amount database 403. That is, when the type of the article is specified using the local feature amount, the front image of the specified article is read from the database, arranged in the virtual display shelf image 1072, and the number of displays is superimposed. As a result, even if an article is placed backward in the image captured by the imaging unit 220, the viewer can confirm the front of the article and can grasp the article arrangement very intuitively. Of course, the number of displays may be superimposed on the captured article image using the article image captured by the imaging unit 220 as it is. In addition, although the example which displays individually the number of display superimposed on an article image is shown individually, this invention is not limited to this, You may display the number of display side by side on an article image.

In addition, a display update button 1076 is displayed on the display unit 214, and when it is detected that the user has selected the display update button 1076, the imaging unit 220 takes a picture of the display shelf again. Along with this, the types of articles in the display shelves and their arrangement are recognized, the number of displays is calculated again, and the latest status of the display shelves is displayed. When imaging is performed to update the viewer, if there is an article row with the number of articles displayed as 0 (in this case, the article type included in the article row cannot be determined), a message prompting confirmation or re-imaging is displayed. May be. In that case, the display unit 214 functions as an imaging instruction unit that transmits an imaging instruction to the imaging unit 220.

Further, a display shelf reversal button 1077 is displayed on the display unit 214, and when it is detected that the user has selected the display

shelf reversal button 1076, the virtual display shelf image 1072 is reversed. For example, when the store clerk is configured to replenish items from the back side of the display shelf opposite to the user, the store clerk intuitively displays which product at which position by inverting the display shelf horizontally. It will be easier to know what should be replenished.

<< Processing procedure of information processing device >>
FIG. 11A is a flowchart illustrating a processing procedure of the information processing apparatus 210. This flowchart is executed by the CPU 1010 of FIG. 10A using the RAM 1040, and implements the functional configuration unit of FIG.

In step S <b> 1101, the information processing apparatus 210 acquires a front image of the display shelf from the imaging unit 220. Next, in step S1103, the information processing apparatus 210 identifies the article arrangement on the front surface of the display shelf from the acquired captured image.

In step S <b> 1105, the information processing apparatus 210 acquires and stores article presence / absence detection data from the article presence / absence sensor 230. In step S1107, the information processing apparatus 210 generates an array of article presence / absence sensors from the article presence / absence detection data.

In step S1109, the information processing apparatus 210 associates the front article arrangement with the article presence sensor arrangement to determine the article arrangement and the number of displays in the display shelf. In step S1111, the information processing apparatus 210 outputs the article arrangement and the number of displays in the display shelf.

(Recognition processing of shelf surface article arrangement)
FIG. 11B is a flowchart illustrating the procedure of the shelf surface article arrangement recognition process (S1103).

In step S1121, the information processing apparatus 210 acquires the received captured image. Next, in step S1123, the information processing apparatus 210 detects a large number of feature points from the captured image. Next, in step S1125, the information processing apparatus 210 generates a local feature amount from the coordinate position, scale, and angle of each feature point in accordance with the processing of FIGS. 7A to 7F.

In step S1127, the information processing apparatus 210 clusters the feature points based on the coordinate positions of the feature points of the captured image in accordance with the processes in FIGS. 6A to 6G. In step S1129, the information processing apparatus 210 collates the local feature group of the captured image with the local feature group of the article in units of clusters.

In step S1131, the information processing apparatus 210 determines whether or not there is a matching local feature amount group from the collation result. If there is a matching local feature quantity group, the information processing apparatus 210 identifies the article having the matched local feature quantity group in step S1133. On the other hand, if there is no matching local feature group, the information processing apparatus 210 performs error processing in step S1135, assuming that there is no clustered local feature group article. In step S1135, control may be performed so that the threshold value and method of clustering are changed depending on the number of errors.

In step S1137, the information processing apparatus 210 determines whether or not the feature points of the captured image remain. If the feature point remains, the information processing apparatus 210 returns to step S1127 and repeats the clustering and matching of the feature point. If no feature point remains, the information processing apparatus 210 generates an article type arrangement table (see FIG. 5C) as an arrangement of the identified identified article on the front surface of the display shelf in step S1139.

(Article presence / absence detection processing)
FIG. 11C is a flowchart illustrating the procedure of the article presence / absence detection process (S1107).

In step S1141, the information processing apparatus 210 acquires the sensor sheet ID and the article presence / absence detection data received from the RFID reader 940. Next, in step S <b> 1143, the information processing apparatus 210 acquires the arrangement information of the doug sheets from the sensor database 406. In step S1145, the information processing apparatus 210 generates an article presence / absence arrangement table (see FIG. 5D) from the sensor sheet ID and the article presence / absence detection data.

(Article placement and display number confirmation processing)
FIG. 11D is a flowchart illustrating a procedure of article arrangement and display number determination processing (S1109).

In step S1151, the information processing apparatus 210 associates the article type arrangement table (see FIG. 5C) and the article presence / absence arrangement table (see FIG. 5D) based on the arrangement of the sensor sheets. Then, in step S1153, the information processing apparatus 210 determines the shelf allocation and the number of displays (see FIG. 5E).

According to the present embodiment, a large number of types of articles displayed in the depth direction on the display shelf can be counted at high speed for each type with a low-cost configuration, so that the supply of articles to the display shelf in real time can be notified. In addition, since the image of the article and the number of articles displayed are displayed at the same time, it is possible to generate and

display an image that intuitively shows the status of a plurality of types of articles displayed on the display shelf in real time. .

[Third Embodiment]
Next, an article management system including an information processing apparatus according to the third embodiment of the present invention will be described. The information processing apparatus according to the present embodiment differs from the second embodiment in that a sheet mark that can identify an article presence / absence sensor group (sensor sheet) is identified from a captured image. Since other configurations and operations are the same as those of the second embodiment, the same configurations and operations are denoted by the same reference numerals, and detailed description thereof is omitted.

《Goods management system》
With reference to FIG. 12 and FIG. 13, the structure and operation | movement of the article | item management system 1200 of this embodiment are demonstrated.

(System overview)
FIG. 12 is a diagram showing an outline of an article management system 1200 including the information processing apparatus 1210 according to this embodiment. In FIG. 12, the same components as those in FIG. 2A are denoted by the same reference numerals, and description thereof is omitted.

The article management system 1200 includes an information processing apparatus 1210, an imaging unit 220 that is a camera, and an article presence / absence sensor 1230. The imaging unit 220 captures an image in the front row of the display shelf 201. Note that the image captured by the imaging unit 220 also includes a sheet mark 1231 added to each sensor sheet of the article presence / absence sensor 1230. That is, the article presence / absence sensors 1230 arranged at the bottom of each stage of each display shelf 201 determine the presence / absence of articles on each of them, and a sheet mark 1231 is added to each sensor sheet.

The information processing apparatus 1210 includes an article identification unit 1211, a display number acquisition unit 212, and a display recognition unit 1213. The article identifying unit 1211 receives the image in the front row of the display shelf 201 from the imaging unit 220, identifies the displayed article type and its arrangement, and identifies the sheet mark 1231. The display recognizing unit 1213 uses the position of the sheet mark 1231 identified by the article identifying unit 1211 for the article arrangement in the front row of the display shelf 201 from the article identifying unit 1211 and the display number information from the display number acquiring unit 212. The number of displays on the display shelf 201 of each article is recognized.

(Operation procedure)
FIG. 13 is a sequence diagram illustrating an operation procedure of the

article management system 1200 including the information processing apparatus 1210. In FIG. 13, the same steps as those in FIG. 3 of the second embodiment are denoted by the same step numbers, and description thereof is omitted.

In FIG. 13, the identification of the sheet mark in step S1310 is added to FIG. In step S1310, the information processing apparatus 1210 identifies the sheet mark from the front image of the display shelf and uses it for specifying the article presence / absence sensor position.

In the second embodiment, the position information of the article presence / absence sensor is specified by storing in advance the arrangement information of the sensor sheet on the display shelf, and is associated with the article identification. Therefore, it is necessary to change the arrangement information when the sensor sheet is moved. In the present embodiment, by specifying the position of the sensor sheet by the sheet mark identified from the photographed image, the position of the sensor sheet, that is, the position of each article presence sensor can be specified even if the sensor sheet is moved.

<< Functional configuration of information processing device >>
FIG. 14 is a block diagram illustrating a functional configuration of the information processing apparatus 1210. In FIG. 14, the same reference numerals are assigned to the functional configurations similar to those in FIG.

14 identifies a sheet mark in the image in addition to identifying the item in the image. For this purpose, the local feature database 1403 stores the local feature from the sheet mark image in addition to the local feature generated from the article image. In order to easily identify the sheet mark, it is desirable that the sheet mark has many characteristic points.

The article arrangement generation unit 1407 refers to the sheet mark information from the article identification unit 1211 and the arrangement information of the article presence / absence sensor 230 in the sensor sheet stored in the sheet management database 1406, and determines the article arrangement of the display shelf. The article presence / absence arrangement table shown is generated.

(Local feature database)
FIG. 15A is a diagram showing a configuration of the local feature database 1403. Note that the local feature database 1403 includes data of the local feature database 403 generated from the article image of FIG. 5A.

The local feature database 1403 stores a local feature group 1512 generated from the sheet mark image in association with the sheet mark ID 1511.

(Sheet management database)
FIG. 15B is a diagram showing the configuration of the sheet

management database 1406.

The sheet management database 1406 stores the sensor sheet ID 1522 of the sensor sheet with the sheet mark and the sheet configuration 1523 in association with the sheet mark ID 1521. The sheet configuration 1523 is data corresponding to the sheet configuration 527 in FIG. 5B.

(Article type arrangement table)
FIG. 15C is a diagram showing a configuration of the article type arrangement table 1530. The article type arrangement table 1530 is a table generated by the article identification unit 1211 based on the articles and sheet marks identified from the captured image. Note that, in FIG. 15C, the same items as those in FIG.

In FIG. 15C, in addition to FIG. 5C, the sensor sheet ID 1537 specified from the sheet mark identified by the article identifying unit 1211 is stored. By the sensor sheet ID 1537 specified from the sheet mark, the article type arrangement table 1530 and the article presence / absence arrangement table generated from the article presence / absence information from the article presence / absence sensor are linked.

Since the article presence / absence arrangement table and the article management table are the same as those in FIGS. 5D and 5E, illustration and description thereof are omitted.

<< Processing procedure of information processing device >>
FIG. 16A is a flowchart illustrating the processing procedure of the information processing apparatus 1210. This flowchart is executed by the CPU 1010 in FIG. 10A using the RAM 1040 to realize the functional configuration unit in FIG. In FIG. 16A, steps similar to those in FIG. 11A are denoted by the same step numbers, and description thereof is omitted.

16A is different from FIG. 11A in that the information processing apparatus 1210 identifies a sheet mark from the captured image, determines the arrangement position of the sensor sheet, and generates an article presence / absence sensor array in step S1607. .

(Sheet mark identification processing)
FIG. 16B is a flowchart showing the procedure of the sheet mark identification process (S1607). In FIG. 16B, steps similar to those in FIG. 11B are denoted by the same step numbers, and description thereof is omitted.

In step S1625, the information processing apparatus 1210 acquires the local feature amount generated from the captured image in step S1103. Note that in the case of using a local feature amount with accuracy different from that of the article in the collation of the sheet mark, a new local feature amount may be generated without using the local feature amount generated in step S1103.

In step S1629, the information processing apparatus 1210 collates the local feature amount group of the captured image with the local feature amount group of the sheet mark in units of clusters. Note that processing unique to sheet mark identification may also be performed in the clustering in step S1127 and the collation in step S1629. When the local feature groups match, the information processing apparatus 1210 identifies a sheet mark in step S1633. In step S1639, the information processing apparatus 1210 generates an arrangement table based on the sheet mark, and links the article type arrangement table 1530 with the article presence / absence arrangement table generated from the article presence / absence information from the article presence / absence sensor. use.

According to this embodiment, since the position can be specified even if the article presence / absence sensor group on the article display shelf is moved, the identification of the article based on the photographed image and the article presence / absence can be achieved even if the article presence / absence sensor group is arbitrarily arranged. The article presence / absence information from the sensor can be easily associated.

[Fourth Embodiment]
Next, an article management system including an information processing apparatus according to the fourth embodiment of the present invention will be described. The information processing apparatus according to the present embodiment is different from the second embodiment in that a shelf mark that can identify an article display shelf is recognized from a captured image. Since other configurations and operations are the same as those of the second embodiment or the third embodiment, the same configurations and operations are denoted by the same reference numerals, and detailed description thereof is omitted.

《Goods management system》
The configuration and operation of the article management system 1700 of this embodiment will be described with reference to FIGS. 17 and 18.

(System overview)
FIG. 17 is a diagram showing an outline of an article management system 1700 including an information processing apparatus 1710 according to this embodiment. In FIG. 17, the same components as those in FIG. 2A are denoted by the same reference numerals, and description thereof is omitted.

The article management system 1700 includes an information processing apparatus 1710, an imaging unit 220 that is a camera, and an article presence / absence sensor 230. The imaging unit 220 captures images in the front row of the plurality of display shelves 1720 and 1730 that are prepared. The image captured by the imaging unit 220 includes shelf marks 1721 to 1723... 1731 to 1733 added to the display shelves of the display shelves 1720 and 1730. That is, shelf marks 1721 to 1723...

1731 to 1733 are added to the display shelves of the display shelves 1720 and 1730, respectively.

The information processing apparatus 1710 includes an article identification unit 1711, a display number acquisition unit 212, and a display recognition unit 1713. The article identification unit 1711 receives the images in the front row of the display shelves 1720 and 1730 from the imaging unit 220, identifies the displayed article type and the arrangement thereof, and displays the shelf marks 1721 to 1723 ... 1731 to 1733. Identify. The display recognizing unit 1713 associates the arrangement of the items in the front row of the display shelves 1720 and 1730 from the item identifying unit 1711 and the display number information from the display number acquiring unit 212 based on the positions of the shelf marks 1721 to 1733. Thus, the number of display shelves 1720 and 1730 of each article is recognized.

The number of shelf marks is not limited to the example of FIG. It is selected corresponding to the field of view of the imaging unit 220.

(Operation procedure)
FIG. 18 is a sequence diagram illustrating an operation procedure of the article management system 1700 including the information processing apparatus 1710. In FIG. 18, the same steps as those in FIG. 3 of the second embodiment are denoted by the same step numbers, and the description thereof is omitted.

In FIG. 18, the identification of the shelf mark in step S1810 is added to FIG. In step S1810, the information processing apparatus 1710 identifies the shelf mark from the front image of the display shelf, and associates the image position from the imaging unit 220 with the article presence / absence sensor position.

In 2nd Embodiment and 3rd Embodiment, the image position which the imaging part 220 image | photographs was fixed, and the same position of the image corresponded to the same position of a display shelf. In the present embodiment, the image position captured by the imaging unit 220 is linked to the same position on the display shelf by the shelf mark identified from the captured image, so that even if the imaging unit 220 swings, The position of each article presence / absence sensor can be associated.

<< Functional configuration of information processing device >>
FIG. 19 is a block diagram illustrating a functional configuration of the information processing apparatus 1710. In FIG. 19, the same reference numerals are given to the functional configurations similar to those in FIG. 4, and description thereof will be omitted.

19 identifies the shelf mark in the image in addition to identifying the item in the image. For this purpose, the local feature quantity database 1903 stores local feature quantities from the shelf mark image in addition to the local feature quantities generated from the article image.

In order to easily identify the shelf mark, it is desirable that the shelf mark has many feature points.

The article arrangement generation unit 1907 refers to the shelf mark information from the article identification unit 1711 and the arrangement information of the article presence / absence sensor 230 in the display shelf stored in the shelf management database 1906, and displays the display shelf from the article presence / absence information. The article presence / absence arrangement table indicating the article arrangement of the items is generated.

(Local feature database)
FIG. 20A is a diagram illustrating a configuration of the local feature database 1903. Note that the local feature database 1903 includes data of the local feature database 403 generated from the article image of FIG. 5A.

The local feature quantity database 1903 stores a local feature quantity group 2012 generated from the shelf mark image in association with the shelf mark ID 2011.

(Shelf management database)
FIG. 20B is a diagram showing a configuration of the shelf management database 1906.

The shelf management database 1906 stores a shelf ID 2022 to which the shelf mark is attached, a shelf configuration 2023 indicating how many rows and columns, and sensor data 2024 in association with the shelf mark ID 2021. The shelf configuration 2023 and the sensor data 2024 are data corresponding to the sensor database 406a in FIG. 5B.

(Article type arrangement table)
FIG. 20C is a diagram showing a configuration of the article type arrangement table 2030. The article type arrangement table 2030 is a table generated by the article identifying unit 1711 based on the articles and shelf marks identified from the captured image. In FIG. 20C, the same items as those in FIG. 5C are denoted by the same reference numerals, and description thereof is omitted.

In FIG. 20C, in addition to FIG. 5C, a shelf column 2037 and a sensor sheet ID 2038 specified with reference to the shelf mark identified by the article identifying unit 1711 and the shelf management database 1906 are stored. The article type arrangement table 2030 and the article presence / absence arrangement table generated from the article presence / absence information from the article presence / absence sensor are linked by the shelf row 2037 and the sensor sheet ID 2038 specified from the shelf mark.

Since the article presence / absence arrangement table and the article management table are the same as those in FIGS. 5D and 5E, illustration and description thereof are omitted.

<< Processing procedure of information processing device >>
FIG. 21A is a flowchart illustrating a processing procedure of the information processing apparatus 1710. This flowchart is executed by the CPU 1010 in FIG. 10A using the RAM 1040 to realize the functional configuration unit in FIG. In FIG. 21A, steps similar to those in FIG. 11A are denoted by the same step numbers and description thereof is omitted.

The difference between FIG. 21A and FIG. 11A is that the information processing apparatus 1710 identifies the shelf mark from the photographed image in step S2107, associates the position of the photographed image with the arrangement position of the sensor sheet, and it is a point to generate.

(Shelf mark identification process)
FIG. 21B is a flowchart illustrating a procedure of shelf mark identification processing (S2107). In FIG. 21B, steps similar to those in FIG. 11B or FIG. 16B are denoted by the same step numbers and description thereof is omitted.

In step S1625, the information processing apparatus 1710 acquires the local feature amount generated from the captured image in step S1103. In addition, in the case of using a local feature amount with accuracy different from that of the article or sheet mark in the collation of the shelf mark, a new local feature amount may be generated without using the local feature amount generated in step S1103. Good.

In step S2129, the information processing apparatus 1710 collates the local feature group of the captured image with the local feature group of the shelf mark in units of clusters. Note that processing unique to shelf mark identification may also be performed in the clustering in step S1127 and the collation in step S2129. If the local feature amount groups match, the information processing apparatus 1710 specifies a shelf mark in step S2133. In step S2139, the information processing apparatus 1710 generates an arrangement table based on the shelf mark, and links the article type arrangement table 2030 and the article presence / absence arrangement table generated from the article presence / absence information from the article presence / absence sensor. use.

According to the present embodiment, since the position of the article display shelf can be determined based on the shelf mark, the identification of the article based on the photographed image and the article presence / absence information from the article presence / absence sensor can be easily associated.

[Fifth Embodiment]
Next, an article management system including an information processing apparatus according to the fifth embodiment of the present invention will be described. The information processing apparatus according to the present embodiment differs from the second embodiment in that an article arrangement peculiar to the article display shelf is identified from

the captured image. Since other configurations and operations are the same as those of the second to fourth embodiments, the same configurations and operations are denoted by the same reference numerals, and detailed description thereof is omitted.

《Goods management system》
With reference to FIG. 22 and FIG. 23, the structure and operation | movement of the article | item management system 1200 of this embodiment are demonstrated.

(System overview)
FIG. 22 is a diagram showing an overview of an article management system 2200 including an information processing apparatus 2210 according to this embodiment. In FIG. 22, the same components as those in FIG. 2A are denoted by the same reference numerals, and description thereof is omitted.

The article management system 2200 includes an information processing apparatus 2210, an imaging unit 220 that is a camera, and an article presence / absence sensor 230. The imaging unit 220 captures an image in the front row of the display shelf 201. In addition, the specific position of each display shelf of the display shelf 201, in FIG. 22, the uppermost article arrangement has an arrangement specific to each display shelf. For the sake of simplicity, FIG. 22 shows an example in which an arrangement of tall bottles (represented by bit 1) and short bottles (represented by bit 0) is arranged at the top of the display shelf 201. Is shown. However, by using a unique arrangement based on the identification result of each article, a display shelf can be specified by making a very small number of article rows unique to each display shelf. Thus, even without the shelf mark as in the fourth embodiment, the shelf and its shooting position can be specified.

The information processing apparatus 2210 includes an article identification unit 211, a display number acquisition unit 212, and a display recognition unit 2213. The article identifying unit 211 receives the image in the front row of the display shelf 201 from the imaging unit 220 and identifies the displayed article type. The display recognizing unit 2213 is based on the position of the shelf identified from the article arrangement unique to the display shelf, the article arrangement in the front row of the display shelf 201 from the article identification unit 211 and the article presence / absence information from the display number acquisition unit 212. The number of displays on the display shelf 201 of each article is recognized.

Note that the interval between the specific article arrangements is not limited to the example of FIG. It is selected corresponding to the field of view of the imaging unit 220.

(Operation procedure)
FIG. 23 is a sequence diagram illustrating an operation procedure of the article management system 2200 including the information processing

apparatus 2210. In FIG. 23, steps similar to those in FIG. 3 of the second embodiment are denoted by the same step numbers, and description thereof is omitted.

In FIG. 23, the identification of the article arrangement peculiar to the display shelf in step S2310 is added to FIG. In step S2310, the information processing apparatus 2210 identifies an article arrangement unique to the display shelf from the front image of the display shelf and associates the image position from the imaging unit 220 with the article presence / absence sensor position.

In the fourth embodiment, a shelf mark is added to correspond to the association between each article identification position and each article presence sensor position. In this embodiment, even if the imaging unit 220 swings by linking the image position captured by the imaging unit 220 to the same position on the display shelf by the article arrangement unique to the display shelf identified from the captured image, Each article identification position can be associated with the position of each article presence sensor.

<< Functional configuration of information processing device >>
FIG. 24 is a block diagram illustrating a functional configuration of the information processing apparatus 2210. In FIG. 24, the same functional components as those in FIG. 4 are denoted by the same reference numerals, and description thereof is omitted.

The article arrangement generation unit 2407 in FIG. 24 refers to the article recognition information from the article identification unit 211 and the unique article row information in the display shelf stored in the article row management database 2406 as the article arrangement storage unit. Then, an article presence / absence arrangement table indicating the article arrangement of the display shelf is generated. In addition, it is desirable that the unique article row in the display shelf can reliably identify the unique article arrangement in order to increase the identification accuracy. For example, an arrangement of articles characterized by color and shape is desirable.

(Article column management database)
FIG. 25 is a diagram showing a configuration of the article row management database 2406. As shown in FIG.

The article row management database 2406 stores a shelf ID 2512, a shelf position 2513 including stages and rows, a shelf configuration 2514 indicating how many rows, and sensor sheet data 2515 in association with the article row ID 2511. The shelf configuration 2514 and the sensor sheet data 2515 are data corresponding to the sensor database 406a in FIG. 5B.

<< Processing procedure of information processing device >>
FIG. 26A is a flowchart illustrating the processing procedure of the information processing apparatus 2210. This flowchart is executed by

the CPU 1010 in FIG. 10A using the RAM 1040 to realize the functional configuration unit in FIG. In FIG. 26A, steps similar to those in FIG. 11A are denoted by the same step numbers, and description thereof is omitted.

26A differs from FIG. 11A in that the information processing apparatus 2210 identifies the shelf from the article row unique to the display shelf in step S2606, associates the position of the photographed image with the arrangement position of the sensor sheet, and This is the point at which the sensor array is generated.

(Article row identification processing)
FIG. 26B is a flowchart illustrating a procedure of article row identification processing (S2606).

In step S2621, the information processing apparatus 2210 collates the photographed article arrangement with the article arrangement stored in the article row management database 2406. In step S2623, the information processing apparatus 2210 determines whether there is a matching article arrangement. If there is a matching article arrangement, the information processing apparatus 2210 identifies a display shelf having the matching article arrangement in step S2625. On the other hand, if there is no matching article arrangement, the information processing apparatus 2210 performs error processing in step S2627, assuming that the display shelf is not found. In step S2627, control may be performed so as to change the article identification accuracy and the shooting position / range according to the number of errors.

According to the present embodiment, since the position of the article display shelf can be determined based on the specific article arrangement, the identification of the article based on the photographed image and the article presence / absence sensor can be performed without adding a sheet mark or a shelf mark to the display shelf. The article presence / absence information from can be easily linked.

[Sixth Embodiment]
Next, an article management system including an information processing apparatus according to the sixth embodiment of the present invention will be described. The information processing apparatus according to the present embodiment is based on article arrangement information obtained from a photographed image and article presence / absence information obtained from an article presence / absence sensor, as compared with the second to fifth embodiments. It is different in that a change in arrangement or an arrangement error is determined. Since other configurations and operations are the same as those of the second to fifth embodiments, the same configurations and operations are denoted by the same reference numerals, and detailed description thereof is omitted.

《Goods management system》
FIG. 27A is a diagram showing an outline of an article management

system 2700 including an information processing apparatus according to this embodiment.

In the article management system 2700, as shown in FIG. 27A, when the small bottle 2712 is at the position of the large bottle 2711 or when the large bottle 2722 is at the position where the small bottle 2721 is located, Detect mistakes. Alternatively, the case where the article arrangement is changed and the arrangement error are discriminated.

FIG. 27B is a diagram showing another outline of the article management system 2700 including the information processing apparatus.

In the article management system 2700, the article presence / absence sensor detects the presence of an article, such as when the large bottle 2731 falls or the small bottle 2733 falls, but from the identification of the front image, the article falls and one article falls. It is found that a plurality of article presence / absence determination ranges are covered.

Note that FIGS. 27A and 27B show an example in which the arrangement of articles is clearly wrong. In this case, an arrangement error can be easily recognized from the article presence / absence data and the article identification data. However, there may be a case where a misplacement cannot be easily recognized by simple comparison (see FIG. 29).

<< Functional configuration of information processing device >>
FIG. 28 is a block diagram illustrating a functional configuration of the information processing apparatus 2810. In FIG. 28, the same functional components as those in FIG. 4 are denoted by the same reference numerals, and description thereof is omitted.

The article arrangement history database 2814 in FIG. 28 accumulates the history of the article arrangement identified by the article identification unit 211 and the article arrangement detected by the article presence sensor. The article arrangement monitoring unit 2815 compares the article arrangement identified by the article identification unit 211 with the article arrangement detected by the article presence / absence sensor. If there is a mismatch, the past article arrangement information is acquired from the article arrangement history database 2814, and it is determined whether the article arrangement is changed or a temporary article arrangement error. If there is an article arrangement error, a warning is displayed on the display unit.

(Article display judgment processing)
FIG. 29 is a diagram for explaining the article display determination process. FIG. 29 shows an example of determining whether the article arrangement is changed or a temporary article arrangement error, but the determination algorithm is not limited to this.

In the article arrangement 2901, the article presence / absence sensors on the display shelf display a total of 32 articles in 8 rows (each row: 4, 4, 3, 4, 5, 4, 4, 4). The articles in each row are (large bottle A, large bottle A, large bottle B, large bottle B, small bottle c, small bottle c, small bottle d, small bottle d) by article identification from the front image.

Next, in the determined article arrangement 2902, the article presence / absence sensors on the display shelf are not changed in a total of 32 articles in 8 rows (each row: 4, 4, 3, 4, 5, 4, 4, 4). However, the articles in each row are a large bottle A, a large bottle A, a large bottle B, a large bottle B, a small bottle c, a small bottle d, a small bottle c, and a small bottle d based on the article identification from the front image. That is, the items in the sixth and seventh rows from the left are switched between the small bottle d and the small bottle c. At this stage, it can also be determined that the articles in the sixth and seventh rows have been rearranged.

In the next determined article arrangement 2903, the number of article presence / absence sensors on the display shelf is 28 in each of eight rows (each row: 4, 4, 3, 4, 3, 3, 3, 4). At this time, the articles in each row are a large bottle A, a large bottle A, a large bottle B, a large bottle B, a small bottle c, a small bottle c, a small bottle d, and a small bottle d based on the article identification from the front image. . That is, the articles in the sixth and seventh rows from the left return to the small bottle c and the small bottle d. In this case, with reference to the article arrangement 2901 and the article arrangement 2902, it can be determined that the foremost bottles in the sixth column and the seventh column from the left in the article arrangement 2902 have an arrangement error.

Note that the example of FIG. 29 is an example, and it is possible to determine rearrangement or placement error by following the history of article arrangement from the history of data from the article presence sensor and the article arrangement identified from the front image. it can.

<< Processing procedure of information processing device >>
FIG. 30A is a flowchart illustrating a processing procedure of the information processing apparatus. This flowchart is executed by the CPU 1010 in FIG. 10A using the RAM 1040 to realize the functional configuration unit in FIG. In FIG. 30A, steps similar to those in FIG. 11A are denoted by the same step numbers and description thereof is omitted.

30A differs from FIG. 11A in that the information processing apparatus 2810 performs an arrangement determination process in step S3008 based on the history of the article presence / absence data from the article presence / absence sensor and the article arrangement identified from the front image. is there.

(Placement judgment process)
FIG. 30B is a flowchart illustrating the procedure of the arrangement determination process (S3008).

In step S3021, the information processing apparatus 2810 acquires the history of the article presence / absence data and the article arrangement data from the article arrangement history database 2814. Next, in step S3023, the information processing apparatus 2810 determines the current article arrangement based on the acquired history.

FIG. 30B shows three determination results. If there is no change between the article presence / absence data and the article arrangement data, the information processing apparatus 2810 determines that there is no change in the article arrangement in step S3025. When both the article presence / absence data and the article arrangement data are changed and there is no difference between the changes, the information processing apparatus 2810 determines in step S3027 that the article is to be rearranged. Also, as shown in FIG. 29, when there is a deviation in the changes in the article presence / absence data and the article arrangement data, the information processing apparatus 2810 determines that there is an article placement error in step S3029.

It should be noted that the article placement change and placement error are not limited to this example, and in other examples, the article identification information based on the front image of this embodiment and the article presence / absence information obtained by the article presence / absence sensor may be compared or the history may be traced. It becomes possible to find it.

According to the present embodiment, in addition to notification of article replenishment, it is possible to notify an article arrangement change or an arrangement error, and therefore fine support for article management in the display shelf can be provided.

[Seventh Embodiment]
Next, an article management system including an information processing apparatus according to the seventh embodiment of the present invention will be described. Compared with the second to sixth embodiments, the information processing apparatus according to the present embodiment identifies each other based on the article arrangement information obtained from the photographed image and the article presence / absence information obtained from the article presence / absence sensor. It differs in that it increases accuracy and detection accuracy. Since other configurations and operations are the same as those of the second to fifth embodiments, the same configurations and operations are denoted by the same reference numerals, and detailed description thereof is omitted.

《Goods management system》
FIG. 31 is a diagram showing an outline of an article management

system 3100 including an information processing apparatus according to this embodiment. FIG. 31 shows an adjustment example 3110 for improving the accuracy of identifying an article from an image and an adjustment example 3120 for improving the accuracy of the presence / absence determination of an article presence / absence sensor.

In the adjustment example 3110, in the detection result 3111 of the frontmost shelf of the display shelf by the article presence / absence sensor, there are articles in all the rows. On the other hand, in the article identification result 3112 identified from the front image, the articles in the seventh column from the left cannot be identified. In this case, it is determined that the image is erroneously identified 3113, and the adjustment 3114 is performed so as to improve the accuracy of identifying the article from the image. The adjustment 3114 includes adjustment of parameters, thresholds, and the like for feature point detection, local feature generation, feature point clustering, and local feature verification in the article identification process.

In the adjustment example 3120, the articles in all rows are identified in the article identification result 3122 identified from the front image. On the other hand, in the detection result 3121 of the frontmost shelf of the display shelf by the article presence / absence sensor, there is no article in the second row. In this case, it is determined as the detection error 3123 of the article presence / absence sensor, and the adjustment 3124 is performed so as to improve the accuracy of the article presence / absence detection. The adjustment 3124 includes adjustment of a threshold value for determining the strength of a response signal in the RFID reader, adjustment of transmission strength for transmitting a command from the RFID reader, and the like. Note that the article identification result may include not only the identification result of the article in the back, but also the identification error of the article presence sensor. You may judge based on.

<< Functional configuration of information processing device >>
FIG. 32 is a block diagram illustrating a functional configuration of the information processing apparatus 3210. In FIG. 32, the same functional components as those in FIG. 4 are denoted by the same reference numerals, and description thereof is omitted.

The error history database 3214 of FIG. 32 accumulates a history of errors in matching between the article arrangement identified by the article identification unit 211 and the article arrangement detected by the article presence / absence sensor. The article identification / article presence / absence collation unit 3217 collates the article arrangement identified by the article identification unit 211 with the article arrangement detected by the article presence / absence sensor, and determines that there is an error if they do not match. Then, the error history is accumulated in the error history database 3214, and the parameter adjustment in the article identification unit 211 and the parameter adjustment in the article arrangement generation unit 407 are

performed. Further, the article identification / article presence / absence collation unit 3217 notifies the imaging unit / article presence / absence sensor adjustment unit 3218 of the occurrence of an error together with information on which adjustment is necessary. The imaging unit / article presence / absence sensor adjustment unit 3218 transmits data for adjusting the imaging unit and / or the article presence / absence sensor.

<< Processing procedure of information processing device >>
FIG. 33A is a flowchart illustrating the processing procedure of the information processing apparatus 3210. This flowchart is executed by the CPU 1010 of FIG. 10A using the RAM 1040, and realizes the functional configuration unit of FIG. In FIG. 33A, steps similar to those in FIG. 11A are denoted by the same step numbers and description thereof is omitted.

The difference between FIG. 33A and FIG. 11A is that the information processing device 3210 detects the presence / absence of the article and / or the article based on the comparison between the article presence / absence data from the article presence / absence sensor and the article arrangement identified from the front image in step S3308. The point is that an identification adjustment process is performed.

(Article presence detection and article identification adjustment processing)
FIG. 33B is a flowchart illustrating a procedure of an article presence / absence detection and article identification adjustment process (S3308).

In step S3321, the information processing apparatus 3210 collates the article presence / absence result with the article identification result. In step S3323, the information processing apparatus 3210 branches based on the collation result. If there is no error from the collation result, the process is terminated.

If there is an error in article identification from the image, the information processing apparatus 3210 performs adjustments related to identification processing such as threshold adjustment for local feature generation in step S3325. In step S3327, the information processing apparatus 3210 determines whether the error has been recovered. If the error is recovered, the process is terminated. Although the adjustment of the identification process in step S3325 and the determination in step S3327 are repeated, they are not shown in FIG. 33B because they become complicated.

If the error is not recovered, the information processing apparatus 3210 adjusts the imaging unit in step S3329. In step S3331, the information processing apparatus 3210 determines whether the error has been recovered. If the error is recovered, the process is terminated. Note that the adjustment of the imaging unit in step S3329 and the determination in step S3331 are repeated, but are not shown in FIG. 33B because they become complicated. If the error is not recovered, the article identification system is notified that there is an error.

If there is an article presence / absence detection error in the determination in step S3323, the information processing apparatus 3210 performs threshold value adjustment for the article presence / absence detection of the RFID reader in step S3335. In step S3337, the information processing apparatus 3210 determines whether the error has been recovered. If the error is recovered, the process is terminated. The adjustment of the article presence / absence sensor in step S3335 and the determination in step S3337 are repeated, but are not shown in FIG. 33B because they become complicated. If the error is not recovered, the article presence / absence detection system is notified that there is an error.

Note that the error detection method of both the article identification system and the article presence / absence detection system or its adjustment method is not limited to the present embodiment. There are other possible error detection methods or adjustment methods unique to the present embodiment in which article display management is performed by linking an article identification system and an article presence / absence detection system.

According to the present embodiment, the identification accuracy and the detection accuracy can be enhanced, and the article arrangement on the display shelf can be reliably grasped.

[Eighth Embodiment]

Next, an article management system including an information processing apparatus according to the eighth embodiment of the present invention will be described. Compared with the second to seventh embodiments, the information processing apparatus according to the present embodiment has an article presence / absence obtained by identifying an article from the article presence / absence pattern in the front row obtained from the article presence / absence sensor and a photographed image. The difference is that the shooting position is specified by collating with the pattern. Since other configurations and operations are the same as those of the second to seventh embodiments, the same configurations and operations are denoted by the same reference numerals, and detailed description thereof is omitted.

《Goods management system》

With reference to FIGS. 34 and 35, the configuration and operation of the article management system 3400 of the present embodiment will be described.

(System overview)

FIG. 34 is a diagram showing an outline of an article management system 3400 including an information processing apparatus 3410 according to this embodiment. In FIG. 34, the same reference numerals are given to the same components as those in FIG. 2A, and description thereof will be omitted.

The article management system 3400 includes an information processing apparatus 3410, an imaging unit 220 that is a camera, and an article presence / absence sensor 230. The imaging unit 220 captures an image in the front row of the display shelf 201. For the sake of simplicity, FIG. 34 shows an example of arrangement with bottles (represented by bit 1) and bottles absent (represented by bit 0) at the top of the display shelf 201. As described above, the shelf and its photographing position can be specified without storing the shelf mark as in the fourth embodiment or the shelf-specific article arrangement as in the fifth embodiment.

The information processing apparatus 3410 includes an article identification unit 211, a display number acquisition unit 212, and a display recognition unit 3413. The display recognizing unit 3413 compares the article presence / absence pattern in the front row of the display shelf 201 from the article identification unit 211 with the article presence / absence pattern in the front row based on the item presence / absence information from the display number acquisition unit 212. Such collation is performed by changing the image acquisition position not only in the same position including the presence of the article but also in the left and right and up and down directions. If a matching article presence / absence pattern is found, it can be determined where on the display shelf is being photographed. Accordingly, since the article presence / absence pattern identified from the image can be associated with the article presence / absence pattern from the article presence / absence sensor, the number of displays on the display shelf 201 of each article is recognized.

(Operation procedure)
FIG. 35 is a sequence diagram illustrating an operation procedure of the article management system 3400 including the information processing apparatus 3410 according to the present embodiment. In FIG. 35, steps similar to those in FIG. 3 of the second embodiment are denoted by the same step numbers, and description thereof is omitted.

35, the article presence / absence pattern collation between the article identification result and the article presence / absence result in step S3510 is added to FIG. In step S3510, the information processing apparatus 3410 compares the article presence / absence pattern identified from the front image of the display shelf with the article presence / absence pattern on the front of the display shelf obtained from the article presence / absence sensor. Are associated with the article presence / absence sensor position.

In the fourth embodiment, a shelf mark is added to correspond to the association between each article identification position and each article presence sensor position. Further, in the fifth embodiment, each article identification position and each article presence / absence are obtained by associating the image position photographed by the imaging unit 220 with the same position on the display shelf according to the display shelf-

specific article arrangement identified from the photographed image. The sensor position was linked. In the present embodiment, without preparing a shelf mark or an article arrangement peculiar to a display shelf, it is possible to identify the shelf and its shooting position and associate each article identification position with each article presence sensor position.

<< Functional configuration of information processing device >>
FIG. 36 is a block diagram illustrating a functional configuration of the information processing apparatus 3410. In FIG. 36, the same functional components as those in FIG. 4 are denoted by the same reference numerals, and description thereof is omitted.

36 includes an article presence / absence pattern generated from the article recognition information from the article identification unit 211 and an article presence / absence pattern generated from the article presence / absence information received by the article presence / absence information receiving unit 405. Match. Then, the shelf that matches the article presence / absence pattern and its shooting position are specified.

(Product column presence / absence column matching)
FIG. 37 is a diagram for explaining article column presence / absence column collation according to the present embodiment.

In the upper part of FIG. 37, an article arrangement pattern 3710 in the front row of the two display shelves generated from the detection data of the article presence / absence sensor is shown. Here, "●" indicates that there is an article in the front row, and "◯" indicates that there is no article in the front row. The first article arrangement pattern has a display shelf ID 3711, a stage 3712, and an article arrangement pattern 3713. The second article arrangement pattern has a display shelf ID 3715, a stage 3716, and an article arrangement pattern 3717.

In the lower part of FIG. 37, an article presence / absence pattern 3721 generated from the article identified from the image is shown. Here, the article arrangement pattern 3713 and the article arrangement pattern 3717 are operated with the article arrangement pattern 3717. In this example, a pattern that matches the article arrangement pattern 3717 appears after the second column from the left of the article arrangement pattern 3717 (within the broken line frame). As a result, it is found that the article presence / absence pattern 3721 generated from the article identified from the image is taken from the second row of the right display shelf, and the identified article arrangement and the article presence / absence arrangement are linked. be able to. In FIG. 37, a pattern including a plurality of stages has been described as an example, but a one-stage article presence / absence pattern may be used.

<< Processing procedure of information processing device >>
FIG. 38A is a flowchart illustrating the processing procedure of the information processing apparatus 3410. This flowchart is executed by

the CPU 1010 of FIG. 10A using the RAM 1040, and implements the functional configuration unit of FIG. In FIG. 38A, steps similar to those in FIG. 11A are denoted by the same step numbers and description thereof is omitted.

The difference between FIG. 11A and FIG. 11A is that the information processing apparatus 3410 collates the presence / absence pattern between the article identification result and the article presence / absence result in step S3805 to identify the shelf and its shooting position.

(Article row identification processing)
FIG. 38B is a flowchart illustrating a procedure of article row identification processing (S3806).

In step S3821, the information processing apparatus 3410 collates the photographed article presence / absence pattern with the article presence / absence pattern by the article presence / absence sensor while scanning. In step S3823, the information processing apparatus 3410 determines whether there is a matching article arrangement pattern. If there is a matching article arrangement pattern, the information processing apparatus 3410 specifies a display shelf and a photographing position having a matching article arrangement in step S3825. On the other hand, if there is no matching article arrangement pattern, the information processing apparatus 3410 performs error processing in step S3827, assuming that the display shelf or the shooting position is not found. In step S3827, control may be performed so as to change the article identification accuracy and the shooting position / range depending on the number of errors.

According to the present embodiment, since the shooting position of the article display shelf can be determined without a special operation for specifying the display shelf as in the third embodiment and the fourth embodiment, the article based on the photographed image can be determined. The identification and the article presence / absence information from the article presence / absence sensor can be easily associated with each other.

[Ninth Embodiment]
Next, an article management system including an information processing apparatus according to the ninth embodiment of the present invention will be described. In the information processing apparatus 3910 according to this embodiment, the display unit 3914 and the imaging unit 3920 are separated from the information processing apparatus 3910 and provided in the tablet terminal 3930 as compared with the second to eighth embodiments. It is different in point. Since other configurations and operations are the same as those of the second to seventh embodiments, the same configurations and operations are denoted by the same reference numerals, and detailed description thereof is omitted.

FIG. 39 is a diagram showing a schematic configuration of an article management system 3900. The article management system 3900 includes an article presence / absence sensor 230 provided on the display shelf 201, an information processing device 3910 as an article management server, and a tablet terminal 3930. The information processing apparatus 3910 includes a display number acquisition unit 3912 and an inventory database 3915. The display number acquisition unit 3912 receives presence sensing data (data indicating the presence / absence of an article on the article presence / absence sensor 230) from the article presence / absence sensor 230, and acquires the number of display for each article row. On the other hand, the inventory database 3915 manages the number of articles in stock for each article type in cooperation with a POS terminal (not shown).

The tablet terminal 3930 includes an article identification unit 3911, a display recognition unit 3913, an imaging unit 3920, and a display unit 3914. That is, the tablet terminal 3930 incorporates an imaging function. The article identification unit 3911 may be provided in the information processing apparatus 3910 instead of the tablet terminal 3930. In that case, the image picked up by the image pickup unit 3920 is transmitted to the information processing apparatus 3910 to request an article identification process.

The tablet terminal 3930 receives the number of displays for each face (article row) from the information processing device 3910 and displays it on the display unit 3914 in a superimposed manner on the captured image (stopped image or live view). As in the second embodiment, the display unit 3914 may display a warning message when there is a product with a display number of 0, or receive or read out sample image data of the product, and nothing is displayed. The store clerk may be instructed which items should be arranged on the shelves that are not present.

Further, the number of stocks read from the stock database 3915 may be displayed superimposed on the article image or arranged side by side.

According to such a configuration, the number of displays and / or the number of stocks is displayed on the captured image only by imaging the display shelf using the tablet terminal 3930.

Although an example using the information processing device 3910 is shown here, the present invention is not limited to this. For example, the tablet terminal 3930 may directly receive the article presence / absence information from the sensor sheet and count the number of displays for each article.

[Other Embodiments]
The present invention has been described above with reference to the embodiments, but the present invention is not limited to the above embodiments. Various changes that can be understood by those skilled in the art can be made to the configuration and details of the present

invention within the scope of the present invention. In addition, a system or an apparatus in which different features included in each embodiment are combined in any way is also included in the scope of the present invention.

In addition, the present invention may be applied to a system composed of a plurality of devices, or may be applied to a single device. Furthermore, the present invention can also be applied to a case where an information processing program that implements the functions of the embodiments is supplied directly or remotely to a system or apparatus. Therefore, in order to realize the functions of the present invention on a computer, a program installed in the computer, a medium storing the program, and a WWW (World Wide Web) server that downloads the program are also included in the scope of the present invention. . In particular, at least non-transitory computer readable media are within the scope of the present invention.

Patent Citations (4)

Publication number	Priority date	Publication date	Assignee
JP2011253324A *	2010-06-01	2011-12-15	Sharp Corp
WO2012029548A1 *	2010-08-31	2012-03-08	新日鉄ソリューションズ株式会社
US20120127314A1 *	2010-11-19	2012-05-24	Sensormatic Electronics, LLC

JP2012174154A *	2011-02-24	2012-09-10	Fujitsu Frontech Ltd

Family To Family Citations

* Cited by examiner, † Cited by third party

Non-Patent Citations (1)

Title
JPN6016045862; 比嘉 恭太: '局所特徴量の特徴点位置に基づくクラスタリングを用いた被写体識別' 第１１回情報科学技術フォーラム講演論文集（第３分冊）, 20120821, ｐｐ．１２９-１３０ *

* Cited by examiner, † Cited by third party

Cited By (7)

Publication number	Priority date	Publication date	Assignee
WO2016063484A1 *	2014-10-23	2016-04-28	日本電気株式会社
WO2016117600A1 *	2015-01-22	2016-07-28	日本電気株式会社
JP2018147028A *	2017-03-01	2018-09-20	東芝テック株式会社

WO2018204342A1 *	2017-05-01	2018-11-08	Symbol Technologies, Llc
JP2019513274A *	2016-03-29	2019-05-23	ボサ ノバ ロボティクス アイピー, インク. Bossa Nova Robotics Ip, Inc.
JP2020521199A *	2017-04-07	2020-07-16	シムビ ロボティクス, インコーポレイテッド Simbe Robotics, Inc.
US10796166B2	2016-03-23	2020-10-06	Nec Corporation

Family To Family Citations

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
US9996818B1	2018-06-12	Counting inventory items using image analysis and depth information
Shangguan et al.	2015	Relative localization of {RFID} tags using spatial-temporal phase profiling

US20200215698A1	2020-07-09	Method for automatically generating planograms of shelving structures within a store
US10789483B1	2020-09-29	Image based inventory item counting
JP2021507203A	2021-02-22	Product detection system and product detection method based on weight monitoring
US9965682B1	2018-05-08	System and method for determining position of a device
CN105701519B	2018-10-09	The practical planogram scene analysis of image based on super-pixel
US9652736B2	2017-05-16	Portable RFID reading terminal with visual indication of scan trace
JP6728404B2	2020-07-22	How to track product placement on store shelves
US10290031B2	2019-05-14	Method and system for automated retail checkout using context recognition
US9477955B2	2016-10-25	Automatic learning in a merchandise checkout system with visual recognition
US9971154B1	2018-05-15	Pointer tracking for eye-level scanners and displays
US20180240180A1	2018-08-23	Contextually aware customer item entry for autonomous shopping applications
US20210056498A1	2021-02-25	Method and device for identifying product purchased by user and intelligent shelf system
JP2019513274A	2019-05-23	System and method for installation, identification and counting of goods
Ni et al.	2013	Multilevel depth and image fusion for human activity detection
US10192197B2	2019-01-29	Automated asset management system with multiple sensing technologies
US8860760B2	2014-10-14	Augmented reality (AR) system and method for tracking parts and visually cueing a user to identify and locate parts in a scene
CN107431786B	2020-08-04	Image processing apparatus, image

		processing system, and image processing method
US10157452B1	2018-12-18	Image processing system for image rectification
AU2011352412B2	2016-07-07	Scene activity analysis using statistical and semantic feature learnt from object trajectory data
US8339265B2	2012-12-25	Method of assigning and deducing the location of articles detected by multiple RFID antennae
CN105404860B	2019-01-11	Method and apparatus for managing personal information of wandering away
CN106934692B	2020-12-22	Article information processing system, method and device
Vezzani et al.	2013	People reidentification in surveillance and forensics: A survey

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
JP2013042446A	2013-03-04	2013-03-04	Information processing system, information processing apparatus, control method thereof, and control program

Applications Claiming Priority (1)

Application	Filing date	Title
JP2013042446A	2013-03-04	Information processing system, information processing apparatus, control method thereof, and control program

Legal Events

Date	Code	Title
2016-02-09	A621	Written request for application examination

2016-11-24	A977	Report on retrieval
2016-12-01	A131	Notification of reasons for refusal
2017-01-30	A521	Written amendment
2017-02-06	TRDD	Decision of grant or rejection written
2017-02-09	A01	Written decision to grant a patent or to grant a registration
2017-03-16	A61	First payment of annual fees (during grant procedure)
2017-03-17	R150	Certificate of patent or registration of utility model

Concepts

machine-extracted

Download Filter table

Name	Image	Sections	Count	Query match
imaging method		claims,abstract,description	75	0.000
storage		claims,description	12	0.000
controlling effect		claims,description	2	0.000

Show all concepts from the description section

Data provided by IFI CLAIMS Patent Services

Patents wo2014087725A1

Merchandise information processing device, data processing method therefor, and program

WO2014087725A1
WIPO (PCT)

Download PDF Find Prior Art Similar

Other languages: French, Japanese

Inventor: 富川 博, 理恵 川邉, 雄代 林, 野村 俊之

Worldwide applications

2013 WO CN JP

Application PCT/JP2013/076654 events

2012-12-04 Priority to JP2012265148

2012-12-04 Priority to JP2012-265148

2013-10-01 Application filed by 日本電気株式会社

2014-06-12 Publication of WO2014087725A1

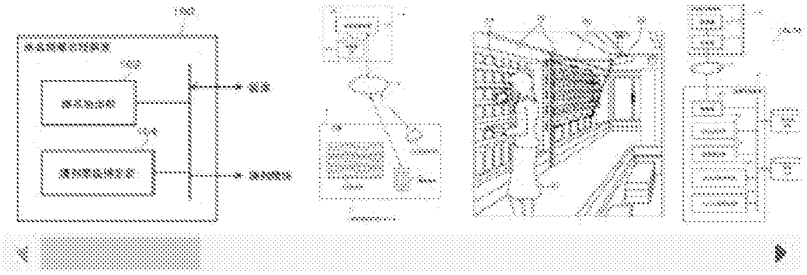
Info: Patent citations (12), Cited by (13), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, PatentScope, Discuss

Abstract

A merchandise information processing device (100) is provided with: a merchandise extraction unit (102) which extracts at least one kind of specific merchandise from an image obtained by capturing an image of a merchandise display state; and a display relationship specification unit (104) which specifies the display relationship between the extracted at least one kind of specific merchandise and other merchandise.

Images (17)



Classifications

G06Q30/02 Marketing, e.g. market research and analysis, surveying, promotions, advertising, buyer profiling, customer management or rewards; Price estimation or determination

View 5 more classifications

Claims (13)

Hide Dependent

1. Product extraction means for extracting at least one type of specific product from an image of the display state of the product;
A product information processing apparatus comprising: at least one type of the extracted specific product and display relationship specifying means for specifying a display relationship with another product.

2. The product information processing apparatus according to claim 1,
Based on the display relationship specified by the display relationship specifying means, a determination means for determining whether or not the display state of the specific product satisfies a display condition of the specific product set in advance.
A product information processing apparatus, further comprising: an output unit that outputs a determination result by the determination unit.

3. The product information processing apparatus according to claim 1 or 2,
The display relationship specifying unit is a product information processing apparatus that counts the number of faces of at least one type of the extracted specific product and specifies a display relationship with the other product based on the number of faces of the specific product.

4. The product information processing apparatus according to any one of claims 1 to 3,
The display relationship specifying means obtains a ratio of the display area of the specific product with respect to the target product including the specific product, and specifies the ratio of

the display area of the specific product as a display relationship with the other product Processing equipment.

5. The product information processing apparatus according to any one of claims 1 to 4,
The display relationship specifying unit is a product information processing apparatus that obtains a relative position between the specific product and the other product from the image, and specifies the display relationship as the display relationship.

6. The product information processing apparatus according to any one of claims 1 to 5,
The display relationship specifying means specifies a target product display area as an area from which the display status of the specific product and the other product should be grasped from the image, and arranges the specific product in the target product display area. A product information processing apparatus specified as a display relationship with the other product.

7. The product information processing apparatus according to claim 6,
The product extraction means further extracts the other product from the image,
From the image, based on the extracted information on the specific product and the other product, another product for which the display state of the specific product is to be identified is specified, and the target product display area is automatically determined. A product information processing apparatus further comprising target product display area discrimination means for performing.

8. The product information processing apparatus according to claim 6 or 7,
Absolute position specifying means for specifying an absolute position of the specific product in a product shelf on which a product is displayed from a relative position between the specific product and the other product included in the target product display area specified from the image A product information processing apparatus further provided.

9. The product information processing apparatus according to any one of claims 1 to 8,
The product extraction unit is a product information processing apparatus that pattern-recognizes the image based on a feature amount of a face image of the specific product held in advance and extracts the specific product.

10. The product information processing apparatus according to any one of claims 1 to 9,
The product is a product information processing apparatus in

which the image is captured by an imaging unit included in a mobile terminal or a monitoring camera installed in a store.

11. The product information processing apparatus according to claim 1,
Transmitting means for transmitting information of the image captured at the store via a network;
Receiving means for receiving the image information via a network,
The product information processing apparatus, wherein the product extraction unit extracts the specific product based on the image information received by the receiving unit.

12. Product information processing device
Extract at least one specific product from an image of the display state of the product,
A data processing method of a product information processing apparatus for specifying a display relationship between at least one type of the extracted specific product and another product.

13. In a computer that implements a product information processing device,
A procedure for extracting at least one type of specific product from an image of the display state of the product;
A program for executing a procedure for specifying a display relationship between at least one kind of the extracted specific product and another product.

Description

Product information processing apparatus, data processing method thereof, and program

The present invention relates to a merchandise information processing apparatus, a data processing method thereof, and a program, and more particularly to a merchandise information processing apparatus that processes information related to a face of a merchandise display shelf, a data processing method thereof, and a program.

Patent Document 1 describes an example of a technique for quantitatively expressing a face-up performance on a product display shelf numerically. The system of Patent Literature 1 identifies a product presence area and a product non-existence area in a display shelf image, and extracts a boundary line.

Further, Patent Document 2 captures a face image of a vending machine, analyzes the result (analysis of column number, product code, selling price, H / C classification) and installation data of the vending machine (column No, selling price). , H / C classification), and a system for

notifying when the setting is not in accordance with the face display of the vending machine is described.

Further, Patent Document 3 describes a system that generates a product display pattern from an image obtained by capturing the display state of a product, compares it with a reference display pattern, and detects a display disorder.

JP 2006-59038 A JP 2012-73738 A JP 2003-230131 A

Using the above-described technology, it may be possible to identify each product from a photographed image of the product display shelf and to identify the arrangement of each product. However, we distinguish between specific products that should be managed and other products, and grasp the display relationship such as how the specific products are displayed in all display states including other products. I couldn't.

The present invention has been made in view of the above circumstances, and an object thereof is a product information processing apparatus capable of efficiently grasping a display relationship between a specific product and another product in a product display shelf of a store, and data processing thereof It is to provide a method and a program.

The product information processing apparatus of the present invention
Product extraction means for extracting at least one type of specific product from an image of the display state of the product;
Display relation specifying means for specifying the display relation between the extracted at least one type of the specified product and other products.

The data processing method of the product information processing apparatus of the present invention includes:
Product information processing device
Extract at least one specific product from an image of the display state of the product,
It is a data processing method for specifying a display relationship between at least one type of the extracted specific product and another product.

The computer program of the present invention is:
In a computer that implements a product information processing device,
A procedure for extracting at least one type of specific product from an image of the display state of the product;
It is a program for executing a procedure for specifying a display relationship between at least one kind of the extracted specific product and another product.

It should be noted that an arbitrary combination of the above-described components and a conversion of the expression of the present invention between a method, an apparatus, a system, a recording medium, a

computer program, and the like are also effective as an aspect of the present invention.

The various components of the present invention do not necessarily have to be independent of each other. A plurality of components are formed as a single member, and a single component is formed of a plurality of members. It may be that a certain component is a part of another component, a part of a certain component overlaps with a part of another component, or the like.

In addition, although the data processing method and the computer program of the present invention describe a plurality of procedures in order, the described order does not limit the order in which the plurality of procedures are executed. For this reason, when implementing the data processing method and computer program of this invention, the order of the several procedure can be changed in the range which does not have trouble in content.

Furthermore, the data processing method and the plurality of procedures of the computer program of the present invention are not limited to being executed at different timings. For this reason, another procedure may occur during the execution of a certain procedure, or some or all of the execution timing of a certain procedure and the execution timing of another procedure may overlap.

According to the present invention, there is provided a product information processing apparatus, a data processing method thereof, and a program capable of efficiently grasping the display relationship between a specific product and other products in a store product display shelf.

The above-described object and other objects, features, and advantages will be further clarified by a preferred embodiment described below and the following drawings attached thereto.

It is a functional block diagram which shows the structure of the merchandise information processing apparatus which concerns on embodiment of this invention. It is a block diagram which shows the structural example of the merchandise information processing system using the merchandise information processing apparatus which concerns on embodiment of this invention. It is a figure for demonstrating the utilization scene of the merchandise information processing apparatus which concerns on embodiment of this invention. It is a functional block diagram which shows the specific structural example of the merchandise information processing apparatus which concerns on embodiment of this invention. It is a figure for demonstrating an example of the structure of the feature-value database of the image recognition apparatus of this embodiment. It is a figure for demonstrating an example of the structure of the goods master hold | maintained in the goods database of this embodiment. It is a flowchart which shows an example of operation | movement of the merchandise

information processing apparatus of this embodiment. It is a flowchart which shows an example of the procedure of operation | movement of the portable terminal and image recognition apparatus of the goods information processing system which concerns on embodiment of this invention. It is a figure for demonstrating the process which recognizes a face area | region from the captured image in the merchandise information processing apparatus of this embodiment. It is a figure which shows the example of the imaging | photography screen using the portable terminal in the merchandise information processing apparatus of this embodiment. It is a functional block diagram which shows the structure of the merchandise information processing apparatus which concerns on embodiment of this invention. It is a block diagram which shows the structural example of the goods information processing system using the goods information processing apparatus which concerns on embodiment of this invention. It is a functional block diagram which shows the specific structural example of the merchandise information processing apparatus which concerns on embodiment of this invention. It is a figure for demonstrating an example of the structure of the contract information table hold | maintained at the goods database of this embodiment. It is a figure for demonstrating the identification method of arrangement | positioning of the goods shelf imaged with the goods information processing apparatus which concerns on embodiment of this invention. It is a figure for demonstrating the automatic discrimination | determination process of the object merchandise display area in the merchandise information processing apparatus which concerns on embodiment of this invention. It is a figure for demonstrating the imaging | photography method of the goods shelf in the goods information processing apparatus which concerns on embodiment of this invention.

Hereinafter, embodiments of the present invention will be described with reference to the drawings. In all the drawings, the same reference numerals are given to the same components, and the description will be omitted as appropriate.

(First embodiment)

FIG. 1 is a functional block diagram showing a configuration of a product information processing apparatus 100 according to an embodiment of the present invention.

Conventionally, the information on the display state of the products on the product display shelves of each retail store has been managed by a salesman of a product maker visiting each store, collecting it manually, and recording it as a daily report or the like.

The merchandise information processing apparatus 100 according to the embodiment of the present invention distinguishes between a specific merchandise to be managed and other merchandise in a merchandise display shelf of a store, and the specific merchandise includes other merchandise. The display relationship such as how the image is displayed in the state is grasped from the photographed image.

The product information processing apparatus 100 according to the embodiment of the present invention includes a product extraction unit 102 that extracts at least one type of specific product from an image obtained by imaging the display state of the product, and at least one type of specific product that is extracted. A display relationship specifying unit 104 for specifying a display relationship with other products.

Each component of the product information processing apparatus 100 includes a CPU (Central Processing Unit), a memory, a program that implements the components of FIG. 1 loaded in the memory, a storage unit that stores the program, and an arbitrary communication interface. This is realized by an arbitrary combination of hardware and software of a computer (not shown). It will be understood by those skilled in the art that there are various modifications to the implementation method and apparatus. Each diagram described below shows a block of logical functional units, not a configuration of hardware units. In addition, in each figure, it has abbreviate | omitted about the structure of the part which is not related to the essence of this invention, and is not showing in figure.

1, the entire product information processing apparatus 100 is controlled by the CPU together with each element. Each function of each unit in FIG. 1 of the commodity information processing apparatus 100 can be realized by the CPU reading the program stored in the hard disk into the memory and executing it.

The computer program of the present embodiment is a computer for realizing the product information processing apparatus 100. The computer program for realizing the product information processing apparatus 100 extracts at least one type of specific product from an image obtained by imaging the display state of the product. It is described to execute a procedure for specifying a display relationship between a specific product and another product.

The computer program of this embodiment may be recorded on a computer-readable recording medium. The recording medium is not particularly limited, and various forms can be considered. The program may be loaded from a recording medium into a computer memory, or downloaded to a computer through a network and loaded into the memory.

FIG. 2 is a block diagram illustrating a configuration example of the product information processing system 1 using the product information processing apparatus 100 according to the embodiment of the present invention. FIG. 3 is a diagram for explaining a use scene of the product information processing apparatus 100 according to the embodiment of the present invention. FIG. 4 is a functional block diagram showing a specific configuration example of the product information processing apparatus 100 according to the embodiment of the present invention.

As shown in FIGS. 2 and 3, the product information processing system 1 of the present embodiment captures an image obtained by capturing products displayed on the product shelf 20 of the store 7 via a network 3 (in the figure, (Represented as "DC"), and the image recognition process received by the image recognition apparatus 10 provided in the data center 5 is stored in the feature amount database (indicated as "feature amount DB" in the figure) 12. Based on the feature value.

There are various ways to shoot the product shelf 20. As an example of the photographing method, even if the entire product shelf 20 including a plurality of stages and a plurality of rows of shelves or a relatively wide photographing region 26 is collectively photographed using the monitoring camera 22 installed in the store 7. Good. Alternatively, as another example of the photographing method, the operator 27 uses the portable terminal 24 with the camera, for example, holding the portable terminal 24 over a relatively narrow range of a part of the product shelf 20 in several stages or rows. You may shoot.

As shown in FIG. 4, the product information processing system 1 of this embodiment includes an information processing terminal 110 used in a store 7 and an image recognition device 10 provided in the data center 5. The information processing terminal 110 and the image recognition device 10 are connected via the network 3.
The information processing terminal 110 is, for example, a portable terminal 24 in FIG. 2 with a built-in camera (not shown) or a terminal (not shown) connected to the monitoring camera 22.

The mobile terminal 24 is a mobile terminal that can be connected to the network 3 via a relay station (not shown), and is, for example, a tablet terminal, a smartphone, or a PDA (Personal Digital Assistant). A terminal connected to the monitoring camera 22 is, for example, a personal computer, a POS (Point Of Sales) system, a tablet terminal, a smartphone, or a PDA (Personal Digital Assistants) terminal.

Each component of the information processing terminal 110 and the image recognition apparatus 10 includes a CPU, a memory, a program that realizes the components of FIG. 4 loaded in the memory, a storage unit that stores the program, and an arbitrary computer that includes a communication interface. Each is realized by any combination of hardware and software. It will be understood by those skilled in the art that there are various modifications to the implementation method and apparatus.

Further, in this embodiment, the image recognition apparatus 10 is realized by cloud computing using a server computer of the data center 5, but is not limited to this. The server computer of the image recognition device 10 may be configured with a virtual server or the like.

The information processing terminal 110 includes an imaging unit 112 and a transmission unit 114.
The imaging unit 112 is, for example, a camera built in the portable

terminal 24, a monitoring camera 22 installed in the store 7, a web camera that can shoot the inside of the store 7 that can be controlled from the information processing terminal 110 or the image recognition device 10, or A combination of these can be used. The image captured by the imaging unit 112 may be a still image or a moving image. When the captured image is a moving image, image data sequentially obtained from the moving image can be used for image recognition processing by the image recognition apparatus 10. Which imaging means is used and which of a still image and a moving image is used for the image recognition processing can be appropriately adopted in consideration of the processing capability of each information processing terminal 110 and the communication load of the network 3. .

When taking an image using the information processing terminal 110, the information processing terminal 110 activates a predetermined application program, controls the imaging unit 112 by the application program, and takes an image of the product shelf 20 to acquire an image. it can. In addition to the configuration in which the information processing terminal 110 includes the imaging unit 112, the imaging unit may be configured to use an external camera connected to the information processing terminal 110.

The transmission unit 114 transmits the image captured by the imaging unit 112 to the image recognition device 10 via the network 3. The communication means of the transmission unit 114 may be either wired or wireless communication, or may be communication via any of a mobile communication network, a public line network, a LAN (Local Area Network), or a WAN (Wide Area Network). It is preferable to adopt appropriately according to the configuration of the processing terminal 110 and the like. As described above, various image communication methods can be considered and are not related to the essence of the present invention, and thus detailed description thereof will be omitted. Further, the information processing terminal 110 can include a configuration for performing an encryption process and an authentication process as a security measure at the time of communication.

The image captured by the imaging unit 112 of the product shelf 20 may be transmitted to the image recognition device 10 by the sequential transmission unit 114 without being stored in the information processing terminal 110 at the time of shooting, or the image may be stored in the information processing terminal 110. A plurality of images may be transmitted to the image recognition apparatus 10 by the transmission unit 114 later.

When using an image captured using the monitoring camera 22 or the web camera, the information processing terminal 110 provided in the store 7 may acquire the image by remotely operating the monitoring camera 22 and capturing the image. The terminal 110 may read and acquire an image from a recording medium on which the image captured

by the monitoring camera 22 is recorded. Various methods of acquiring images are conceivable and are not related to the essence of the present invention, and thus detailed description thereof is omitted.

In the present embodiment, the image data taken by the store 7 is transmitted to the data center 5 and the image recognition device 10 of the data center 5 performs the image recognition process. However, the present invention is not limited to this. For example, the information processing terminal 110 may include an extraction unit (not shown) that extracts a feature amount from an image captured by the imaging unit 112. The transmission unit 114 may transmit the feature amount information to the data center 5. Compared with the case of transmitting image data, the configuration of transmitting feature amount information can reduce the communication amount and suppress the communication load.

Further, the information processing terminal 110 may include an image recognition unit 122 that holds the feature amount data of the recognition target product image and performs image recognition processing of the captured image. The transmission unit 114 may transmit the image recognition result to the data center 5. This configuration is effective, for example, when there are few types of products to be recognized or when the processing capability of the information processing terminal 110 is high, and the load on the server of the data center 5 can be reduced.

1 can be realized by combining the image recognition device 10 of the data center 5 (FIG. 4) and the information processing terminal 110 of the store 7 (FIG. 4). It is desirable that the function sharing of each component of the merchandise information processing apparatus 100 is appropriately determined in consideration of the processing capability of the image recognition apparatus 10 or the information processing terminal 110, communication load, and the like.

The information transmitted from the store 7 to the image recognition device 10 by the transmission unit 114 includes, for example, store identification information, photographer information, monitoring camera 22 or information processing terminal 110 identification information, in addition to the image data itself. May further be included. Further, when the image information does not include attribute information such as shooting date and time, the shooting date and time may be included. Further, when an image obtained by photographing a part of the product shelf 20 is transmitted, it is preferable to include information indicating which region is photographed in the transmission image information. These pieces of information may be acquired automatically by, for example, linking with an application program that creates a daily report. Or you may make an operator input information using the operation screen of the portable terminal 24.

The image recognition device 10 may be connected to an input device (not shown) such as a keyboard and a mouse, a display device such as a display, and an output device (not shown) such as a printer, and is a user interface function operated by an operator. You may have. Further, the image recognition device 10 may have a form in which an input / output device such as a touch panel is integrated.

The image recognition apparatus 10 includes a receiving unit 120, an image recognition unit 122, a product specifying unit 132, a relative position specifying unit 134, and a face number counting unit 142, a feature amount database 12, and a product database (see FIG. (Indicated as "product DB") 130. The product specifying unit 132, the relative position specifying unit 134, and the face number counting unit 142 may be realized by a product information management server device (not shown) different from the image recognition device 10.

FIG. 5 is a diagram for explaining an example of the structure of the feature amount database 12 of the present embodiment.
As shown in FIG. 5A, information on face images of each product is registered in the feature amount database 12. Specifically, as illustrated in FIG. 5B, the feature amount database 12 includes, as the feature amount table 124, at least a product ID for identifying a product and a feature amount capable of recognizing a face image of the product. One feature point data is stored in association with each other.

Returning to FIG. 4, the receiving unit 120 receives image data from the information processing terminal 110 via the network 3. The image recognition unit 122 extracts a feature amount from the image data received by the receiving unit 120 and refers to the feature amount database 12 and has a feature amount that matches the feature amount extracted in the feature amount database 12. Check to see if it exists.

The recognition processing by the image recognition unit 122 includes, for example, the following processing.
(A1) A feature amount is extracted from the captured image, and the feature amount database 12 is referenced to perform pattern recognition processing of the face image of the product. Here, the product face image to be subjected to pattern recognition processing may not be able to specify the product name. For example, if the product is a beverage, it is only necessary to recognize a face region such as a plastic bottle from the image. Here, all the face areas of all products existing in the captured image may be specified.
(A2) The relative position in the captured image of the face area of the recognized product is acquired.
(A3) The feature quantity of the image in the recognized face area is collated with the feature quantity stored in the feature quantity database 12, and a search is made for a match at least with a feature quantity equal to or greater than a threshold value.
(A4) The product ID corresponding to the matched feature amount is specified.

As shown in FIG. 6, the product database 130 holds information such as a product ID, a product name, a product classification code, a price, or an image ID for identifying product face image data, as the product master 136. The product classification code can include, for example, information indicating a hierarchical classification. When the major classification is beverage, the middle classification is classified into tea, coffee, tea, fruit juice, carbonated drink, water, etc. As a small classification of tea, classifications such as hojicha, green tea, oolong tea, and blended tea can be included, and as branch numbers, classifications such as region limitation, period limitation, and campaign can be included. Further, the product database 130 may include information on products of other companies.
Further, when information of images taken from each side of the same product is registered in the product database 130, the image recognition unit 122 can recognize the direction of the product.

Returning to FIG. 4, the product specifying unit 132 acquires a product ID having a feature amount recognized as having a feature amount registered in the feature amount database 12 by the image recognition unit 122 from the image recognition unit 122. , Identify the corresponding product. The following method can be considered as a method of specifying a product (hereinafter also referred to as "specific product") to be specified by the product specifying unit 132. Similarly, target products to be described later may also be specified.
(B1) At the time of shooting by the imaging unit 112, the operator specifies at least one type of specific product on the information processing terminal 110 side. At this time, the information processing terminal 110 can display a screen for designating a specific product, such as a product list, and accept an operator's selection. Then, the information processing terminal 110 transmits information on the specified specific product together with the captured image to the image recognition apparatus 10, and the product specifying unit 132 can perform processing based on the received information on the specific product.
(B2) On the image recognition apparatus 10 side, at least one type of specific product is designated and set as predetermined setting information. The product specifying unit 132 refers to the setting information and performs processing based on the information on the specified specific product. The setting information may be configured to select or update the setting in combination with other conditions such as a predetermined period and a store area.
(B3) The image recognition apparatus 10 automatically recognizes it. For example, the product specifying unit 132 can automatically recognize a product registered in the feature amount database 12 as a specific product. In this case, it is assumed that only specific products are registered in the feature amount database 12. In addition, for the target product, the product specifying unit 132 can automatically recognize a product belonging to the same classification as the target product based on the classification of the specific product. When the classification has

a hierarchical structure, a product that belongs to the same or higher classification is set as the target product. For example, when the product is a beverage and the specific product is green tea, the target product may be green tea or tea of a higher level classification.

Here, the specific product is at least one type of product to be managed in the product information processing system 1, and may be a specific product of the company or a product group of a specific series. The other products are products other than the specific product. The managed product (target product) includes a specific product and other products, and is a product that is a target for which the display relationship in the product shelf 20 should be grasped. For example, for a specific product for which the display relationship is to be grasped, if the product is a beverage, a group of products such as carbonated drinks and teas are individually managed. That is, the display relationship in a product group including a plurality of types of products belonging to different classifications such as carbonated drinks and tea shall not be managed. In the present invention, at least one specific product (carbonated beverage product A) and other products (carbonated beverage products B, C, D) are distinguished from each other in the same classification, for example, carbonated beverages. The display relationship in the display state of the target product (carbonated beverage products A, B, C, D) in the product shelf 20 including the specific product and other products is grasped.

In the present embodiment, products with the same classification are displayed together in the vicinity of the product shelf 20, and in the case of a display state in which products with different classifications are mixedly displayed, the display relationship is grasped. It can be excluded from the target. That is, it is assumed that there is an area including the target product of the same classification on the same shelf of the product shelf 20 or a plurality of shelves continuous in the vertical direction. The product information processing apparatus 100 may further include a configuration for detecting and notifying such a mixed state of products.

The product specifying unit 132 identifies and specifies whether the product corresponding to the acquired product ID is a specific product to be managed or other products. At this time, the product identification unit 132 may acquire product information corresponding to the product ID from the product master 136 with reference to the product database 130. Further, the product specifying unit 132 determines whether or not the other product is a target product for which the display relationship should be grasped, and specifies the target product.

The feature amount database 12 only needs to hold at least information on a specific product to be managed, but may hold information on other products, for example, products of other companies or products not managed.
When only specific product information is held, the product specification

unit 132 can specify a product that matches the feature amount registered in the feature database 12 as a specific product. Items that do not match can be identified as other products. In this case, it is assumed that the area of the target product in the image has already been specified, or that only the target product is included in the captured image. A method for specifying the target product area will be described later.

In addition, when other feature information is also stored in the feature quantity database 12 or the product master 136, the product ID corresponding to the feature value registered in the feature quantity database 12 is included in the specified specific product information. Based on this, it is possible to determine whether the product is a specific product or another product. Further, the classification of the specific product is determined from the information of the specified specific product, and other products belonging to the same category as the specific product are specified as the target product. Here, for example, when the product A of the company's carbonated drink is a specific product, the same category, that is, the company's product other than the product A of the carbonated drink and the product of the carbonated drink of another company can be targeted.

For example, as shown in FIG. 9, the area 52 surrounded by a dotted line from the captured image 50 indicates that it is a face area of each product recognized as a specific product or a target product. In the case of a configuration in which image recognition processing is performed simultaneously with image capturing, a frame indicating the face area of the product recognized in this way may be displayed on the screen of the portable terminal 24. In addition, the target product display area 54 may be enclosed in a frame as shown by a one-dot chain line on the display screen of the captured image 50 and presented.

Also, in the case of a configuration in which image recognition processing is performed simultaneously with image capturing, as shown in FIG. 10A, the captured image is displayed on the screen 60 of the portable terminal 24, and FIG. As shown in FIG. 6, based on the product ID specified from the image, the product information 62 may be displayed superimposed on the corresponding product position. Then, when the operator confirms these recognition results and the image recognition result is incorrect, the product information processing apparatus 100 corrects the recognition result or notifies that the recognition result is incorrect. May be further provided.

As described above, the display relationship specifying unit 104 in FIG. 1 specifies the display relationship between the specific product and other products based on the position of each product face. As the display relationship specifying unit 104 in FIG. 1, in the present embodiment, as shown in FIG. 4, a relative position specifying unit 134 and a face number counting unit 142 are provided.

Here, the display relationship can include, for example, the following items. The display relationship specifying unit 104 specifies at least one of these display relationships.
(C1) Relationship between the number of faces of a specific product and other products in the target product As an example, the number of faces of the specific product relative to the number of faces of all products of the target product (3 out of 5 faces, etc.)
Ratio of the number of faces of a specific product to the number of faces of all products of the target product (30%, etc.)
(C2) Relationship between the area of the face area of the specific product and other products in the target product As an example, the ratio of the area of the face area of the specific product to the area of the face area of all the products of the target product (40%, etc.)
(C3) Relative position of the specific product in the target product As an example, the number of stages in which the specific product is displayed with respect to the number of shelves on which all the products of the target product are displayed (2 out of 4 stages)
The position of the shelf on which the specific product is displayed (the top of the four levels, the center, the first, the second level, etc.) with respect to all the levels on the shelf where all the target products are displayed
Position in the shelf where the specific product is displayed, compared to the shelf where all the products of the target product are displayed (left side of the shelf, the middle, the number of faces from the third face from the left, etc.)
(C4) Absolute position of the specific product on the product shelf 20 As an example, the specific product is displayed in what number of faces (or what percentage of the shelf) from the left of what level of the product shelf 20 (C5) State of face direction of specific product As an example, when a specific product has product images in 4 directions (direction 1 to direction 4), the total number and state of each direction (out of 10 faces, orientation 1 Is 5 faces, orientation 2 is 3 faces, orientation 3 and orientation 4 are 1 face each)

In the present embodiment, an example will be described in which the relationship between the number of faces of a specific product and other products in the target product and the relative position of the specific product and other products in the target product are specified as a display relationship.

The display relationship specifying unit 104 may obtain a relative position between the specific product and another product from the captured image, and may output it as a display relationship.
In the present embodiment, the relative position specifying unit 134 includes images of target products including the specific product specified by the product specifying unit 132 based on the position of each product face recognized from the captured image by the image recognition unit 122. Specify the relative position of. Alternatively, as described later, when the shooting area can be specified, the display

relationship specifying unit 104 may specify the absolute position of each product face in the product shelf 20. The position of the product face may be described by at least one location in the product face image area, for example, the center, the center of gravity, or the coordinates of at least one corner on the left, right, top, and bottom. Alternatively, the display relationship specifying unit 104 may obtain the relative position and distribution information of the display area of the specific product with respect to the display region of the target product as the display relationship. The relative position specifying unit 134 outputs the obtained relative position between the specific product and the target product as a display relationship.

The face number counting unit 142 counts the number of faces of at least one type of specific product extracted by the image recognition unit 122, and specifies the display relationship with other products based on the number of faces of the specific product.
In the present embodiment, the face number counting unit 142 counts the number of faces of the specific product and the target product specified by the product specifying unit 132, and based on the number of faces, displays the display relationship between the specific product and other products. Specify and output.
Further, when the images taken from each side of the same product are registered in the product database 130, the face number counting unit 142 can count the number of faces of the specific product and the target product for each product direction. .

Thus, in the present embodiment, the relative position specifying unit 134 and the face number counting unit 142 can obtain and output the display relationship between the specific product and the target product. For example, the display date and time, the product code and the product name of the specific product, and the display relationship information such as the total number of faces of the target product and the number of faces of the specific product are output. The display relationship is output as text data, a predetermined program language, or information data, and can be saved as a file or stored in a database. Alternatively, information may be transmitted to the information processing terminal 110 via the network 3. These display-related information can be displayed on the screen of the image recognition device 10, a terminal device connectable to the image recognition device 10, or the display unit of the information processing terminal 110. Alternatively, the display-related information can be output as a report such as a daily report.

In the configuration as described above, a data processing method performed by the product information processing apparatus 100 according to the present embodiment will be described below. FIG. 7 is a flowchart illustrating an example of the operation of the product information processing apparatus 100 according to the present embodiment.

In the data processing method of the present embodiment, the product extraction unit 102 of the product information processing apparatus 100 extracts at least one type of specific product from an image obtained by imaging the display state of the product (step S101), and the display relationship specifying unit 104 However, the display relationship between the extracted at least one type of the specified product and other products is specified (step S103).

Here, the operation of the merchandise information processing system 1 in a configuration in which the merchandise shelf 20 of the store 7 is imaged using the portable terminal 24 and transmitted to the data center 5 will be specifically described.
FIG. 8 is a flowchart showing an example of an operation procedure of the mobile terminal 24 and the image recognition apparatus 10 of the product information processing system 1 according to the embodiment of the present invention.
First, the portable terminal 24 images the product shelf 20 by the imaging unit 112 (step S111). And the portable terminal 24 transmits a captured image to the image recognition apparatus 10 of the data center 5 by the transmission part 114 (step S113).

In the image recognition apparatus 10, the receiving unit 120 receives a captured image (step S115). Then, the image recognition unit 122 extracts a feature amount from the image, and performs a pattern recognition process on the face image of the product (step S117). And the image recognition part 122 acquires the relative position in the captured image of each face area ¡ region recognized as a face image of goods (step S119).

Then, the image recognition unit 122 collates the feature amount of the recognized face image with the feature amount of the feature amount database 12, and acquires a product ID (step S121). Then, the product specifying unit 132 specifies whether the product corresponding to the face image is a specific product or another product (step S123).

Furthermore, the product specifying unit 132 determines whether another product is the target product, and specifies the target product (step S125). Then, the relative position specifying unit 134 specifies the relative position in the images of the specific product and the target product (step S127). Further, the face number counting unit 142 counts the number of faces of the specific product and the target product, respectively (step S129). Then, the number of faces and the relative position obtained by the product specifying unit 132 and the face number counting unit 142 are output as a display relationship (step S131).

In this way, in the present embodiment, the product is individually recognized from the image obtained by capturing the product shelf 20 in the store 7, and the number of faces and the relative position are displayed as the display relationship between the specific product and other products. Can be obtained.

For example, in the present embodiment, the number of faces of the target product, the number of faces of the specific product, the number of columns of the target product, the number of rows from which column of the specific product, and the number of faces, etc. Display relations can be acquired.

As described above, according to the product information processing apparatus 100 of the embodiment of the present invention, when an operator visits each store 7, photographs the product shelf 20 using the mobile terminal 24, and uploads a captured image, Alternatively, when the images captured by the surveillance camera 22 installed in the store 7 are collected, the specific product to be managed automatically is distinguished from the other products, and the specific product includes all other products. It is possible to obtain a display relationship such as how the state is displayed in the state. Thus, according to the product information processing apparatus 100 of the embodiment of the present invention, it is possible to efficiently grasp the display relationship between the specific product and other products in the product display shelf of the store.

(Second Embodiment)
FIG. 11 is a functional block diagram showing the configuration of the product information processing apparatus 200 according to the embodiment of the present invention.
The product information processing apparatus 200 according to this embodiment is different from the above embodiment in that it determines whether the display relationship obtained by the product information processing apparatus 100 satisfies a predetermined display condition and outputs a determination result. Is different.
The product information processing apparatus 200 includes the same product extraction unit 102 and display relation specifying unit 104 as the product information processing apparatus 100 of the above embodiment, and further includes a determination unit 202 and an output unit 204.

Based on the display relationship specified by the display relationship specifying unit 104, the determination unit 202 determines whether or not the display state of the specific product satisfies the display condition of the specific product set in advance.
The output unit 204 outputs the determination result by the determination unit 202.

FIG. 12 is a block diagram illustrating a configuration example of the product information processing system 1 using the product information processing apparatus 200 of the present embodiment. FIG. 13 is a functional block diagram showing a specific configuration column of the product information processing apparatus 200 according to the embodiment of the present invention.
In the present embodiment, the data center 5 includes the image recognition apparatus 10 similar to that of the above-described embodiment, and further includes a product management apparatus 210

that can access a product database (shown as "product DB" in the drawing) 212. . Note that the image recognition device 10 and the product management device 210 may be configured by the same server computer.

For example, the arrangement of products displayed on the product shelf 20 of each store 7 of a retail store is determined by a product manufacturer and a retail store or the headquarters of the retail store in advance. In order for the manufacturer of the product to check whether or not the product is displayed at each store 7 according to this contract, an operator who has received an instruction from the manufacturer goes to each store 7 and the display state of the product shelf 20 It was necessary to check and report the result to the headquarters.
The merchandise information processing apparatus 200 according to the embodiment of the present invention displays the specific merchandise and other merchandise on the merchandise display shelves in the store when performing a contract confirmation operation between the retail store and the manufacturer. It is effective because the relationship can be grasped efficiently.

The contract content includes at least one display condition. Examples of display conditions can include:
(D1) Designate the number of faces of a specific product. As an example, "special product is displayed continuously in 4 out of 10 faces" is specified.
(D2) Specify the position and number of product shelves for displaying specific products. For example, "display on the top shelf", "display on the center shelf", or "display on the second and third shelf" is specified.
(D3) A ratio for displaying a specific product is designated. As an example, "30% of all products of the same classification are displayed for a specific product" is specified.

As shown in FIG. 13, in the product information processing system 1 of the present embodiment, the image recognition device 10 is connected to the feature amount database 12 in the same manner as the image recognition device 10 of the embodiment of FIG. And an image recognition unit 122. The merchandise management apparatus 210 is connected to the merchandise database 212, and includes a merchandise specifying section 132, a relative position specifying section 134, and a face number counting section 142 that the image recognition apparatus 10 of the above embodiment of FIG. In addition, a determination unit 202, an output unit 204, and a ratio calculation unit 232 are further provided.

The product database 212 holds a contract information table 222 shown in FIG. The contract information table 222 stores, for example, at least one display condition for at least one product in association with each store ID that identifies the store 7. Alternatively, the contract content may be selected or updated according to conditions such as a predetermined period and area. Moreover, the priority of a plurality of conditions can be

further set as a condition. Each condition can be expressed by, for example, a conditional expression described in a predetermined program language or the like.

The discriminating unit 202 of the merchandise management apparatus 210 refers to the contract information table 222 in FIG. 14 and, based on the display relationship obtained by the display relationship specifying unit 104, whether the display state of the specific product satisfies each display condition. Is determined.
The output unit 204 outputs the determination result 214 by the determination unit 202. The output form is not particularly limited. For example, it is displayed on a terminal screen, uploaded to a website, printed on a printer, sent to a predetermined email address, recorded in a file in a predetermined format, registered in a database, or a combination thereof. can do.

In addition to the result of determining whether or not each display condition is satisfied (whether the condition has been achieved (OK) or not (NG)), the content of the condition is achieved by store, by area, by product, by product category, Information on stores that do not achieve or achieve the target value of the achievement rate (information such as store name, number of stores, store area, affiliation group), or a combination thereof can be included. In addition, the history of these pieces of information can be accumulated in time series. Alternatively, these pieces of information can be incorporated into report information such as daily reports, weekly reports, and monthly reports.

The ratio calculation unit 232 calculates the ratio of the number of faces of the specific product to the number of faces of all the products of the target product based on the specific product and the number of faces of the target product obtained by the face number counting unit 142.
In the present embodiment, the display relationship specifying unit 104 in FIG. 11 includes a relative position specifying unit 134, a face number counting unit 142, and a ratio calculating unit 232.

The product information processing apparatus 200 according to the present embodiment configured as described above operates in the same manner as the above-described embodiment, and further, the determination unit 202 determines the specific product based on the display relationship obtained by the display relationship specifying unit 104. It is determined whether the display state satisfies each display condition, and the output unit 204 outputs the determination result. That is, the product information processing apparatus 200 can efficiently evaluate whether or not the display state matches the contract contents simply by imaging the display state of the product on the product shelf 20 at the store 7 or the like.

As described above, according to the product information processing apparatus 200 of the embodiment of the present invention, the same effect as that of the above embodiment can be obtained, and further, the

confirmation work of the contract between the retail store and the manufacturer can be performed. Therefore, it is possible to efficiently grasp the display relationship between the specific product and other products on the product display shelf of the store, and to collate with the contract contents efficiently and accurately.

As mentioned above, although embodiment of this invention was described with reference to drawings, these are the illustrations of this invention, Various structures other than the above are also employable. For example, in another embodiment, the display relationship specifying unit 104 obtains the ratio of the display area of the specific product to the target product including the specific product, and sets the ratio of the display area of the specific product as the display relationship with other products. It may be specified and output.

Moreover, the following method can be considered as an example of a method for specifying or identifying a shooting region at the time of shooting the product shelf 20 by the imaging unit 112 of the information processing terminal 110 of the above embodiment.
(E1) A label or the like on which identification information such as a shelf number or a barcode is attached in advance to the product shelf 20, and the shelf number is recognized from an image taken so that the label is included in the image.
(E2) Before shooting, the operator inputs information such as a shelf number to be shot using the operation screen of the portable terminal 24. Or the area | region of the image | photographed merchandise shelf 20 is specified based on the information of the imaging | photography direction and imaging | photography range of the surveillance camera 22 at the time of imaging | photography.
(E3) Instruct the operator to sequentially photograph the instructed product shelves in accordance with the guidance by the application program. Alternatively, the operator is allowed to photograph the shelves on which products predetermined for operation are displayed in a predetermined order.

FIG. 15 is a diagram for explaining an example in which a label or the like describing identification information such as a shelf number or a barcode is attached to the product shelf 20.
FIG. 15 illustrates an example in which the product shelf 20 includes a plurality of shelves 70 and, for example, a plurality of products 72 are displayed over a wider range than the imaging region 76 of the imaging unit 112.
The shelf 70 is arranged and attached in the imaging region 76 so as to include at least one label 74 describing information for identifying the arrangement of each shelf 70 of the product shelf 20. Then, the product information processing apparatus 100 or the product information processing apparatus 200 holds the relative position information of the label 74 and the shelf 70 of the product shelf 20.

The product information processing apparatus 100 or the product information processing apparatus 200 captures the product 72 displayed on the product shelf 20 so that at least one label 74 is included by the imaging unit 112, whereby the product information processing apparatus 100 or the product information processing apparatus 200 includes the label included in the captured image. Based on the identification information 74, the position of each shelf 70 in the product shelf 20 in the captured image can be acquired.

FIG. 16 is a diagram for explaining an automatic determination process of a target product display area in a product information processing apparatus according to another embodiment of the present invention. In another embodiment, the display relationship specifying unit 104 specifies the target product display area 84 as an area where the display state of the specific product 80 and the other product 82 should be grasped from the captured image (image of the imaging area 76), The arrangement of the specific product 80 in the target product display area 84 may be specified as a display relationship with other products 82.

In another embodiment, the display relationship specifying unit 104 assigns the specific product 80 and the other product 82 based on the product ID specified based on the face image of each product 72 recognized in the imaging area 76. Identify. Then, the product information processing device 100 or the product information processing device 200 automatically determines the area where the specified specific product 80 and the other product 82 exist as the target product display area 84 and specifies the target product display area to be specified. A section (not shown).

In addition, the target product display area determination unit describes information for identifying the classification of the product displayed on each shelf 70 on the label 74 as described above, and images it together with the product 72, thereby displaying the target product display. The region 84 can also be determined. Alternatively, at the time of imaging, the information processing terminal 110 may accept an instruction to select a target product or an input operation, and then perform imaging so that only the target product is included. Alternatively, a frame surrounding an area to be recognized on the captured image is displayed on the screen of the information processing terminal 110, and an operation for deforming the frame to include only the target product on the screen of the information processing terminal 110 is received and operated. The area designated by the above may be used as the target product display area 84.

Further, when the imaging area 76 is narrower than the target product display area 84, the entire product shelf 20 is divided into a plurality of imaging areas 76a, 76b, 76c, and 76d, as shown in FIG. Based on the plurality of images, the entire product shelf 20 may be grasped and the target product display area 84 may be specified.

For example, the information processing terminal 110 may acquire a plurality of images obtained by sequentially imaging the entire product shelf 20 by instructing the operator in the imaging order of the plurality of imaging regions 76a, 76b, 76c, and 76d by guidance. Alternatively, based on a predetermined order, the worker may take an image of the plurality of imaging regions 76a, 76b, 76c, and 76d. Alternatively, a plurality of image capturing areas 76a, 76b, 76c, and 76d are imaged by moving the shooting location while automatically controlling the shooting direction and the like by the monitoring camera 22, and a plurality of items for grasping the entire product shelf 20. An image may be acquired.

Alternatively, when the worker can recognize the target product display area 84 (FIG. 17) in advance, only the two imaging areas 76 a and 76 b are captured so that at least the target product display area 84 is included, and two captured images are obtained. You may acquire and discriminate | determine the object merchandise display area | region 84 based on two captured images. Alternatively, the product information processing apparatus 100 or the product information processing apparatus 200 uses a combination of an image of the entire product shelf 20 captured using the monitoring camera 22 and an image of a narrow area captured using the portable terminal 24. Also good.

Further, the product information processing apparatus 100 or the product information processing apparatus 200 determines the absolute position of the specific product in the product shelf 20 from the relative position between the specific product 80 and the other product 82 included in the target product display area 84 specified from the image. An absolute position specifying unit (not shown) may be further provided.

In addition, in the said embodiment, although the goods displayed on the goods shelf 20 are made into object, it is not limited to this. The merchandise information processing apparatus according to the embodiment of the present invention can be used, for example, for grasping the display status of a face such as a vending machine.

Although the present invention has been described with reference to the embodiments and examples, the present invention is not limited to the above embodiments and examples. Various changes that can be understood by those skilled in the art can be made to the configuration and details of the present invention within the scope of the present invention.

Hereinafter, examples of the reference form will be added.
1. Product information processing device
Extract at least one specific product from an image of the display state of the product,
A data processing method of a product information processing apparatus for specifying a display relationship between at least one type of the extracted specific product and another product.
2. 1. In the data processing method of the product information

processing apparatus described in
The product information processing apparatus
Based on the specified display relationship, it is determined whether the display state of the specific product satisfies a predetermined display condition of the specific product,
A data processing method of a product information processing apparatus that outputs a discrimination result.

3. 1. Or 2. In the data processing method of the product information processing apparatus described in
The product information processing apparatus
A data processing method for a product information processing apparatus that counts the number of faces of at least one type of the specified product that has been extracted, and that specifies a display relationship with the other product based on the number of faces of the specified product.

4). 1. To 3. In the data processing method of the product information processing apparatus according to any one of the above,
The product information processing apparatus
A data processing method of a product information processing apparatus that obtains a ratio of a display area of the specific product to a target product including the specific product and specifies a ratio of the display area of the specific product as a display relationship with the other product.

5. 1. To 4. In the data processing method of the product information processing apparatus according to any one of the above,
The product information processing apparatus
A data processing method of a product information processing apparatus that obtains a relative position between the specific product and the other product from the image and specifies the display relationship.

6). 1. To 5. In the data processing method of the product information processing apparatus according to any one of the above,
The product information processing apparatus
From the image, the target product display area is specified as an area where the display state of the specific product and the other product should be grasped, and the arrangement of the specific product in the target product display area is displayed with the other product. A data processing method for a product information processing apparatus specified as a relationship.

7). 6). In the data processing method of the product information processing apparatus described in
The product information processing apparatus
Further, the other product is extracted from the image,
From the image, based on the extracted information on the specific product and the other product, another product for which the display state of the specific product is to be identified is specified, and the target product display area is automatically determined. Data processing method for product information processing apparatus.

8). 6). Or 7. In the data processing method of the product information

processing apparatus described in
The product information processing apparatus further includes:
A product information processing apparatus that identifies an absolute position of the specific product in a product shelf on which a product is displayed from a relative position between the specific product and the other product included in the target product display area specified from the image. Data processing method.
9. 1. To 8. In the data processing method of the product information processing apparatus according to any one of the above,
The product information processing apparatus
A data processing method of a product information processing apparatus that recognizes a pattern of the image based on a feature amount of a face image of the specific product held in advance and extracts the specific product.
10. 1. To 9. In the data processing method of the product information processing apparatus according to any one of the above,
The product information processing apparatus
A data processing method for a merchandise information processing apparatus that performs processing using the image captured using an imaging unit included in a mobile terminal or a surveillance camera installed in a store.
11. 1. To 10. In the data processing method of the product information processing apparatus according to any one of the above,
The product information processing apparatus includes an information processing terminal and a server device,
The information processing terminal is
Send the information of the image captured in the store to the server device via the network,
The server device is
Receiving information on the image from the information processing terminal via a network;
A data processing method of a product information processing apparatus, wherein the server device extracts the specific product based on the received information of the image.

12 In a computer that implements a product information processing device,
A procedure for extracting at least one type of specific product from an image of the display state of the product;
A program for executing a procedure for specifying a display relationship between at least one kind of the extracted specific product and another product.
13. 12 In the program described in
A procedure for determining whether a display state of the specific product satisfies a display condition of the specific product determined in advance based on the display relationship specified by the procedure of specifying the display relationship;
A program for causing a computer to further execute a procedure for outputting a discrimination result according to the discrimination

procedure.

14 12 Or 13. In the program described in

A program for causing a computer to execute a procedure of counting the number of faces of at least one type of the extracted specific product and specifying a display relationship with the other product based on the number of faces of the specific product.

15. 12 To 14. In any program,

A program for causing a computer to execute a procedure for obtaining a ratio of a display area of the specific product to a target product including the specific product and specifying a ratio of the display area of the specific product as a display relationship with the other product. .

16. 12 To 15. In any program,

The program for making a computer perform the procedure which calculates | requires the relative position of the said specific goods and the said other goods from the said image, and specifies as the said display relationship.

17. 12 To 16. In any program,

From the image, the target product display area is specified as an area where the display state of the specific product and the other product should be grasped, and the arrangement of the specific product in the target product display area is displayed with the other product. A program that causes a computer to execute a procedure specified as a relationship.

18. 17. In the program described in

Further, a procedure for extracting the other product from the image, From the image, based on the extracted information on the specific product and the other product, another product for which the display state of the specific product is to be identified is specified, and the target product display area is automatically determined. A program for causing a computer to execute the procedure.

19. 17. Or 18. In the program described in

The computer further includes a procedure for identifying the absolute position of the specific product in the product shelf on which the product is displayed from the relative position between the specific product and the other product included in the target product display area specified from the image. A program to be executed.

20. 12 Thru 19. In any program,

A program for causing a computer to execute a procedure for pattern recognition of the image based on the feature amount of the face image of the specific product held in advance and extracting the specific product.

21. 12 To 20. In any program,

The program for making a computer perform the procedure which processes using the said image imaged using the imaging part contained in a portable terminal, or the surveillance camera installed in the shop.

This application claims priority based on Japanese Patent Application No. 2012-265146 filed on Dec. 4, 2012, the entire disclosure of which is incorporated herein.

Patent Citations (12)

Publication number	Priority date	Publication date	Assignee
JPH0717608A *	1993-05-06	1995-01-20	Hitachi Ltd
JP2002366621A *	2001-06-05	2002-12-20	Komatsu Noriko
JP2003114971A *	2001-10-02	2003-04-18	Kao Corp
WO2010023944A1 *	2008-08-28	2010-03-04	日本たばこ産業株式会社
JP2012073738A *	2010-09-28	2012-04-12	Canon It Solutions Inc
Family To Family Citations			
US5537312A *	1993-05-06	1996-07-16	Hitachi, Ltd.
JP3908047B2 *	2002-02-04	2007-04-25	富士通株式会社
JP2006218030A *	2005-02-09	2006-08-24	Seiko Epson Corp

CA2720217C *	2010-04-08	2016-03-29	Accenture Global Services Limited
JP2009301297A *	2008-06-12	2009-12-24	Toshiba Tec Corp
US20100106662A1 *	2008-10-29	2010-04-29	Satyanarayanan Ramaswamy
JP2012126532A *	2010-12-16	2012-07-05	Japan Tobacco Inc

* Cited by examiner, † Cited by third party

Cited By (13)

Publication number	Priority date	Publication date	Assignee	Titl
JP2016071782A *	2014-10-01	2016-05-09	辛東主	Me dis inf tot sys
JP2016194833A *	2015-03-31	2016-11-17	富士通株式会社	Cor dis pos det pro me cor dis pos det pro pro cor dis pos

				det pro app
JP2017004505A *	2015-05-16	2017-01-05	タタコンサルタンシーサービシズリミテッドTATA Consultancy Services Limited	Me sys pla cor che on ana
WO2018016214A1 *	2016-07-21	2018-01-25	日本電気株式会社	Ima pro dev pro me pro
WO2018124168A1 *	2016-12-27	2018-07-05	株式会社Space2020	Ima pro sys pro dev pro me ima pro pro
JP6396568B1 *	2017-09-19	2018-09-26	ヤフー株式会社	PR PR PR DE PR ME TE DE INF PR DE
WO2019065212A1 *	2017-09-29	2019-04-04	日本電気株式会社	Inf pro dev inf pro sys cor me pro

JP2019513274A *	2016-03-29	2019-05-23	ボサノバロボティクスアイピー、インク. Bossa Nova Robotics Ip, Inc.	Sys me inst ide and of

Family To Family Citations

JP6339633B2 *	2016-06-28	2018-06-06	新日鉄住金ソリューションズ株式会社	Sys inf pro app inf pro me pro
CN106971457A *	2017-03-07	2017-07-21	深圳市楼通宝实业有限公司	Sel ven me sys
CN109271920A *	2018-09-12	2019-01-25	上海了物网络科技有限公司	The sys me me sup arti ide
CN109784193A *	2018-12-20	2019-05-21	上海扩博智能技术有限公司	Ter acc dev sys inte refr
CN111319911A *	2020-02-23	2020-06-23	安徽古井贡酒股份有限公司	Onl inte liqu cor and

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title

US10078826B2	2018-09-18	Digital point-of-sale analyzer
EP3761281A1	2021-01-06	Information processing system
US20200168003A1	2020-05-28	Offline shopping guide method and apparatus
US10614514B2	2020-04-07	Computer vision system and method for automatic checkout
US9298969B2	2016-03-29	Method and apparatus for recognizing actions
US10129507B2	2018-11-13	System and method for self-checkout using product images
JP5356615B1	2013-12-04	Customer behavior analysis device, customer behavior analysis system, and customer behavior analysis method
US20180165728A1	2018-06-14	Distributed and automated transaction systems
US20180253674A1	2018-09-06	System and method for identifying retail products and determining retail product arrangements
US20160110703A1	2016-04-21	Method, product, and system for identifying items for transactions
TWI567676B	2017-01-21	Method and apparatus for managing product placement on store shelf
US10713644B2	2020-07-14	Modulating mobile-device displays based on ambient signals to reduce the likelihood of fraud
EP3182349A2	2017-06-21	Planogram matching
US20210042816A1	2021-02-11	System and methods for shopping in a physical store
US10692231B1	2020-06-23	Composite agent representation
US8774462B2	2014-07-08	System and method for associating an order with an object in a multiple lane environment
US20180232796A1	2018-08-16	Dynamic customer checkout experience within an automated shopping environment
US20180240180A1	2018-08-23	Contextually aware customer item entry for autonomous shopping applications

KR101779094B1	2017-09-18	A integration store management system using intelligent type image analysis technology
RU2727084C1	2020-07-17	Device and method for determining order information
US20140063256A1	2014-03-06	Queue group leader identification
US20150039458A1	2015-02-05	Method and system for automated retail checkout using context recognition
US20150025969A1	2015-01-22	Multisystem Interface for Roaming Self-Checkout
US20130204719A1	2013-08-08	Systems and methods for license plate recognition to enable advance order pickup
US20140278645A1	2014-09-18	Monitoring recurring activities and locations of workers

Priority And Related Applications

Priority Applications (2)

Application	Priority date	Filing date	Title
JP2012265148		2012-12-04	
JP2012-265148		2012-12-04	

Applications Claiming Priority (2)

Application	Filing date	Title
JP2014550977A	2013-10-01	Product information processing apparatus, data processing method thereof, and program
CN201380063274.9A	2013-10-01	Merchandise information processing device, data processing method therefor, and program

Legal Events

Date	Code	Title
2014-07-30	121	Ep: the epo has been informed by wipo that ep was design

2015-05-11	ENP	Entry into the national phase in:
2015-06-05	NENP	Non-entry into the national phase in:
2015-07-01	WWE	Wipo information: entry into national phase
2015-12-30	122	Ep: pct application non-entry in european phase

Concepts

machine-extracted

Download Filter table

Name	Image	Sections	Count	Query match
processing method		title,claims,description	33	0.000
extract		claims,abstract,description	16	0.000
extraction		claims,abstract,description	10	0.000
		claims,description	40	0.000

imaging method			
method	claims,description	38	0.000

Show all concepts from the description section

Data provided by IFI CLAIMS Patent Services

About Send Feedback Public Datasets Terms Privacy Policy

--The following are summaries of the two items ("Photographing an image of display shelfs while pausing" and "Thorough audit of store based on 3D map") of the cited document 2, cited by the examiner. --

Photographing an image of display shelfs while pausing

Simbe's Tally roams around supermarkets and drugstores, navigating among people and obstacles without hitting them, to audit display shelves for out-of-stocks, misplaced merchandise, incorrect price tags, and disorganized displays (Figure 1). …

Two image sensors that capture images of product display shelves are mounted on the side of the main body. Using these image sensors, Tally photographs the product display shelves at both sides of an aisle at one time. The width of the shelves that can be photographed at one time is 122 cm (4 feet), which is the size of a standard product display shelf in the U.S.

The maximum height that can be photographed is 250 cm, and for high shelves, the robot extends its main body to photograph the high spots. In practice, Tally stops at every 122 cm, that is at every shelf, and photographs the shelves on both sides of the aisle in order. The robot is also equipped with LIDAR, distance image sensors, and acoustic sensors to detect customers and obstacles. …

Thorough audit of store based on 3D map

Based on a 3D map of the store, Tally roams every aisle of the store and photographs the product display shelves. The 3D map has been created in advance by having Tally roam the store during the time when there are no customers around such as after closing.

In the 3D map of the store, data on "shelf allocation", such as where and what products should be located on the product display shelves, is also registered. The "shelf allocation software" (Planogram) used in the retail industry in the U.S. contains data such as product images and price information. …

The image data of the product display shelves photographed by Tally is sent to the cloud operated by Simbe. The cloud-based system performs object and character recognition to audit whether a product is present or not, or whether a price tag is attached correctly. …

The data captured by Tally is stored in Simbe's cloud. Users can check the data on their computers, smartphones, and tablet devices (Figure 3). Here, the users can confirm whether the product is available or not, however, they cannot confirm how many in stock. Bogolea says, "The purpose of auditing product display shelves for retailers is to prevent opportunity loss due to stockouts. As long as they know the availability of products, they can prevent opportunity loss," Bogolea explains.

引用非特許文献

特許出願の番号	特願２０１８－５５１８３８
作成日	令和　３年　２月１８日
作成者	竹下　翔平　　５３７９　５Ｌ００
発明の名称	品物の設置、特定および計数のためのシステムおよび方法

本複製物は、特許庁が著作権法第42条第2項第1号の規定により複製したものです。
取扱にあたっては、著作権侵害とならないよう十分にご注意ください。
本複製物について:特許庁HPより［ホーム］>［お問い合わせ］>［よくある質問］>［特許ラベル消耗特許文献送付 Q&A 集］

Emerging Tech
NIKKEI Robotics http://techon.jp/ROBO/

日経Robotics、今月の1本

商品陳列棚の在庫を確認するロボット 北米の小売りチェーンが試験運用開始

ロボット向けソフトウエアフレームワーク「ROS」を開発した米Willow Garage社。2014年に事業を停止した同社の出身者が起業したスタートアップがまた現れた。米サンフランシスコに本拠を置き、2015年11月に初めての製品となる小売店向け在庫確認ロボット「Tally」を発表した米Simbe Robotics社だ。

倉庫での商品ピックアップロボット「Fetch」を2015年4月に発表した米Fetch Robotics社も、Willow Garage社出身者が起業したスタートアップだった。Willow Garage社で経験を積んだ技術者が、各産業に特化したロボットをリリースするのが、シリコンバレーのロボット業界の新たな流れになるかもしれない。

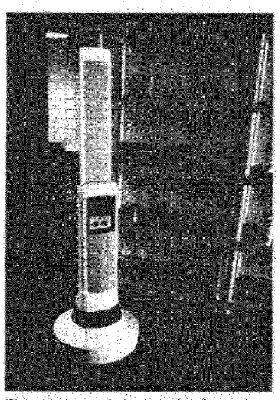


図1　米Simbe Robotics社の「Tally」
本体側面に2個のイメージセンサを搭載。通路の左右に置かれた商品陳列棚を同時かつ1度に撮影する。

一時停止しながら陳列棚を撮影

Simbe社のTallyは、スーパーやドラッグストアの店内を人や障害物を避けながら巡回し、商品陳列棚の状態をチェックし、商品の品切れや配置間違い、値札の付け間違い、陳列の乱れなどの有無を確認する（図1）。高さは96.5cmで質量が13.6kg。本体下部に自走用の車輪を備え、内蔵するLiイオン2次電池によって8～12時間の走行が可能だ。ROSを全面採用したほか、プロセサには米Intel社の「Core i5」を用いている。

本体の側面には、商品陳列棚を撮影するイメージセンサを2個搭載。これにより、Tallyは通路の左右にある商品陳列棚を同時かつ1度に撮影する。1度に撮影できる棚の幅は、米国の標準的な商品陳列棚の寸法である122cm（4フィート）。

撮影可能な高さは最大250cmで、高い棚の場合は本体が伸びて高い箇所を撮影する。実際にはTallyが122cm、つまり棚ごとに停止し、通路両脇の棚を順に撮影していく。客や障害物などを検知するためのLIDARや距離画像センサー、音響センサーも搭載。各センサーの仕様や役割の詳細は明かしていない。

3D地図を基に店内をくまなく巡回

Tallyは店内の3D地図を基に店内の通路をくまなく巡回して、商品陳列棚を撮影する。この3D地図は、閉店後など客のいない時間帯にTallyに店内を巡回させ、あらかじめ作成しておく。

店内の3D地図には、商品陳列棚のどこにどのような商品があるのかといった「棚割」のデータも登録する。米国の小売業界が使用する「棚割ソフト（Planogram）」には、商品の画像データや価格情報などのデータが登録してある。ユーザーはSimbe社が提供するツールを使って、棚割ソフトのデータを3D地図に登録する仕組みだ。

Tallyが撮影した商品陳列棚の画

本複製物は、特許庁が著作権法第42条第2項第1号の規定により複製したものです。
取扱にあたっては、著作権侵害とならないよう十分にご注意ください。
本複製物について:特許庁HPより［ホーム］>［お問い合わせ］>［よくある質問］>［特許］>［引用非特許文献送付 Q&A 集］

像データは、Simbe社が運用するクラウドに送信。クラウド上で物体認識や文字認識を実行し、商品の有無や値札の付け間違いなどを確認する。

「小売業では長年、RFIDを使って店頭在庫を管理する取り組みが続けられているが、スーパーやドラッグストアが扱う大量の日用品にRFIDタグを取り付けるのは、コスト的に難しい。日用品を管理するには画像認識技術を使用するしかない」。Simbe社の創業者兼CEOであるBrad Bogolea氏はそう語る(図2)。

Tallyが取得したデータはSimbe社のクラウドに蓄積される。ユーザーはパソコンやスマートフォン、タブレット端末で、それらのデータを確認できる(図3)。この際、商品の有無はチェックできるが、その個数までは確認できない。Bogolea氏は「小売店が商品陳列棚をチェックする目的は、店頭在庫が無くなることによる機会損失を防ぐため。商品の有無さえ分かれば、機会損失は防げる」と説明する。



図2　Simbe社の創業者兼CEOである Brad Bogolea氏
Willow Garage社出身のエンジニア2人とともにSimbe社を起業した。

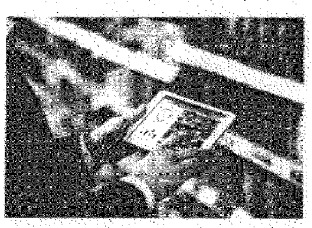


図3　スマートフォンやタブレット端末などで店頭在庫をチェック
専用アプリを使って各種データを確認できる。(写真:Simbe社)

最大2万種類/時の商品に対応

Tallyは1時間当たり1万5000～2万種類の商品を撮影できる。「Walgreens」や「CVS」といった1店舗当たり1万種類強の商品を扱う米国のドラッグストアであれば、1時間ほどで全商品の撮影が完了する。

3万～4万種類の商品を扱う「Safeway」のような食品スーパーでは、2時間ほどかかる。「Target」や「Wal-Mart」などの総合ディスカウントストアは1店舗当たり16万～18万種類もの商品を扱うため「1店舗につき、Tallyは2台必要」(Bogolea氏)。

Simbe社は小売店に対してTallyとソフトウエアを組み合わせたサービスを提供する。同社はこのような形態を「Robot as a Service」と呼ぶ。Tallyはレンタルし、単体販売はしない。レンタル料金はドラッグストアの規模であれば1店舗当たり800米ドル/月、ディスカウントストアの規模であれば同9250米ドル/月としている。

Bogolea氏によれば、米国のドラッグストアは現在、商品陳列棚をチェックするのに、1店舗につき1週間当たり平均30～40人・時の作業量を費やすという。米国のドラッグストア店員の時給は10米ドル前後。その人件費は1週間当たり300～400米ドル、月に換算して1200～1600米ドル前後になる。従って、月額レンタル料金800米ドルのTallyを導入した方がコストが下がる。Bogolea氏は「Tallyを使うことで、人間よりも正確かつ低コストに商品陳列棚をチェック可能になる」と意気込む。

Simbe社によれば、現在、北米のいくつかの小売りチェーン店がTallyの試験運用を開始しているという。具体的な店名は明かしていない。

小売業の課題を解決する開発

Simbe社はBogolea氏とCTOのMirza Shah氏、Product Design LeadのJeff Gee氏の3人が2014年に創業。Shah氏とGee氏はWillow Garage社出身で、同社を退社した2人がShah氏のカレッジ時代の友人のBogolea氏を誘って起業した。

「Willow Garage社はロボットの用途はユーザーが考える」というスタンスの会社だった。それに対して我々は、小売業の課題を解決することを目指してロボットを開発している」。Bogolea氏はSimbe社のスタンスをそう説明している。

(中田 敦=シリコンバレー支局)

Electronic Patent Application Fee Transmittal					
Application Number:	15471722				
Filing Date:	28-Mar-2017				
Title of Invention:	System and Method for Locating, Identifying and Counting Items				
First Named Inventor/Applicant Name:	Sarjoun Skaff				
Filer:	David R. Stevens/Annette Tri				
Attorney Docket Number:	BOSS-01001				
Filed as Small Entity					
Filing Fees for Utility under 35 USC 111(a)					
Description		**Fee Code**	**Quantity**	**Amount**	**Sub-Total in USD($)**
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	130	130
		Total in USD ($)		**130**

Electronic Acknowledgement Receipt	
EFS ID:	42743171
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/Annette Tri
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	17-MAY-2021
Filing Date:	28-MAR-2017
Time Stamp:	17:25:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$130
RAM confirmation Number	E20215GH25493490
Deposit Account	502421
Authorized User	Annette Tri
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	237913 e30346d17b5e1bf56e33644982f0659902cdcf3b	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	JP2014170431A.pdf	20530576 4386e2e9e27c323d4d2b168056f126f6a91415e1	no	68
Warnings:					
Information:					
3	Foreign Reference	WO2014087725A1.pdf	9484669 b981b43c87e2d27acd4777bb86cd7d37afe1fbe0	no	35
Warnings:					
Information:					
4	Non Patent Literature	NPL.pdf	605690 dac163cc7031d13d0526d46b4d9e683d12e89e06	no	5
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30289 6f0c523f5e3d47b496c6614892a9c6c65fdfe9de	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	30889137		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PRINTER RUSH
(PTO ASSISTANCE)

Application: 15471722	Examiner: DELIGI	GAU: 3627
From:	Location: RTFM	Creation Date: 05/18/2021

Week Date: 3/22/2021

DOC CODE	DOC DATE	MISCELLANEOUS
[ ] 1449		[ ] Continuing Data
[X] IDS	05/17/2021	[ ] Foreign Priority
[ ] CLM		[ ] Document Legibility
[ ] IIFW/FWCLM		[ ] Fees
[ ] SRFW		[ ] Petition (TC)
[ ] DRW		[ ] Other
[ ] OATH		
[ ] 312		
[ ] SPEC		

[RUSH] Message:

Please respond to the 5-17-21 IDS.

Thank you

[XRUSH] Response:

Initials: _____

Examiner: PUBS contact - James Leija, (703) 756-1197
NOTE: This form will be included as part of the official USPTO record with the response document coded as XRUSH.
REV: AUG 16

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34051 7590 06/24/2021

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Kerri Hardt	(Typed or printed name)
/Kerri Hardt/	(Signature)
06/23/2021	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

TITLE OF INVENTION: System and Method for Locating, Identifying and Counting Items

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	06/24/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
DELIGI, VANESSA LIMA	3627	705-028000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 David R. Stevens
2 Stevens Law Group
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: BOSSA NOVA ROBOTICS IP, INC.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): LEETSDALE, PENNSYLVANIA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 50-2421

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature: /David R. Stevens/ Date: 06/23/2021
Typed or printed name: David R. Stevens Registration No.: 38626

PTOL-85 Part B (08-16) Approved for use through 08/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	15471722
Filing Date:	28-Mar-2017
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Filer:	David R. Stevens/Kerri Hardt
Attorney Docket Number:	BOSS-01001

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	600	600

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**600**

Electronic Acknowledgement Receipt	
EFS ID:	43065947
Application Number:	15471722
International Application Number:	
Confirmation Number:	7664
Title of Invention:	System and Method for Locating, Identifying and Counting Items
First Named Inventor/Applicant Name:	Sarjoun Skaff
Customer Number:	34051
Filer:	David R. Stevens/Kerri Hardt
Filer Authorized By:	David R. Stevens
Attorney Docket Number:	BOSS-01001
Receipt Date:	23-JUN-2021
Filing Date:	28-MAR-2017
Time Stamp:	13:46:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$600
RAM confirmation Number	E20216MD46544456
Deposit Account	502421
Authorized User	Kerri Hardt
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee.pdf	717833 26651c2a8f14b2d47d422b274367d25486f80086	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30443 2326a332025f1ef361b1d7f4155db23f77057371	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	748276		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001	7664

34051 7590 07/09/2021

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110

EXAMINER
DELIGI, VANESSA LIMA

ART UNIT	PAPER NUMBER
3627	

NOTIFICATION DATE	DELIVERY MODE
07/09/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@stevenslawgroup.com

Corrected ***Notice of Allowability***	**Application No.** 15/471,722	**Applicant(s)** Skaff et al.	
	Examiner VANESSA DELIGI	**Art Unit** 3627	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 05/17/2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-2,6-9,16,20-22 and 27-37 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 05/17/2021.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/VANESSA DELIGI/ Patent Examiner, Art Unit 3627	/A. Hunter Wilder/ Primary Examiner, Art Unit 3627

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	03-28-2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

U.S. PATENTS

Examiner Initials	Cite No.	Patent Number	Issue Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
	1				

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initials	Cite No.	Publication Number	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
	1				
	2				
	3				
	4				

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Foreign Document Number	Country Code	Publication Date YYYY-MM-DD	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant
/V.D./	1	2014170431 A	JP	2014-09-18	Toshiyuki et al.	
/V.D./	2	2014087725A1	WO	2014-06-12	宮川　博	
	3					

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	03-28-2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

NON-PATENT LITERATURE DOCUMENTS		
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.
/V.D./	1	"Photographing an image of display shelfs while pausing" and "Thorough audit of store based on 3D map"

EXAMINER SIGNATURE			
Examiner Signature	/VANESSA DELIGI/	Date Considered	07/05/2021

INFORMATION DISCLOSURE STATEMENT BY APPLICANT		
	Application Number	15/471,722
	Filing Date	03-28-2017
	First Named Inventor	Sarjoun Skaff
	Art Unit	3627
	Examiner Name	DELIGI, VANESSA LIMA
	Attorney Docket Number	BOSS-01001

CERTIFICATION STATEMENT	
[X]	That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).
OR	That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).
	See attached certification statement.
	The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
	A certification statement is not submitted herewith.

SIGNATURE			
Signature	/David R. Stevens/	Date (YYYY-MM-DD)	2021-05-17
Name/Print	David R. Stevens	Registration Number	38626

PRINTER RUSH
(PTO ASSISTANCE)

Application: 15471722	**Examiner:** DELIGI	**GAU:** 3627
From:	**Location:** RTFM	**Creation Date:** 05/18/2021

Week Date: 3/22/2021

DOC CODE	DOC DATE	MISCELLANEOUS
[ ] 1449		[ ] Continuing Data
[X] IDS	05/17/2021	[ ] Foreign Priority
[ ] CLM		[ ] Document Legibility
[ ] IIFW/FWCLM		[ ] Fees
[ ] SRFW		[ ] Petition (TC)
[ ] DRW		[ ] Other
[ ] OATH		
[ ] 312		
[ ] SPEC		

[RUSH] Message:

Please respond to the 5-17-21 IDS.

Thank you

[XRUSH] Response:

IDS received on 05/17/2021 has been considered.

Initials: /V.D./

Examiner: PUBS contact - James Leija, (703) 756-1197
NOTE: This form will be included as part of the official USPTO record with the response document coded as XRUSH.
REV: AUG 16

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Jul 09, 2021 04:43:51 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	NOA	07/09/2021	BOSS-01001
	NOA	07/09/2021	BOSS-01001
	1449	07/09/2021	BOSS-01001
	1449	07/09/2021	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/471,722	08/10/2021	11087272	BOSS-01001	7664

34051 7590 07/21/2021

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 332 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Sarjoun Skaff, Pittsburgh, PA;
Bossa Nova Robotics IP, Inc., Pittsburgh, PA;
Jonathan Davis Taylor, Pittsburgh, PA;
Stephen Vincent Williams, Pittsburgh, PA;
Simant Dube, Berkeley, CA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

To: uspto@stevenslawgroup.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 34051

Jul 22, 2021 03:50:26 AM

Dear PAIR Customer:

Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 34051 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	ISSUE.NTF	07/21/2021	BOSS-01001

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PTO/SB/123 (04-15)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

CHANGE OF CORRESPONDENCE ADDRESS
Patent

Address to:
Mail Stop Post Issue
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Patent Number	11087272
Issue Date	08/10/2021
Application Number	15/471,722
Filing Date	03/28/2017
First Named Inventor	Sarjoun Skaff
Attorney Docket Number	186063.TR005

Please change the Correspondence Address for the above-identified patent to:

☒ The address associated with Customer Number: 153979

OR

☐ **Firm *or* Individual Name**

Address

City	**State**	**ZIP**

Country

Telephone	**Email**

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

This form will not affect any "fee address" provided for the above-identified patent. To change a "fee address" use the "Fee Address Indication Form" (PTO/SB/47).

I am the:

☐ Patentee.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☒ Attorney or agent of record. Registration Number 800046.

Signature	/Zhangyuan JI/
Typed or Printed Name	Zhangyuan JI
Date	January 24, 2024
Telephone	773-680-9572

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Post Issue, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and TrademarkOffice; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork ReductionAct of 1995, no personsare required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: SHANGHAI HANSHI INFORMATION TECHNOLOGY CO., LTD.

Application No./Patent No.: 15/471,722 Filed/Issue Date: 03/28/2017

Titled: System and Method for Locating, Identifying and Counting Items

SHANGHAI HANSHI INFORMATION TECHNOLOGY CO., LTD., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Sarjoun Skaff et al. To: BOSSA NOVA ROBOTICS IP, INC.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 041769, Frame 0309, or for which a copy thereof is attached.

2. From: BOSSA NOVA ROBOTICS IP, INC. To: BOSSA, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 065617, Frame 0298, or for which a copy thereof is attached.

This collectionof information is required by 37CFR 3.73(b). The informationis required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application.Confidentiality isgoverned by 35U.S.C. 122 and37 CFR 1.11and 1.14.This collection is estimated to take 12 minutes to complete, including gathering,preparing, and submitting the completed applicationform to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should besent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETEDFORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: BOSSA, LLC To: HANSHOW AMERICA, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 065617, Frame 0320, or for which a copy thereof is attached.

4. From: HANSHOW AMERICA, INC. To: SHANGHAI HANSHI INFORMATION TECHNOLOGY CO., LTD.

The document was recorded in the United States Patent and Trademark Office at
Reel 065617, Frame 0349, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☑ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Zhangyuan JI/
Signature

January 24, 2024
Date

Zhangyuan JI
Printed or Typed Name

800046
Title or Registration Number

[Page 2 of 2]

An official website of the United States government
Here's how you know

15/471,722 | BOSS-01001:

System and Method for Locating, Identifying and Counting Items

PUBLIC VIEW

Application #	Confirmation #	Attorney Docket #	Patent #
15/471,722	7664	BOSS-01001	11,087,272 Download PDF Issued - 08/10/2021

Filing or 371 (c) date	Status
03/28/2017	Patented Case 07/21/2021

Show/hide menu

4 Assignments found

Assignment 1

Reel/frame	Date recorded	Pages
041769/0309	03/28/2017	7

Conveyance
ASSIGNMENT OF ASSIGNORS INTEREST
(SEE DOCUMENT FOR DETAILS).

Assignors	Execution date
SKAFF, SARJOUN	11/29/2016
TAYLOR, JONATHAN DAVIS	11/29/2016
WILLIAMS, STEPHEN VINCENT	11/29/2016
DUBE, SIMANT	12/01/2016

Correspondent
STEVENS LAW GROUP
1754 TECHNOLOGY DRIVE
SUITE #226
SAN JOSE, CA 95110

Assignee
BOSSA NOVA ROBOTICS IP, INC.
2740 SMALLMAN ST, SUITE 400
PITTSBURGH, PENNSYLVANIA 15222

Assignment 2

Reel/frame	Date recorded	Pages

065617/0298	11/20/2023	7

Conveyance
ASSIGNMENT OF ASSIGNORS INTEREST
(SEE DOCUMENT FOR DETAILS).

Assignors	Execution date	Correspondent
BOSSA NOVA ROBOTICS IP, INC.	08/11/2023	ARCH & LAKE LLP 203 NORTH LASALLE STREET, SUITE 2100 CHICAGO, IL 60601

Assignee
BOSSA, LLC
3945 FREEDOM CIRCLE, SUITE 560,
SANTA CLARA, CALIFORNIA 95054

Assignment 3

Reel/frame	Date recorded	Pages
065617/0320	11/20/2023	11

Conveyance
ASSIGNMENT OF ASSIGNORS INTEREST
(SEE DOCUMENT FOR DETAILS).

Assignors	Execution date	Correspondent
BOSSA, LLC	10/10/2023	ARCH & LAKE LLP 203 NORTH LASALLE STREET, SUITE 2100 CHICAGO, IL 60601

Assignee
HANSHOW AMERICA, INC.
228 PARK AVENUE SOUTH, #79525,
NEW YORK, NEW YORK 10003

Assignment 4

Reel/frame	Date recorded	Pages
065617/0349	11/20/2023	5

Conveyance
ASSIGNMENT OF ASSIGNORS INTEREST
(SEE DOCUMENT FOR DETAILS).

Assignors	Execution date	Correspondent

HANSHOW AMERICA, INC.	11/13/2023	ARCH & LAKE LLP 203 NORTH LASALLE STREET, SUITE 2100 CHICAGO, IL 60601

Assignee

SHANGHAI HANSHI INFORMATION TECHNOLOGY CO., LTD.
ROOM 155, BUILDING NO. L, NO.2399,
ZUCHONGZHI RD, PUDONG NEW ARA,
SHANGHAI, CHINA 201203

10 per page ◆ Page 1 of 1 ▼

Disclaimer: Assignment information on the assignment database reflects assignment documents that have been actually recorded. If the assignment for a patent was not recorded, the name of the assignee on the patent application publication or patent may be different. If you have any comments or questions concerning the data displayed, contact OPR / Assignments at 571-272-3350.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
15/471,722	**01/24/2024 11:59:52 AM Z ET**	**BOSS-01001**

Title of Invention

System and Method for Locating, Identifying and Counting Items

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	11087272
CONFIRMATION #	7664	FILED BY	Xuanjie Wang
PATENT CENTER #	64065944	FILING DATE	03/28/2017
CUSTOMER #	34051	FIRST NAMED INVENTOR	Sarjoun Skaff
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	ZHANGYUAN JI

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
186063.TR005_change of address patent-C.AD-C.AD.pdf	2	Change of Address	187 KB
186063.TR005_Statement373c-R3.73-R3.73.pdf	5	Assignee showing of ownership per 37 CFR 3.73	481 KB
186063.TR005-General-Transmittal-TRAN.LET-TRAN.LET.pdf	1	Transmittal Letter	680 KB
186063.TR005_Hanshi_POA-PA..-PA..pdf	3	Power of Attorney	892 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
186063.TR005_change of address patent-C.AD-C.AD.pdf	A128E05DF99DCC01674EFECC1ECBCCD879C6BD8286942C487E996BD2FA1364039461DD20E00D0FA0EE1442260FCC020C338959F31012B1E283C7FCD611874D97
186063.TR005_Statement373c-R3.73-R3.73.pdf	E14F36C7D281BA826E5E4B3EC2A7E9F7E3DC625A269BCA7EF312D83AB7469536B639555BCC409D0E38E7F5D288AD57825F9EED347C9E455A602F81B823066E9D
186063.TR005-General-Transmittal-TRAN.LET-TRAN.LET.pdf	0A5E84D3308F2F4608269FECA71D25C387BFDB781AC51DEA2F7A8F4826CD03DC06B5475D53202253382C917465B7C22BD2B77D01A2F48B06264A806F5EB7E568
186063.TR005_Hanshi_POA-PA..-PA...pdf	C4CCB0C1DCBC86433D9D9AEB4E6C48C923387069791 2E0C33B786473A93E8267578F9968F44AC6E4C9AD2A60BBB049239B1881026722932BB8D79F328BAEBE58

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	15/471,722
Filing Date	03/28/2017
First Named Inventor	Sarjoun Skaff
Title	System and Method for Locating, Identifying and Counting Items
Art Unit	3627
Examiner Name	VANESSA LIMA DELIGI
Attorney Docket Number	186063.TR005

SIGNATURE of Applicant or Patent Practitioner

Signature	/Zhangyuan JI/	Date (Optional)	January 24, 2024
Name	Zhangyuan JI	Registration Number	800046
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 09/30/2025. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 153979

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Shanghai Hanshi Information Technology Co ltd.

☐ Inventor or Joint Inventor (title not required below)
☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Feng Li		
Title	CFO		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0035. Public burden for this form is estimated to average 3 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013). https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to: 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law; 2) a Federal, state, local, or international agency, in response to its request; 3) a contractor of the USPTO having need for the information in order to perform a contract; 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record; 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record; 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations; 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals; 8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)); 9) the Office of Personnel Management (OPM) for personnel research purposes; and 9) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Additional Uses

Additional USPTO uses of the information in this record may include disclosure to: 1) the International Bureau of the World Intellectual Property Organization, if the record is related to an international application filed under the Patent Cooperation Treaty; 2) the public i) after publication of the application pursuant to 35 U.S.C. 122(b), ii) after issuance of a patent pursuant to 35 U.S.C. 151, iii) if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections, or an issued patent, or iv) without publication of the application or patent under the specific circumstances provided for by 37 CFR 1.14(a)(1)(v)-(vii); and/or 3) the National Archives and Records Administration, for inspection of records.

Doc Code: TRAN.LET

Document Description: Transmittal Letter

PTO/SB/21 (07-09)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

Application Number	15/471,722
Filing Date	03/28/2017
First Named Inventor	Sarjoun Skaff
Art Unit	3627
Examiner Name	VANESSA LIMA DELIGI
Attorney Docket Number	186063.TR005

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☑ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☑ Other Enclosure(s) (please Identify below):
  1. Statement under 3.73 (c)
  2. Change of Address Request
  3. Power of Attorney

Remarks

STATEMENT UNDER 37 CFR 3.73(c) to establish the right of SHANGHAI HANSHI INFORMATION TECHNOLOGY CO., LTD, and then POA, change of address. Thankyou!

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	ARCH & LAKE LLP		
Signature	/Zhangyuan JI/		
Printed name	Zhangyuan JI		
Date	January 24, 2024	Reg. No.	800046

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature	/Zhangyuan JI/		
Typed or printed name	Zhangyuan JI	Date	January 24, 2024

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001

CONFIRMATION NO. 7664

34051
Stevens Law Group
1754 Technology Dr. Ste 226
San Jose, CA 95110

POWER OF ATTORNEY NOTICE

OC000000067507067

Date Mailed: 01/30/2024

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/24/2024.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/vostuart/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/471,722	03/28/2017	Sarjoun Skaff	BOSS-01001

CONFIRMATION NO. 7664

153979
Arch & Lake LLP
203 North LaSalle Street, Suite 2100
Chicago, IL 60601

POA ACCEPTANCE LETTER

OC000000067507098

Date Mailed: 01/30/2024

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/24/2024.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/vostuart/

TO: shenwang@archlakelaw.com,haotan@archlakelaw.com,USPTO@dockettrak.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - Correspondence Notification for Customer Number 153979

Tue Jan 30 05:05:15 EST 2024

Dear Patent Center Customer:

Correspondence Address:

Arch &Lake LLP
203 North LaSalle Street, Suite 2100
Chicago,ILLINOIS,60601
UNITED STATES

This is a courtesy notification regarding the following USPTO patent application(s) associated with your Customer Number, 153979, that have new outgoing correspondence. This correspondence is now available for viewing in Patent Center.

The official date of notification of the outgoing correspondence will be indicated on the form (e.g., PTOL-90) accompanying the correspondence.

Disclaimer:
The list of documents shown below are provided as a courtesy and is not part of the official file wrapper. The content of the images shown in the Image File Wrapper is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15471722	N570	01/30/2024	BOSS-01001
15471722	N570	01/30/2024	BOSS-01001

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. To update your email address(es), select Manage/Manage customer numbers.

If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

Large Entity Declaration

PATENT
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Number: 15/471,722 **Current Date Jan. 24, 2024**

Filing Date: Mar. 28, 2017

Patent Number: 11087272

Issue Date: Aug. 10, 2021

CHANGE OF ENTITY STATUS PURSUANT TO 37 C.F.R. §1.27 (g)(2)

Commissioner for Patents
Mail Stop M Correspondence
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This communication hereby notifies the United States Patent and Trademark Office that small entity status is no longer applicable for the above-identified patent.

COMPANY or FIRM NAME AND ADDRESS:

NAME:
SHANGHAI HANSHI INFORMATION TECHNOLOGY CO., LTD.

ADDRESS:
ROOM 155, BUILDING NO. L, NO.2399, ZUCHONGZHI RD, PUDONG NEW ARA, SHANGHAI, CHINA 201203

Respectfully submitted,

Min Liang
Signature
Min LIANG
Printed Name
CTO
Title

Reg. # if US Attorney_____

DOC CODE-IMLS

FAX TO:

Commissioner of Patents and Trademarks
Attn. Maintenance Fee Branch
Office of Finance – Maintenance Fee Division
2051 Jamieson Ave – Suite 300
Alexandria, VA 22314

Fax no.: 001 571 273-6500

1 February 2024

URGENT

Dear Sirs,

Please see the attached entity status form to be amended to **LARGE** Entity status.

Please can you amend you records accordingly.

Many thanks for your assistance.

Kind regards,
Arpita Singh

Data Verification Specialist

Clarivate

Direct Dial: + 44(0)1534 811383
E-mail: Arpita.Singh@@clarivate.com

Certificate of Facsimile Transmission

I hereby certify that this document is being facsimile transmitted to the USPTO at 001 571-273-6500 on the date shown below.

Date 1-Feb-24 Signed Arpita Singh

[redacted] RCVD AT 2/1/2024 11:51:16 AM [Eastern Standard Time] * SVR:W-PTOFAX-DTS-E1/22 * DNIS:2736500 * CSID:442030311081 * ANI:3055037548 * DURATION (mm-ss):01-30