

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

REGIONS BANK
Petitioner,

v.

UNITED SERVICES AUTOMOBILE ASSOCIATION
Patent Owner.

Case No. IPR2025-01326
U.S. Patent No. 12,159,310

**PETITION FOR *INTER PARTES* REVIEW
OF CLAIMS 1-16 OF U.S. PATENT NO. 12,159,310
UNDER 35 U.S.C. §312 AND 37 C.F.R. §42.104**

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I. INTRODUCTION

U.S. Patent No. 12,159,310 (“’310 patent”) claims methods for using mobile devices to capture and submit check images for deposit by a bank. However, mobile remote check deposit was described in a patent application (“Garcia”) published years earlier, and the only features that the claims of the ’310 patent purport to add relate to the use of existing technologies to control a mobile device camera and automatically capture check images. By 2009, these elements would have been simple and obvious to implement in a check deposit system.

Indeed, in prior proceedings involving related patents, the Board found and the Federal Circuit affirmed that automatically capturing an image for mobile check deposit is obvious in view of Luo and Yoon relied on herein. EX1009-571-FWD, 23-72, 73-74. And in another proceeding relating to a patent with an even earlier alleged priority chain, the Board found and the Federal Circuit affirmed that implementing Garcia’s method with a downloaded application that accesses a software abstraction layers (*e.g.*, “application programming interfaces” or “APIs”) would have been obvious. EX1010-598-FWD, 23-31, 69. The ’310 patent does not add anything meaningful to the claims that were previously invalidated. Petitioner therefore respectfully request that the Board institute *inter partes* review and hold claims 1-16 of the ’310 patent unpatentable.

II. MANDATORY NOTICES

A. Real Party-In-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that Regions Bank is the real parties-in-interest. Regions Banks is a wholly-owned subsidiary of Regions Financial Corporation.

B. Related Matters

Under 37 C.F.R. 42.8(b)(2), Petitioner states that Patent Owner (“PO”) has asserted two patents, including the ’310 patent and another patent in the ’310 patent family (U.S. Patent No. 12,211,095) in *United Services Auto. Ass’n (“USAA” or “PO”) v. Regions Bank*, Case No. 2:25-cv-00082 (E.D. Tex.). Petitioner is serving a petition for *inter partes* review of the ’095 patent concurrently herewith. PO failed to claim an earlier priority date when filing the ’095 patent, and the ’095 patent issued as an AIA patent that is not currently eligible for inter partes review. On May 13, 2025, PO filed a certificate of correction to claim priority to a pre-AIA application, which the examiner approved on July 17, 2025, but the Office has not yet printed. Petitioner will file the petition for *inter partes* review of the ’095 patent when it becomes eligible.

Thirteen prior post-grant proceedings have been filed pertaining to patents in the ’310 patent’s family by third parties, none of which are pending: 8,699,779 (CBM2019-00005, IPR2019-01083, IPR2020-00976, IPR2021-01070), 8,977,571 (CBM2019-00004, IPR2019-01082, IPR2020-00975, IPR2021-01073), 9,569,756

(IPR2020-00092), 9,818,090 (CBM2019-00002, IPR2019-00815, IPR2020-00882, IPR2022-01593). Among those proceedings, the following reached final written decisions finding all challenged claims unpatentable, which were affirmed by the Federal Circuit:

(1) IPR2021-01070 (U.S. Patent No. 8,699,779) – challenged claims 1-2, 7-10, and 15-17 unpatentable

(2) IPR2021-01073 (U.S. Patent No. 8,977,571) – challenged claims 1-6, 9, 10, 12, and 13 unpatentable

C. Counsel

Under 37 C.F.R. §§ 42.8(b)(3)-(4), Petitioner identifies the following lead and backup counsel, to whom all correspondence should be directed.

Lead Counsel: David Cavanaugh (Reg. No. 36,476)

Backup Counsel: Gregory Lantier (notice of intent to designate as a provisionally recognized PTAB attorney to be filed)

Andrew Danford (notice of intent to designate as a provisionally recognized PTAB attorney to be filed)

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Petitioner consents to service by e-mail on lead and backup counsel.

III. CERTIFICATION OF GROUNDS FOR STANDING

Petitioner certifies under 37 C.F.R. § 42.104(a) that the patent for which review is sought is available for *inter partes* review and under 37 C.F.R.

§§42.101(a)-(c) that Petitioner is not barred or estopped from requesting a *inter partes* review on the grounds identified in this Petition.

IV. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Under Rules 42.22(a)(1) and 42.104(b)(1)-(2), Petitioner requests cancellation of claims 1-16 of the '310 patent.

A. Prior Art References

According to its face, the '310 patent was filed on March 1, 2024, and claims priority through a series of continuation applications to Application No. 12/545,127, filed on August 21, 2009, now Pat. No. 8,977,571.¹ The following references are pertinent to the grounds of unpatentability presented below:

1. International Patent Application Publication No. WO2005/043857 (“Garcia”) (EX1003),² published May 12, 2005, is prior art at least under 35 U.S.C. §§102(a), 102(b). Garcia is of record on the face of the '310 patent but did not form the basis of a rejection during prosecution.

2. Chinese Patent Application Publication No. CN 1897644A (“Luo”) (EX1004),³ published January 17, 2007, is prior art under 35 U.S.C. §§102(a),

¹ This Petition applies pre-AIA provisions of 35 U.S.C. §§102, 103.

² Garcia was originally published in Spanish, which is provided in Exhibit A of EX1003. Citations to “EX1003” refer to Exhibit B of EX1003, which is a certified English translation.

³ Luo was originally published in Chinese, which is provided in Exhibit A of EX1004. Citations to “EX1004” refer to Exhibit B of EX1004, which is a certified English translation.

102(b). Luo is of record on the face of the '310 patent but did not form the basis of a rejection during prosecution.

3. Reto Meier, Professional Android™ Application Development, Wiley Publishing (June 25, 2008) (“Meier”) (EX1005), is prior art under 35 U.S.C. §§ 102(a), 102(b). As the Declaration of June Munford details, Meier was publicly available as of June 25, 2008, before the earliest provisional application to which the '310 patent claims priority. EX1062-Munford. Meier is not of record on the face of the '310 patent.

4. U.S. Patent Application Publication No. 2007/0194102 (“Cohen”) (EX1006), published August 23, 2007, is prior art under 35 U.S.C. §§102(a), 102(b). Cohen is of record on the face of the '310 patent but did not form the basis of a rejection during prosecution.

5. U.S. Patent Application Publication No. 2007/0262148 (“Yoon”) (EX1007), published on November 15, 2007, is prior art under 35 U.S.C. §§102(a), 102(b). Yoon is of record on the face of the '310 patent but did not form the basis of a rejection during prosecution.

6. Vikram Goyal, Pro Java ME MMAPi: Mobile Media API for Java Micro Edition, Apress (June 14, 2006) (“Goyal”) (EX1008), is prior art under 35 U.S.C. §§102(a), 102(b). As the Declaration of June Munford details, Goyal was publicly available as of June 14, 2006, before the earliest provisional application to

which the '310 patent claims priority. EX1062-Munford. Goyal is not of record on the face of the '310 patent.

B. Grounds for Challenge

Petitioner requests cancellation of claims 1-16 of the '310 patent. The grounds for challenge are:

Ground	References	Basis	Claims Challenged
I	Garcia, Luo, Meier, Cohen	§103	1-3, 5-6, 8-12, 14-16
II	Garcia, Luo, Meier, Cohen, Yoon	§103	4, 7, 13
III	Garcia, Luo, Goyal, Cohen	§103	1-3, 5-6, 8-12, 14-16
IV	Garcia, Luo, Goyal, Cohen, Yoon	§103	4, 7, 13

This Petition is supported by the declaration of Dr. Daniel Lopresti (EX1002).

V. TECHNOLOGY BACKGROUND

A. Checks

Checks are financial instruments that direct the payor's bank to pay a specified amount to the payee. To deposit a check, the payee's bank must collect information from the check, including the amount, account number, and account holder identity. *See* EX1003-Garcia, 7:1-14, 10:12-13; EX1006-Cohen, [0008], [0022]. Checks typically contain a **magnetic-ink character-recognition**

(“MICR”) line. See EX1006-Cohen, [0008], [0022]; EX1011-Clarke, 1:22-32, 5:61-65. The **MICR line** includes the payor’s bank routing number, the customer account number, and check number:

John Smith
2 Jefferson Rd
E. Brunswick, NJ

April 29, 1999

Pay To The
Order Of: COMCS \$ 37 no/00

Thirty-Seven and no/100

John Smith

0210000891: 1234567891 0000003700

EX1014-Slater, Fig.11. Checks have “been in use in one form or another for hundreds of years.” EX1012-Richardson, [0005]. EX1002-Decl., ¶¶59-61.

B. Electronic Check Processing

Long ago, check deposit was a manual process. However, “[o]ver time, the process has become gradually more and more automated with the advent of high speed check processing machines, computer-readable check numbers, and...computer handwriting recognition.” EX1012-Richardson, [0005]; EX1013-FDIC. EX1002-Decl., ¶62.

By the early 2000s, banks had the automated technology necessary to process check deposits using check images without having a physical copy of the check. EX1012-Richardson, [0007]. For example, banks had “*well known*” optical character recognition (“OCR”) technology that could read information from

a check image automatically. EX1006-Cohen, [0007]; EX1003-Garcia, 11:7-15; EX1014-Slater, [0023]. In 2004, Congress enacted the Check Clearing for the 21st Century Act (“Check 21 Act”), that required banks to accept a digital image of a check in lieu of the original paper check. EX1006-Cohen, [0010]; EX1012-Richardson, [0007]-[0008]; EX1013-FDIC. The creation of a digital image of a check that removes the need for a paper check is a process known as “truncation.” EX1006-Cohen, [0004]; EX1012-Richardson, [0008]. EX1002-Decl., ¶¶63-67.

C. Image-Based Document Processing with Camera Phones

By the mid-2000s, **camera phones** had become increasingly ubiquitous with hundreds of millions of **devices** in circulation globally. The resolution and performance of these **devices** improved rapidly—surpassing 1 megapixel and becoming capable of capturing images suitable for text recognition and **document** processing. This shift enabled new applications for **camera**-based **document** analysis and recognition. Advances in on-device processing and adaptive OCR technologies allowed **mobile devices** to accurately capture and interpret **document** content. Other techniques like **alignment guides** (shown below)—which help users **align documents** in **camera preview windows** to avoid distortions like warp and skew—had been implemented in commercial products to produce OCR-readable images. EX1004-Luo, 1, 4-6; EX1007-Yoon, [0022]-[0023]; EX1016-MotoRokr-Manual, 95-96. To avoid subjecting image quality metrics to user error,

autocapture features were introduced to automatically capture an image when one or more monitoring criterion—like detecting **document** edges and sufficient brightness—were satisfied. EX1004-Luo, 6; EX1007-Yoon, [0019], [0025]-[0026]; EX1016-MotoRokr-Manual, 95-97.

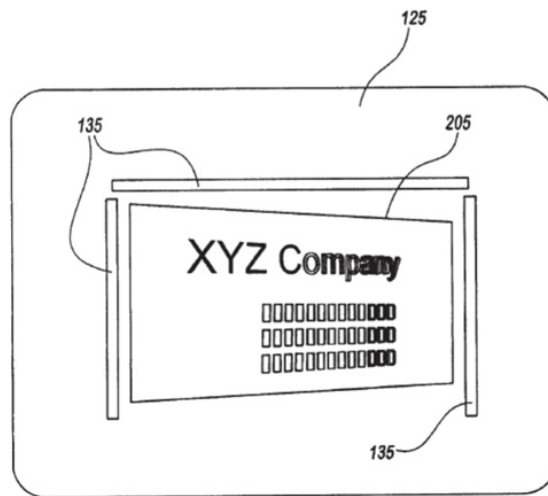


Fig. 5

EX1004-Luo, Fig.5. EX1002-Decl., ¶¶68-71.

It was well recognized by the early/mid-2000s that one natural and foreseeable application of this technology was the ability to scan and transmit bank checks. EX1003-Garcia, Abstract; EX1017-Acharya, Abstract; EX1018-Burks, 1:31-36, 14:15-31. For example, a 2005 academic paper demonstrated a working prototype that used a standard **camera phone** to capture and process bank checks. EX1019-Parikh, 80. By the late 2000s, two banks had already introduced mobile

deposit applications. EX1020-Bruno-Britz; EX1021-Mitek, 37. *See also* EX1022-Bruene. EX1002-Decl., ¶¶72-73.

D. Mobile Applications

Beginning in the 1990s, **mobile devices** like **PDA**s gained popularity for providing useful functionality in a compact formfactor. EX1023-Edwards. By the mid-2000s, **PDA**s hit the market with features like handwriting recognition and high-quality **cameras**. EX1024-Rajeswari, 1863; EX1025-Slocombe, 1-4.

Cellphone capabilities increased significantly, too: the iPhone was released in 2007 with a 2-megapixel **camera** and a nearly-half-a-gigahertz processor. EX1026-Apple; EX1027-EveryiPhone EX1028-Nokia. EX1002-Decl., ¶¶74-75.

These increased capabilities brought about the ubiquity of downloadable mobile applications. EX1005-Meier, 5; EX1008-Goyal, 66-67. Following this trend, the Apple App Store opened in July 2008 with 500 downloadable applications. EX1029-Graham. **Mobile device** manufacturers also distributed free software development kits (SDKs) with APIs that let an app developer to easily access **device** features like the **camera**, GPS, and/or accelerometer without having to write all the code to make the **camera** operate. EX1005-Meier, 5-6; EX1008-Goyal, 1, 127, 174; EX1030-Aiello, 3, 10; EX1031-Raento, 51, 53, 58. The mid-2000s thus saw the advent of highly capable **camera**-based applications like business card readers and those that could augment reality by processing live

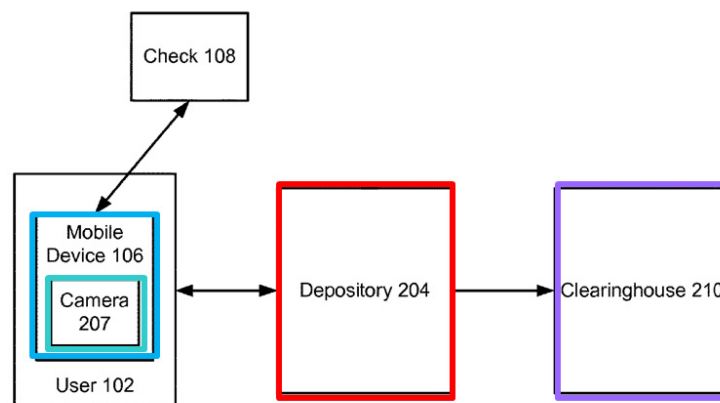
images/frames from the captured video in real time on the **mobile device**.

EX1005-Meier, 320; EX1032-Patrick, 2. EX1002-Decl., ¶¶76-78.

VI. THE '310 PATENT

A. Brief Description

As shown in Figure 2 (reproduced below), the '310 patent is generally directed to “remote deposit of checks” wherein “the payee may capture a digital image of a check using a [**camera on a** **mobile device**. The **financial institution** [*i.e.*, **depository**] may then receive from the payee the digital image of the check. The **financial institution** may then use the digital image to credit funds to the payee” via a **clearinghouse** in compliance with Check 21. EX1001-USP310, 1:29-34. EX1002-Decl., ¶79.



200

FIG. 2

EX1001-USP310, Fig.2. EX1002-Decl., ¶79.

The '310 patent describes capturing check images by (1) “monitoring” “[a]n image of a check that is in the field of view of a **camera**” of a **mobile device**, (2) providing “feedback” to the “user of the **camera** regarding the image of the check,” and (3) “[w]hen the image of the check in the field of view passes *monitoring criteria*, [taking] an image...by the **camera** and provid[ing] [the image] to a **financial institution**.” EX1001-USP310, Abstract; *see also id.*, 1:45-50. These steps are shown in 830-860 in Figure 8, reproduced below.

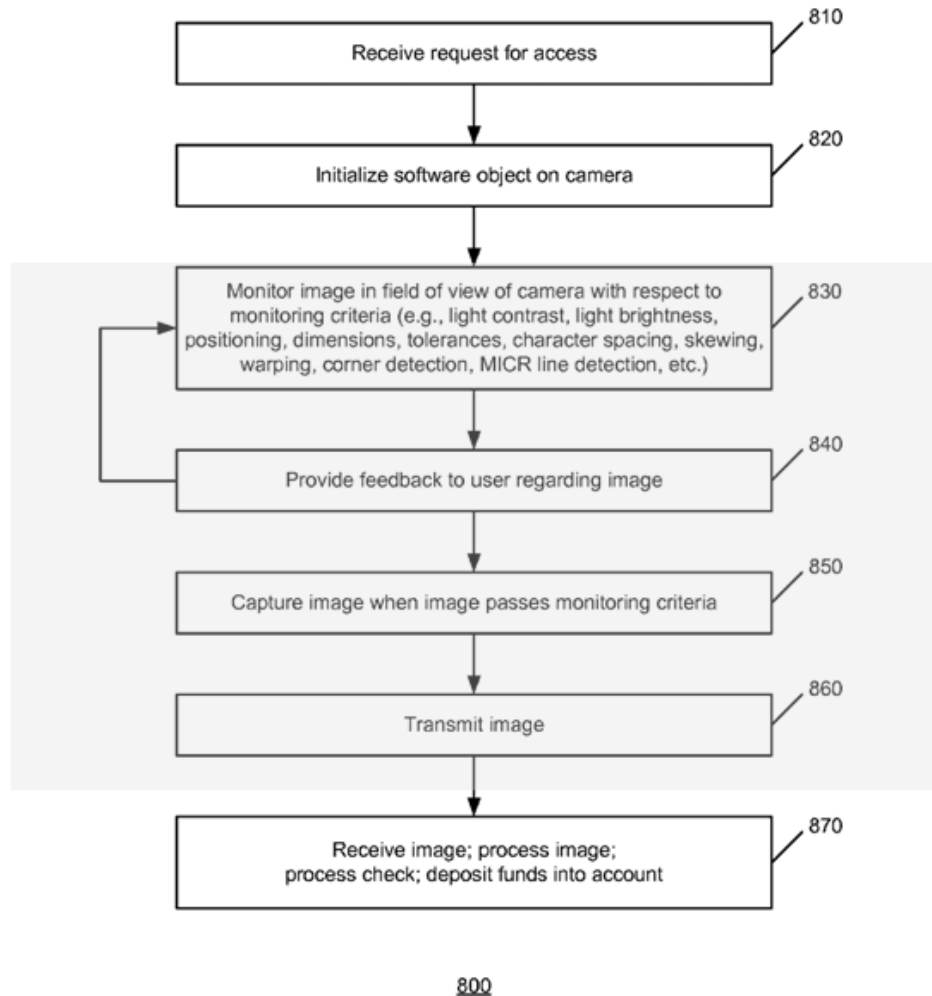


FIG. 8

EX1001-USP310, Fig.8. EX1002-Decl., ¶80.

The patent lists potential monitoring criteria, including “light contrast on the image, light brightness of the image, positioning of the image, dimensions, tolerances, character spacing, skewing, warping, corner detection, and **MICR (magnetic ink character recognition) line** detection....” EX1001-USP310, 4:15-

19. Rather than provide experimental data or actual implementations of how to determine if such criteria are met, the patent instead relies on “known” techniques. *Id.*, 7:17-18 (“The edge 257 may be detected using any known technique(s).”); 7:66-67 (“Any known technique(s) for edge detection and/or corner detection may be used.”); 8:59-63 (“Any known **MICR line** detection technique(s) may be used....”); 9:10-12 (“[T]he spacing between the numbers in the **MICR line** may be determined using any known measuring and/or image processing technique(s)”; 9:47-49 (“A histogram is a well known graph and may be used to display where all of the brightness levels contained in an image are found....”); 10:17-19 (“Any known technique for generating a histogram for an image (such as a grayscale image of the image 230) may be used.”). EX1002-Decl., ¶¶81-82.

The ’310 patent also discusses basic software components for implementing the purported invention. The patent explains that the **mobile device camera** can be “operate[d] through a software abstraction layer, such as an application programming interface (API).” EX1001-USP310, 11:26-28. The patent does not purport to invent new or improved APIs. Instead, it relies on known APIs in mobile operating systems like Windows Mobile, Symbian OS, iPhone OS, Palm OS, BlackBerry OS, and Android. *Id.*, 11:39-41. EX1002-Decl., ¶83.

B. Prosecution History

Application No. 18/593,856, which issued as the '310 patent, was filed on March 1, 2024. EX1001-USP310, cover; EX1033-FH310, 49-50. The application was originally filed without a priority claim, and was therefore rejected over U.S. Patent No. 8,977,571. EX1033-FH310, 64-76, 130-38. After PO added a priority claim to the '571 patent, various claims were rejected over U.S. Patent No. 10,380,562 ("Prasad") in view of U.S. Patent No. 10,504,185 ("Buentello"), both assigned to PO. *Id.*, 139-41, 176-86. The rest were objected to as allowable. *Id.* PO rewrote the objected to claims into independent form (*id.*, 190-212), and the examiner issued a Notice of Allowance on September 19, 2024 (*id.*, 679-88). As explained below, the issued claims would have been obvious in view of the prior art cited in this Petition. EX1002-Decl., ¶84.

VII. CLAIM CONSTRUCTION

The Board need only to construe claim terms to the extent necessary to resolve a controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Petitioner does not believe that any term requires construction for purposes of this Petition.

VIII. PERSON OF ORDINARY SKILL

A person of ordinary skill in the art ("POSITA") as of the claimed priority date of the '310 patent would have had a bachelor's degree in electrical engineering, computer science, computer engineering, or equivalent field, and at

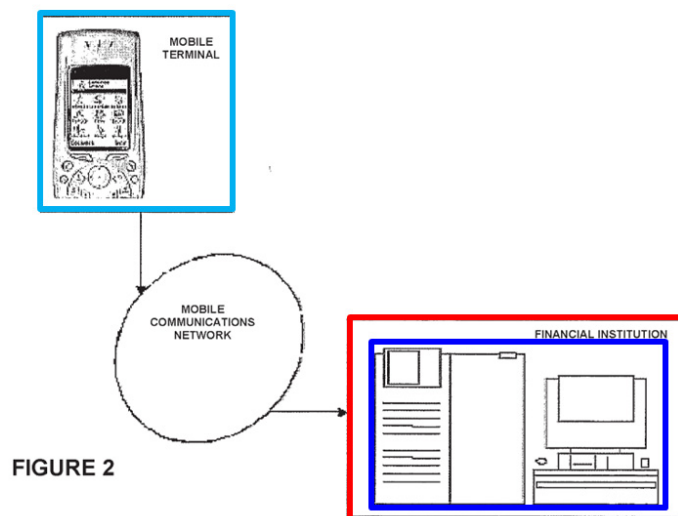
least two years of prior experience with (1) image capture/scanning technology, involving transferring and processing of image data to and at a server and (2) software application development. Less work experience may be compensated by a higher level of education and vice versa. EX1002-Decl., ¶¶85-87.

IX. PRINCIPAL PRIOR ART REFERENCES

A. Garcia (EX1003)

Like the '310 patent, Garcia teaches a remote check deposit method “for processing and accepting **documents**, such as...bank checks...using...a **mobile device** capable of capturing and sending images.” EX1003-Garcia, 1:7-13.

Garcia’s Figure 2 illustrates the method that includes a user’s “**mobile device**” and “**computer equipment** at the **financial institution**.” *Id.*, 9:11-18.



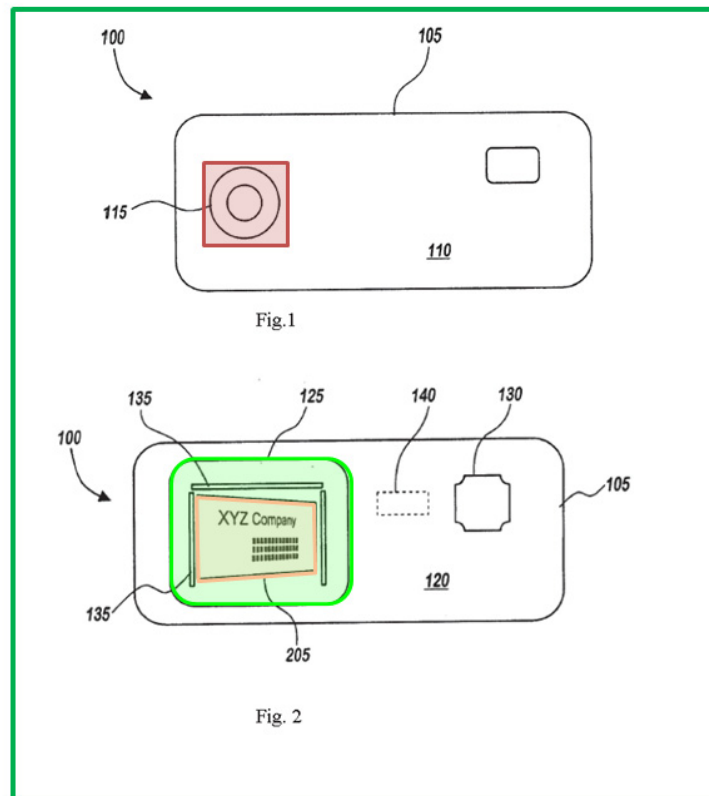
Id., Fig.2. EX1002-Decl., ¶¶90-92.

Like the '310 patent, the **mobile device** can capture and send the image of a check and information associated with the deposit to a **financial institution**.

EX1003-Garcia, 10:10-13, 10:16-18, 11:20-12:3, 12:9-13. The **institution** then recognizes, verifies, and processes the received information “by the usual means (truncation systems),” “ultimately obtaining a digital photograph of the check and a data set that allows it to automatically process the deposit of the check.” *Id.*, 11:7-10, 11:15-19, 12:17-22. That automatic processing uses “**computer equipment**...that has an optical character recognition (OCR) system.” *Id.*, 11:7-15. *See also id.*, 11:15-19, Fig.1. EX1002-Decl., ¶¶92-96.

B. Luo (EX1004)

Like Garcia and the '310 patent, Luo is directed to “digital **cameras** in a variety of **handheld** electronic **devices**” including “**mobile phones**” and “**personal digital assistants (PDAs)**....” EX1004-Luo, 1. Luo depicts a **handheld camera system** 100 including an “**image sensor** 115 adapted to receive an image” and a “**preview window** 125” that functions as a “viewfinder” that “display[s] in real time any moving **image** of the scene in front of the **image sensor** 115.” *Id.*, 3. EX1002-Decl., ¶¶97-100.



EX1004-Luo, Figs.1-2. EX1002-Decl., ¶100.

Luo discloses techniques to improve image capture using such **handheld devices** to obtain “well-focused and clear **document** images” to “make the [OCR] of any text printed in the **document** effective and reliable.” EX1004-Luo, 4. Luo recognizes that images captured using **handheld devices** may result in “unideal variable factors such as the distance from the lens” to yield images that “may contain defects such as projective distortion” which impair OCR on the **document**. *Id.*, 1. EX1002-Decl., ¶101-103.

For example, as illustrated in Figure 3, “projective deformation” occurs when the “the surface of the object to be imaged” (also called the “object plane 310”) and the “preview image displayed in window 125” (forming the “image plane 320”) are not “substantially parallel,” resulting in “the shape in the region ‘p’ on the object plane” being “enlarged by the lens 315 and distorted into a region ‘Q’ of a different shape on the image plane....” EX1004,-Luo, 4. EX1002-Decl., ¶100.

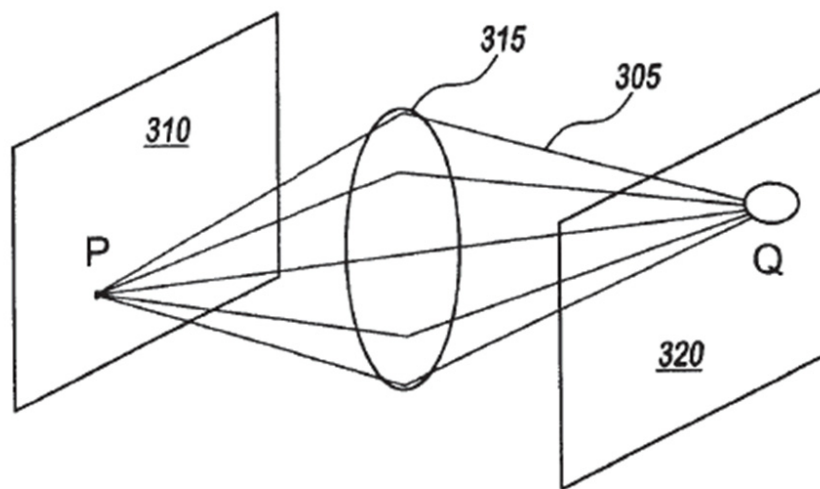


Fig. 3

EX1004-Luo, Fig.3. As illustrated in Figure 5, such projective deformation (used interchangeably with the term “projective distortion”) causes portions of the **document** to be blurred, which can negatively affect subsequent image processing steps, such as OCR. *Id.*, 1, 5.

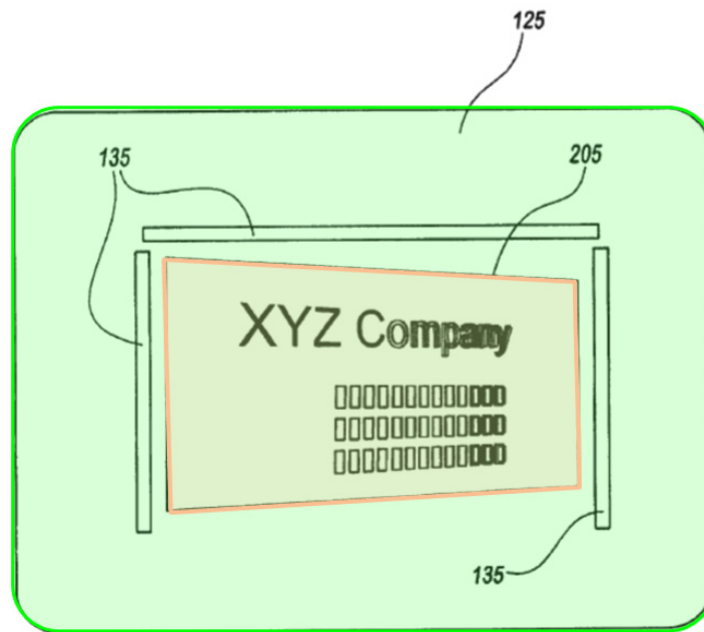


Fig. 5

EX1004-Luo., Fig.5. EX1002-Decl., ¶¶103-104.

Luo addresses these problems using “**reference lines**.” Luo’s “**reference lines**” work the same way as the ’310 patent’s “**alignment guide**”:

Luo, FIGURE 5

’310 Patent, FIGURE 3

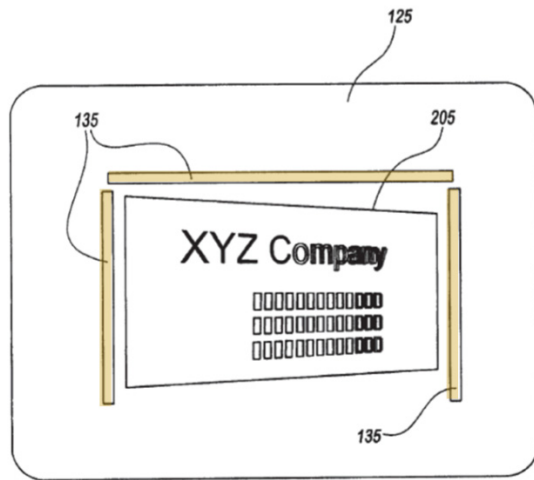


Fig. 5

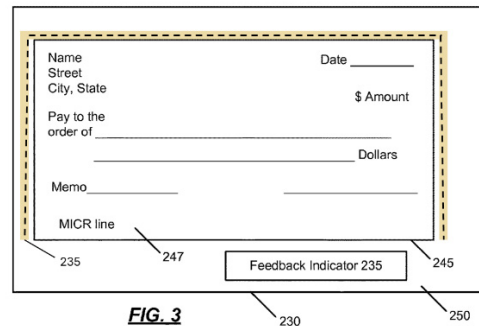


FIG. 3

EX1004-Luo, Fig.5; EX1001-USP310, Fig.3. For example, Luo teaches that “projective distortion in the image is reduced” by monitoring the **document** image 205 relative to **reference lines** 135 and allowing “the image of the object [to] be captured” “only when the **straight edge** 205 shown in the **preview window** 125 is substantially parallel to the corresponding **reference line** 135....” EX1004-Luo, 7. To ensure proper **alignment**, Luo provides the user with instructions and feedback throughout the process, for example, by changing the color or flicker of the **reference lines** and other indications when the method determines an edge of the **document** in the **preview window** is parallel to one of the **reference lines**. *Id.*, 4, 6, Fig.6, claim 5. EX1002-Decl., ¶¶105-109.

C. Meier (EX1005)

Meier is a guide for developing mobile applications—specifically for Android-based devices, which is one of the prior art operating systems identified

by the '310 patent. EX1005-Meier, xvii; EX1001-USP310, 11:36-41. Meier teaches that “Android developers are free to write applications that take full advantage of increasingly powerful mobile hardware.” EX1005-Meier, xvii, 1. To do so, Android provides “APIs” that allow applications to access the hardware of the **mobile device** like the **camera**. *Id.*, 1, 3, 5-6, 12, 16. For example, Meier teaches that Android Camera APIs can be used to “capture images and preview and capture live video” from a mobile application. *Id.*, 315, 319-21. Once a third party writes an application, it can be downloaded from the Android Marketplace. *Id.*, 5. EX1002-Decl., ¶¶110-14.

D. Cohen (EX1006)

Cohen, like Garcia and the '310 patent, is directed to depositing a check using its image. EX1006-Cohen, [0008], [0022]. Cohen discloses that a merchant can deposit checks using “remote computer 108, equipped with scanner 106” and “a software scanning module which allows checks to be scanned front and back, the magnetic **MICR line** to be read....” *Id.*, [0021].

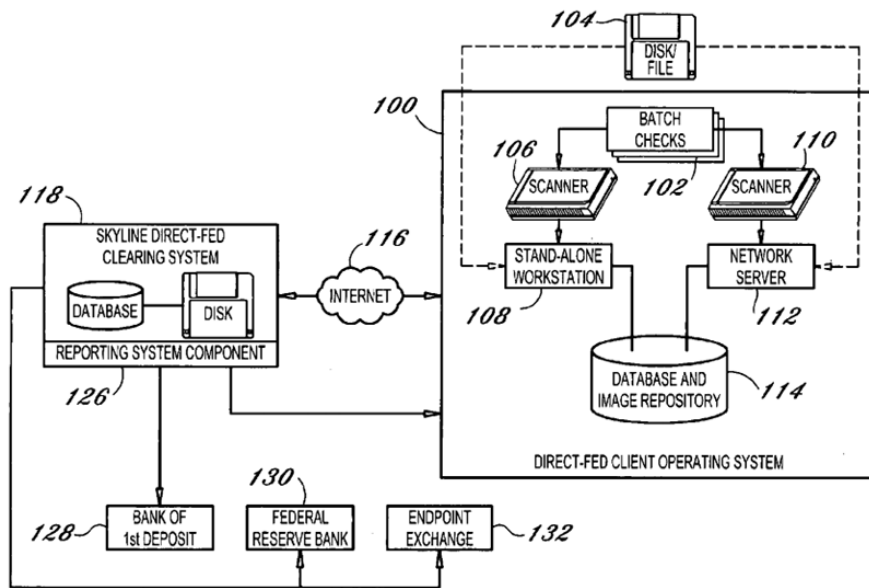


FIG. 1

Id., Fig.1. EX1002-Decl., ¶¶115-18.

The merchant's system runs an "OCR and parsing processes [that] return[s] value data, including: (1) check amount; (2) bank routing number; (3) bank account number; and (4) check number" as well "quantitative measurements, or values, representing the confidence level of the accuracy of the OCR results pertaining to each of the respective pieces of data." EX1006-Cohen, [0022], Fig.2. An operator at the "merchant site 100 reviews the images and data for each check" including the accuracy confidence levels, to validate the images and information read therefrom and confirm there are no errors. *Id.* The images are then transmitted to a clearing system 118 for deposit. *Id.*, [0016], [0022]-[0023].

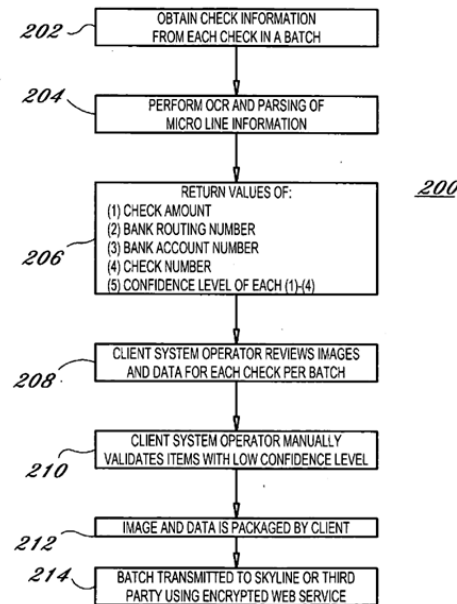


FIG. 2

Id., Fig.2. EX1002-Decl., ¶119.

E. Yoon (EX1007)

Yoon, like Luo and the '310 patent, is directed to capturing better images of **documents** using a **mobile device** by automatically capturing an image when certain criteria are satisfied. EX1007-Yoon, Abstract, [0019], [0032], claim 1.

Like Luo and the '310 patent, Yoon teaches that one criterion can be **alignment** of the edge of a **document** with a **guide** or **reference line**. *Id.*, [0019], [0022], [0024], [0026]-[0030], Fig.2, claims 2-7, 9, 12-17. Yoon teaches that the brightness of the image can be used as an additional criterion before capture. *Id.*, [0007], [0019], [0025]-[0026], [0032], Fig.2. EX1002-Decl., ¶¶120-24.

F. Goyal (EX1008)

Goyal is a guide for developing mobile applications—specifically for Java-enabled devices (*e.g.*, Alcatel, Motorola, and Nokia). EX1008-Goyal, 5, 15, back cover. Goyal teaches that “MMAPI [Multi Media API] allows you to create applications”—referred to as “MIDlets”—“for Java-enabled devices that can discover and use the multimedia capabilities of the device that they are running.” *Id.*, 1, 3, 127. Goyal teaches that Java-enabled device MMAPIs can be used to “capture snapshots or full videos” from within a mobile application. *Id.* 127; *see also id.*, 1, 16, 128, 174, 253. Once completed, users can download applications via the well-known “over the air” (“OTA”) interface. *Id.*, 66-67. EX1002-Decl., ¶¶125-28.

X. SPECIFIC GROUNDS FOR UNPATENTABILITY

A. Ground I: Claims 1-3, 5-6, 8-12, 14-16 are Obvious Over Garcia with Luo/Meier/Cohen

1. Garcia/Luo/Meier/Cohen

Garcia/Meier/Cohen/Luo are analogous art, and a POSITA would have been motivated to combine them with a reasonable expectation of success. EX1002-Decl., ¶¶129-33.

a. Garcia in view of Luo/Meier

First, Garcia/Luo/Meier are analogous art to the Challenged Claims.

Garcia/Luo/Meier are in the same field as the Challenged Claims—capturing and

processing **document** images. *See, e.g.*, EX1001-USP310, claim 1; EX1003-Garcia, 1:7-13 (disclosing a method “for processing and accepting **documents**, such as, for example, bank checks, with guarantee of authentication of the issuer and the **document** itself, using electronic media for its implementation through a **mobile device** capable of capturing and sending images via Internet connection.”); EX1004-Luo, 6-7 (describing image-capturing method applicable to image a wide variety of small rectangular **documents**), 1 (describing OCR); EX1005-Meier, 315 (disclosing software development platform/kits that “[a]ccess to the [**mobile device camera**] for taking pictures and previewing video,” which could be of a **document**). EX1002-Decl., ¶¶134-37.

Second, a POSITA would have been motivated to combine Garcia’s mobile remote check deposit method with well-known **mobile device** image capture techniques, including Luo’s guidance and autocapture techniques and Meier’s downloaded application and APIs for controlling **mobile device cameras**. EX1002-Decl., ¶138.

As Section IX.A details, Garcia discloses a remote check deposit method that extracts deposit information from images captured by a **mobile device**. EX1003-Garcia, 1:7-13, 11:7-15. Garcia explains that the “**mobile equipment** that performs the initial processes of capturing, digitizing and processing the image consists of a **mobile telephone** equipped with the features and functions necessary

for said purpose, particularly a **mobile telephone** with a **camera** and processing capacity.” *Id.*, 11:1-6; 9:21-10:3 (discussing “computer application”). A POSITA would have been motivated to apply teachings from the prior art like Luo/Meier to fill implementation details regarding how the check image is captured and determined to be suitable for capture or deposit, and the software architecture on the **mobile device**. EX1002-Decl., ¶139.

Luo provides such teachings with respect to capturing check images on a **mobile device**. Specifically, Luo teaches improving captured **mobile device** images of **documents** for OCR by providing instructions and feedback to the user and helping the user **align** the **document** edge with parallel **reference lines** in a **camera preview window**. EX1004-Luo, Abstract, 5-7, claims 5, 11, 13, Fig.6. Luo further discloses automatically capturing the image of the **document** when the **document** is properly **aligned** in the **preview window**. *Id.* EX1004-Luo, 6. Luo teaches that such techniques result in “improved method and system for capturing the...image,” are “user friendly and intuitive in use,” ensure the “image is clearer and more accurate,” and reduce projective distortion, which “accelerate[the] image capture process” and “optical character recognition...with high accuracy.” EX1004-Luo, 7. EX1002-Decl., ¶¶140-41.

A POSITA would have been motivated to incorporate Luo’s teachings into Garcia. Luo teaches that the disclosed image capture techniques, including parallel

reference lines and instructions to the user, can produce higher quality images that reduce problems such as “projective distortion” and “blur,” which improves OCR accuracy. EX1004-Luo, 1, 5, 7. A POSITA would have therefore been motivated to use Luo’s **preview window**, instructions, feedback, **document alignment**, and automatic capture techniques to improve captured images for use in Garcia’s check deposit method. EX1002-Decl., ¶¶133. A POSITA would have recognized that Luo’s techniques would have been directly applicable to check image capture to predictably increase the likelihood of obtaining images suitable for “[r]ecognizing, verifying, and electronically treating and processing,” as disclosed by Garcia. EX1003-Garcia, 6:8-10. EX1002-Decl., ¶¶142-43.

Implementing Garcia’s mobile check deposit method using Luo’s **camera** method would have amounted to applying a known technique/method (*e.g.*, Luo’s **preview window**, instructions, feedback, **document alignment**, and automatic capture techniques) to a known device/method (*e.g.*, Garcia’s mobile phone equipped with a **camera** for capturing a check image) ready for improvement (*e.g.*, to improve OCR of Garcia’s images) to yield predictable results (*e.g.*, a better check image). *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). EX1002-Decl., ¶144.

Garcia teaches using “a computer application in the **mobile telephone**” and “features and functions necessary” to carry out check image capture. EX1003-

Garcia, 9:21-10:1, 11:4. Luo similarly teaches processors running “stored program instructions” and “software...that enables the [camera] preview window.”

EX1004-Luo, 3, 7-8. A POSITA would have been motivated to apply teachings from the prior art like Meier to fill in implementation details regarding the software architecture and how the software is loaded onto the mobile device. EX1002-Decl., ¶145.

Meier fills in those details with well-known and readily available software components. Meier is a “hands-on guide to building mobile applications” that teaches developers how “to get the most out of Android,” including by taking advantage of the device camera. EX1005-Meier, xvii, 5-6, 12, 315. Meier explains that mobile applications can be downloaded onto the device, and that such applications can “[a]ccess to the device camera for taking pictures and previewing video.” *Id.*, xviii, 5, 12, 315. To that end, Meier teaches “application-neutral APIs [to] provide low-level access to the increasingly diverse hardware commonly available on mobile device,” such as the camera. *Id.*; *see also id.*, 319-21, 325 (summarizing “Camera APIs”). EX1002-Decl., ¶¶146-47.

A POSITA would have been motivated to implement the Garcia/Luo combination with Meier’s downloadable application and Camera APIs. By the mid-2000s, mobile applications were becoming increasingly popular, including those that accessed camera functionality. *See, supra*, §§V.C, V.D; EX1005-

Meier, 315, 319-20. Downloaded applications allow an enterprise, such as a bank in the case of Garcia, to provide customers with customized functionality that is more complex than other solutions, such as webpages. EX1034-Yuan, 52.

Downloaded applications only need to be installed once, and can provide additional security as compared to a webpage. *Id.*, 44, 52. Downloaded applications also facilitate access to device features like the **camera** without requiring the enterprise to write **mobile device** software from the ground up.

EX1005-Meier, 1, 3, 5-6, 12, 16, 315, 319-21. Downloaded applications with APIs for controlling image capture were already used for desktop check deposit (EX1036-Westerman; EX1037-EasCorp; EX1038-eServices), so a POSITA would have been motivated to use the equivalent architecture for **mobile devices**. *See generally* EX1039-Hariharan. EX1002-Decl., ¶¶148-51.

A POSITA would have been motivated to look to how-to guides like Meier to implement the teachings of Garcia/Luo on a mobile platform, like Android. In the Garcia/Luo/ Meier combination, Meier's downloadable application and Camera API would include the software required for Garcia/Luo's teachings. For example, the downloaded application would facilitate Luo's **preview window** and image capture using the Camera API that provides third-party mobile applications access to video preview from a **device camera** (*e.g.*, using Android's `setPreviewDisplay` feature) and the ability to capture a picture from that

video feed (*e.g.*, using `takePicture`). EX1004-Luo, Abstract, 5-7, claims 5, 11, 13, Fig.6; EX1005-Meier, xviii, 5, 12, 315, 318-20. Moreover, Meier provides numerous other implementation details, such as how to initialize the **camera** and control additional settings. *See, e.g.*, EX1005-Meier, 319-20. EX1002-Decl., ¶152.

Implementing Garcia/Luo's software using Meier's teaching of a downloaded application and API would have amounted to applying a known technique/method (*e.g.*, Meier's well-known software architecture) to a known device/method (*e.g.*, Garcia/Luo's mobile check capture and processing software) ready for improvement (*e.g.*, facilitating Garcia/Luo's functionality without requiring repeated downloads and writing **camera** control software) to yield predictable results (*e.g.*, capturing/processing a check image with a **mobile device**). *KSR*, 550 U.S., 416. EX1002-Decl., ¶153.

Third, the similarity between the references and the teachings therein would have led a POSITA to reasonably expect success in implementing the combination of Garcia's mobile check deposit method using the teachings of Luo's capture method and Meier's software architecture. All three are directed to **mobile devices** with **cameras** and image capture software (EX1003-Garcia, 1:7-13, 11:1-6; EX1004-Luo, 3, 6-8; EX1005-Meier, 315), which suggests the teaching from one reference would have been applicable to the others. Moreover, Garcia/Luo teach

capturing images of the same subjects—Luo’s disclosure of small rectangular **documents** with **straight edges** would include Garcia’s “bank checks.” EX1003-Garcia, 12:4-7; EX1004-Luo, 1, 4, 6. EX1002-Decl., ¶¶154-56.

Regarding the references themselves, Garcia teaches a “computer application” in a **mobile device** that engages in an interactive session with a **financial institution** for a check deposit without expressing difficulties implementing such features. EX1003-Garcia, 9:19-10:18. Thus, Garcia assumes that implementing known details like Luo’s image capture process or Meier’s software architecture would have been well within the level of skill of a POSITA, and could have been accomplished using computer code. EX1004-Luo, 1, 3, 7-8; EX1005-Meier, 315, 319-20. Other contemporaneous evidence confirms that controlling a **mobile device camera** using an API was known and “trivial.” EX1040-CodeGuru, 1 (stating “[a] number of Windows Mobile 5.0 APIs (for example, SHCameraCapture) make it trivial for a mobile application developer to

access a **camera**”).⁴ Moreover, Meier is a handbook directed to “*anyone* interested in creating applications for...**mobile phone[s]**” and teaches only “some experience in software development and [familiarity] with basic development practices” is expected. EX1005-Meier, xvii. Accordingly, it would have been obvious for a POSITA to combine the teachings of Garcia with Luo/Meier to incorporate Garcia into Luo/Meier’s teachings regarding monitoring, monitoring criterion, capturing the image when the image passes the monitoring criterion, feedback to a user, and a software application for download to Garcia’s mobile check deposit method that incorporates a **camera**. EX1002-Decl., ¶¶157-59.

⁴ The ’310 patent similarly assumes a POSITA would understand how to implement the claimed image capture process and software architecture, and also lacks implementation details, such as specific APIs, example code, or particular monitoring criterion parameters. EX1001-USP310, 7:54-60, 8:7-19, 24-30, 10:42-51, 11:26-51, 16:19-39, 21:1-27, claims 1-2, 5-6, 8, 9; *Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339 (Fed. Cir. 2020) (specification silence on implementation “suggest[s]” POSITA is “more than capable of selecting between the known methods”).

Finally, the Board and Federal Circuit have already found obvious the combination of a similar mobile check deposit reference like Garcia with Luo's image capture techniques to be obvious (EX1009-571-FWD, 23-72; EX1060-PNC2, *3-*7), and the combination of Garcia with another prior art disclosure regarding downloaded applications similar to Meier (EX1010-598-FWD, 20-25). The combination of Garcia with Luo and Meier would have been obvious for the same reasons.

b. Garcia in view of Cohen

First, like Garcia, Cohen is analogous art to the Challenged Claims. Cohen is in the same field as the Challenged Claims—capturing and processing **document** images. EX1001-USP310, claim 1; EX1006-Cohen, [0002] (disclosing a method for “captur[ing], processing, and archiving” check images). EX1002-Decl., ¶160.

Second, a POSITA would have been motivated to incorporate Cohen's teachings into Garcia. Garcia discloses “[r]ecognizing, verifying, and electronically treating and processing the information received by [a **financial institution**]” and requires that such **institution** has “**computer equipment**...that has an optical character recognition (OCR) system.” EX1003-Garcia, 6:8-10; 11:10-15. Cohen fills in implementation details regarding what Garcia's “verifying” and “processing” entails. For example, Cohen discloses techniques for

verifying and processing of check images using OCR, reading the **MICR line**, and validating various information items via accuracy confidence levels. EX1006-Cohen, Abstract, [0017], [0019]-[0022], [0042]-[0044], [0059], [0076]-[0088], [0093], Figs.1-2, claims 8, 14. Cohen also discloses that the user can review and confirm the image and information read from the check after processing but before submitting. EX1006-Cohen, [0022], [0032], [0045], [0078], [0091], [0093]-[0094], Fig.2. EX1002-Decl., ¶¶161-65.

A POSITA would have been motivated to combine Garcia's mobile check deposit method with Cohen's check image processing teachings, including OCR, validation, and confirmation techniques, to improve the reliability and automation of remote check deposit. Garcia itself teaches toward the combination. Garcia identifies the need for OCR and data processing/verification (EX1003-Garcia, 1:6-13, 2:7-14, 4:11-18, 5:1-10, 6:8-10, 11:1-19, 12:17-22, claims 1, 4, Fig.1), and Garcia directs a POSITA to the "usual means" of processing checks, such as "truncation systems" (EX1003-Garcia, 11:15-19; EX1010-598-FWD, 50 ("We understand Garcia to use the words 'usual means' to refer to a bank's existing (or usual) check processing systems, *i.e.*, the check processing used for other checks received by the bank.")). This would have led a POSITA to truncation systems like Cohen, which disclose additional check processing steps left by Garcia to the skill and discretion of a POSITA. EX1006-Cohen, [0004]-[0010], [0018], [0025],

[0036] (describing check truncation, substitute checks). A POSITA would have been drawn to Cohen in particular, as Cohen is directed to techniques for ensuring that an image captured by a user's **device**—as opposed to an ATM or other bank system—are of sufficient quality for deposit. These techniques would have been directly applied to Garcia's mobile check deposit method. Incorporating Cohen's teachings to allow a user to review a captured check image and information extracted therefrom would have ensured that only higher quality check images are submitted, decreasing the likelihood that the image would later be rejected. EX1006-Cohen, [0022], [0072], [0078], [0092]. EX1002-Decl., ¶¶166-68.

In the combination, Garcia teaches performing recognizing, processing, and verifying by a remote bank computer (EX1003-Garcia, 1:6-13, 2:7-14, 4:11-18, 5:1-10, 6:8-10, 11:1-19, 12:17-22, claims 1, 4, Fig.1), whereas Cohen teaches performing at least some of those steps on a user's **mobile device**. EX1006-Cohen, Abstract, [0017], [0019]-[0022], [0043]-[0044], [0059], [0076]-[0088], [0093], Fig.2, claims 8, 14. When faced with the alternatives of performing such steps on the **mobile device** or the server, a POSITA would have found “[e]ach of these two design choices [to be] an obvious combination of prior-art elements.” *ACCO Brands Corp. v. Fellowes, Inc.*, 813 F.3d 1361, 1367 (Fed. Cir. 2016). On the one hand, a POSITA would have been motivated to perform check image processing steps on the **mobile device** to save bandwidth and delay by determining readability

of deposit information before transmitting the image for deposit over a bandwidth-constrained network. EX1042-PNC, *8-*10; EX1043-Attia, 4:1-7; EX1044-Nepomniachtchi, 10:29–48; EX1048-Randle, [0028], [0021], [0074]. On the other hand, a POSITA would have also been motivated to perform such processing at the bank’s server where the rest of the verification takes place and to avoid processing burden on the **mobile device**. EX1042-PNC, *10; EX1043-Attia, 4:1-7; EX1044-Nepomniachtchi, 10:29-48. EX1002-Decl., ¶¶168-72.

Third, the similarity between Garcia and Cohen and the teachings therein would have led a POSITA to reasonably expect success. Garcia and Cohen are both directed to depositing checks using images (EX1003-Garcia, 1:7-13; EX1006-Cohen, [0002]), which suggests that Cohen’s check image processing steps would have also been applicable to Garcia’s images. Moreover, both Garcia and Cohen teach processing and verifying steps, including OCR. EX1003-Garcia, 1:6-13, 2:7-14, 4:11-18, 5:1-10, 6:8-10, 11:7-19, 12:17-22, claims 1, 4, Fig.1; EX1006-Cohen, [0017], [0019]-[0022], [0043]-[0044], [0059], [0076]-[0088], [0093], Fig.2, claims 8, 14. Thus, Garcia’s broader disclosure of “[r]ecognizing, verifying, and electronically treating and processing the information received by [a **financial institution**]” encompasses Cohen’s complementary teaching of more detailed steps like OCRing the **MICR** and amount, and obtaining accuracy confidence levels for deposit information. Indeed, Garcia’s teaching to process the check image with the

“usual means” like Cohen’s truncation would have led a POSITA to expect success. EX1003-Garcia, 11:7-19; EX1006-Cohen, [0004]. Accordingly, it would have been obvious for a POSITA to combine the teachings of Garcia with Cohen. EX1002-Decl., ¶¶173-75.

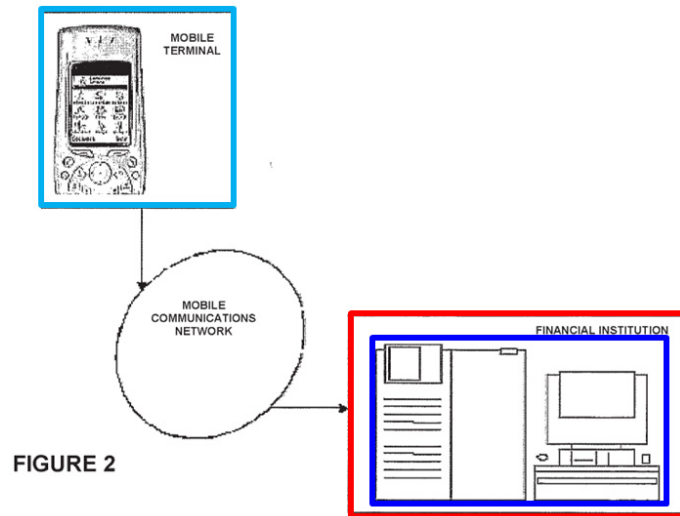
2. Claims 1, 2, 5-6, 8-11, 14-15

a. Claims

1[pre]/2[pre]/5[pre]/6[pre]/8[pre]/9[pre]/10[pre]/11[pre]/14[pre]/15[pre]

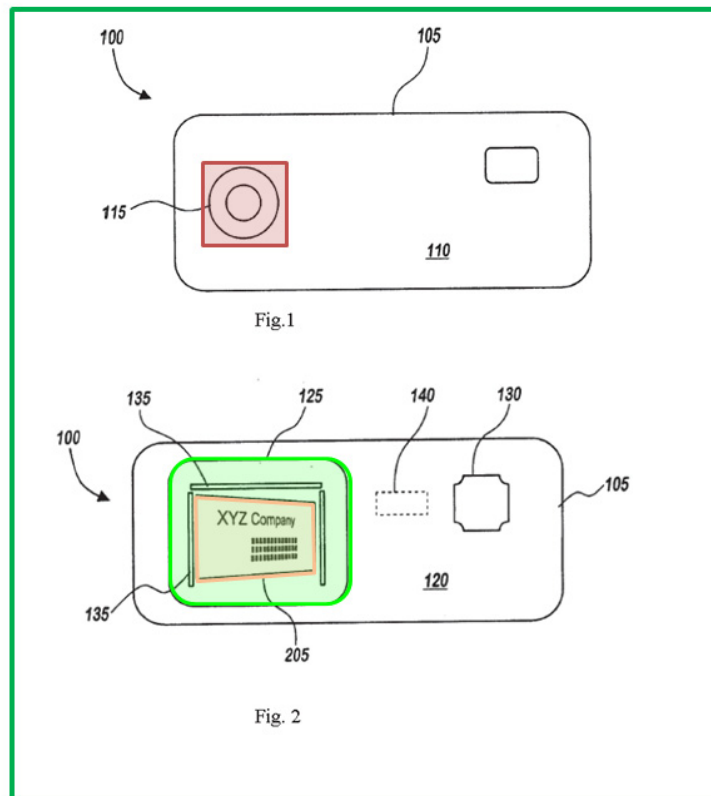
Garcia/Meier/Luo teaches a *method enabling mobile check deposit* (e.g., method of performing remote check deposit (Garcia)) *auto-capture functionality* (e.g., automatically capturing image upon satisfying the **alignment guide** (Luo)) *via video frame processing* (e.g., live image processing (Luo) via **camera** capture using an API (Meier)). EX1002-Decl., ¶176.

Garcia discloses a method for *mobile check deposit* in which a **mobile device** captures an image of a check and transmits the image over a communications network to a remote **financial institution** for processing and deposit. EX1003-Garcia, 1:6-13, 3:13-14, 4:11-18, 9:11-18, Fig.2 (reproduced below).



Id., Fig.2. EX1002-Decl., ¶177.

Luo discloses a method for automatically capturing an image of a **document** using a **handheld device**. EX1004-Luo, 3, 6, Figs.1-2 (reproduced below).



Id., Figs.1-2. Luo teaches obtaining **document** images suitable for OCR by automatically capturing the image when **straight edges** of the **document** in a **preview window** are parallel to one or more **reference lines**. *Id.*, 1, 4-7, Figs.3, 5, claims 3, 10. EX1002-Decl., ¶¶178-79.

Meier discloses methods that allow a **mobile device** to display and process video frames from a **camera**. For example, Meier teaches that an API of a **mobile device** can “[a]ccess to the **device camera** for taking pictures and previewing video.” EX1005-Meier, 315. Meier teaches that when the API uses the Camera Preview feature to have “[a]ccess to the **camera’s** streaming video means that you

can incorporate live video into your applications.” EX1005-Meier, 320. Meier discloses that “**camera** preview can be displayed in real time onto a Surface.” *Id.* Further, Meier teaches that “early Android applications have used this functionality as the basis for augmenting reality,” which demonstrates live processing of images/frames from the captured video. EX1005-Meier, 320. EX1002-Decl., ¶¶180-82.

b. Claims 1[a]/2[a]/10[a]/11[a]

Garcia/Meier teach *providing an app for download to a mobile device of a user (e.g., Garcia’s **mobile device** include computer application/Meier’s downloadable software application), the user’s mobile device including a camera and a memory storing (e.g., on Garcia’s **mobile device**) a software abstraction layer [for controlling the camera] (e.g., Meier’s API), the app associated with a bank to control check deposit (e.g., Garcia’s remote deposit application) by controlling the camera through the software abstraction layer, wherein the app, when downloaded to the user’s mobile device and executed by the user’s mobile device, is configured to cause the user’s mobile device to perform operations comprising.* EX1002-Decl., ¶183.

Garcia discloses a **mobile device** with a **camera** that takes a check image using a “computer application.” EX1003-Garcia, 9:19-10:18. Additionally, Garcia teaches a **mobile device** “that performs the [] processes of capturing, digitizing,

and processing the image consists of a **mobile telephone** equipped with the *features and functions necessary for said purpose, particularly a mobile telephone with camera and processing capacity,*” and submits the image of the check to a bank for deposit (*i.e., control check deposit*). *Id.*, 4:11-18, 7:18-22, 11:1-6, 16:19-20. Further, a POSITA would have understood that the **mobile device** disclosed in Garcia would have included a *memory* coupled to a processor to store software to perform the “features and functions” of Garcia’s method. EX1002-Decl., ¶¶183-87.

Meier discloses a downloadable application that can implement the “features and functions” described in Garcia—*i.e.*, capturing an image of a check from a **mobile device**. EX1005-Meier, 5, 20, 315, 320. Meier further teaches that such an application can use an API (*software abstraction layer*) of the **mobile device** to “access **camera** hardware,” for example to “capture images and preview and capture live video.” *Id.*, 20, 315, 319. Meier’s API and associated software, *when executed, cause[s] the user’s mobile device to perform operations*, such as “adjust **camera** settings, take pictures, and manipulate streaming **camera** previews.” EX1005-Meier, 319. In combination with Garcia/Luo/Cohen, the software would perform additional operations. §§X.A.2.c-X.A.2.j; X.A.1. EX1002-Decl., ¶¶188-90.

In the Garcia/Meier combination, the app would have been *provid[ed]* by and *associated with a bank* by virtue of the check images being sent to a computer at the **financial institution** for processing. EX1003-Garcia, 1:15-19, 4:1-8, 4:11-18. Because Garcia discloses replacing an in-person deposit with a remote one (EX1003-Garcia, 1:15-2:14, 7:18-8:14), a POSITA would have found it obvious for the depositor's bank to provide the application. In the combination with Meier, the image capture and processing steps described below with reference to limitations 1[b]-1[i] would have been performed by the downloaded application. EX1002-Decl., ¶¶191-92.

c. Claims

1[b]/2[b]/5[b]/6[b]/8[b]/9[b]/10[b]/11[b]/14[b]/15[b]

Garcia/Luo render obvious *providing instructions* (e.g., Luo's instructions) *to the user for capturing an image of a check* (e.g., Garcia). EX1002-Decl., ¶193.

Garcia teaches “[c]apturing the digital image of the obverse and the reverse side of the **document**.” EX1003-Garcia, 10:10-11, 12:4-9. The method described in Garcia, is further described as “an interactive session...with the **receiving institution** through the mobile communications operator.” *Id.*, 10:1-3. A POSITA would understand that in the context of such a real-time interactive session, the method would necessarily include instructions or prompts guiding the user to correctly position the check for image capture. Such guidance was standard in

mobile imaging applications at the time and would have been readily understood as implied in Garcia’s description of real-time validation and feedback. *Id.*, 4:11-18, 5:1-9, 12:17-13:5, claim 4; EX1045-Zhu,⁵ 9 (“The technical solution of the present invention is further characterized in that said **camera** system displays instructional text on said screen to guide the **mobile phone** user to perform correct operations during the execution of each step.”); EX1046-Lin, [0154]; EX1017-Acharya, 7:5–13; EX1004-Luo, 6; EX1007-Yoon, [0022], [0026], [0028]. EX1002-Decl., ¶194.

Additionally, Luo teaches providing “*instructions* to the user when the **straight edge** displayed in the **preview window** is substantially parallel to the corresponding **reference line** *before capturing the image of the object*.” EX1004-Luo, 6, claim 5; *see also id.*, Abstract, claims 11, 13, Fig.6. EX1002-Decl., ¶¶195-96.

d. Claims

1[c]/2[c]/5[c]/6[c]/8[c]/9[c]/10[c]/11[c]/14[c]/15[c]

⁵ Zhu was originally published in Chinese, which is provided in Exhibit A of EX1045. Citations to “EX1045” refer to Exhibit B of EX1045, which is a certified English translation.

Garcia/Luo/Meier teach *generating a live video of the check* (e.g., Garcia's check) *in a field of view of the camera* (e.g., Garcia/Luo/Meier's viewfinder/preview), *the downloaded app causing the live video to be generated by controlling the camera through the software abstraction layer* (e.g., Meier's API). EX1002-Decl., ¶197.

In the Garcia/Luo/Meier combination, the **document** captured by Luo's method would have been a *check*. EX1003-Garcia, 1:6-13, 4:11-18; *see also* §X.A.1.a. EX1002-Decl., ¶198.

Luo further teaches *generating a live video of a document in the field of view of the camera*. Luo teaches that the **preview window** “is suitable for **displaying the image** received by the **image sensor 115**” and “can function as a viewfinder of a conventional **camera** and display in real time any **moving image of the scene in front of the image sensor 115**.” EX1004-Luo, 3. A POSITA would have understood the “viewfinder” would have shown video from the **camera**, and that that “the scene in front of the **image sensor 115**” in Luo's viewfinder is in *the field of view of the camera*, which would have included the **document** being imaged. EX1004-Luo, 3. EX1002-Decl., ¶199.

Meier also teaches *generating a live video of the check in a field of view of the camera*. For example, Meier discloses an API for controlling the **camera**, and that the capture process involves “previewing video” before capturing the image

API. EX1005-Meier, 315, 319. A POSITA would have understood “preview video” to be live video. Because the Camera API (*software abstraction layer*) controls access to the **camera** hardware to control image preview and capture, the downloaded application in the Garcia/Luo/Meier combination would *cause the live video to be generated by controlling the camera through the software abstraction layer* (e.g., API). See EX1005-Meier, 315, 319; *supra* §X.A.2.b. EX1002-Decl., ¶¶200-202.

e. Claims 1[d]/2[d]/5[d] 6[d]/8[d]/9[d]

Garcia/Luo/Meier teach *overlaying an alignment guide* (e.g., Luo’s **straight edge** and **reference lines**) *on the live video of the check in the field of view of the camera*. EX1002-Decl., ¶203.

In the Garcia/Luo/Meier combination, the imaged **document** is a *check*. EX1003-Garcia, 1:6-13, 4:11-18; *see also* §X.A.1.a. As discussed above, Luo/Meier also teaches *the check in the field of view of the camera*. See §X.A.2.d. EX1002-Decl., ¶204.

Luo further teaches *overlaying reference lines* and a **straight edge** (e.g., **alignment guide**) in the **preview window** (e.g., *on the live video*). EX1004-Luo, Abstract (disclosing displaying “a preview image depicting a **straight edge** (205) and at least two **reference lines** (135) simultaneously...in a **preview window** (125) of the **camera system** (100), where each **reference line** (135) corresponds to

a **straight edge** (205).”), 3 (explaining that **reference line** 135 is displayed in the **preview window** “[w]hen the mode selection switch 130 is set to the **document capture mode**.”), Fig. 5:

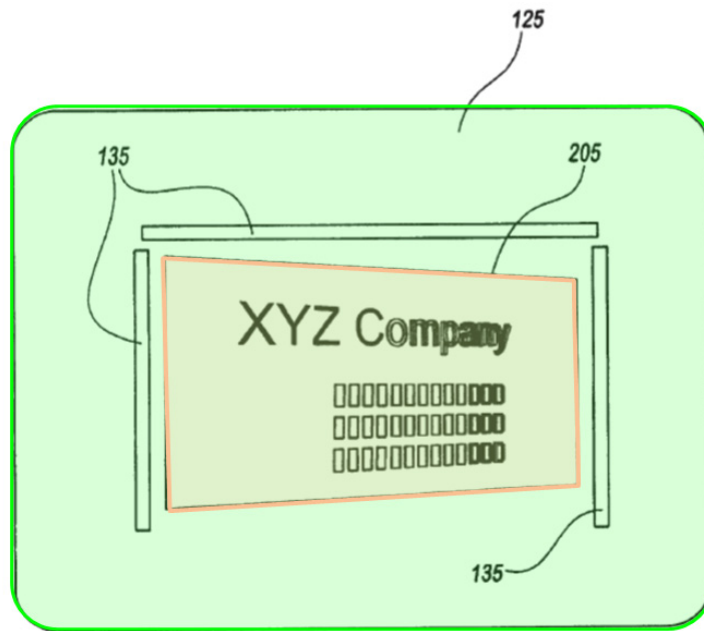


Fig. 5

EX1004-Luo, Fig.5. Luo’s projected **reference lines** are an **alignment guide** because they represent shapes or indicators for **guiding alignment**. EX1002-Decl., ¶¶205-206.

f. Claims 1[e]/2[e]/10[d]/11[d]/14[d]/15[d]

Garcia/Luo/Meier teach *monitoring the live video of the check in the field of view of the camera with respect to at least one monitoring criterion*. EX1002-Decl., ¶207.

The Garcia/Luo/Meier combination discloses displaying *live video of the check in the field of view of the camera*. §§X.A.1.a., X.A.2.d. EX1002-Decl., ¶208.

As shown below, Luo further teaches *monitoring...with respect to a monitoring criterion* by monitoring whether the “**straight edge 205**” of an object “displayed *in the preview window 125* is substantially parallel to the corresponding **reference line 135**” and “only when the **straight edge 205** shown in the **preview window 125** is substantially parallel to the corresponding **reference line 135** can the image of the object be captured.” EX1004-Luo, Abstract, 5-7. As Luo explains, waiting for **alignment** with the **reference lines** reduces the amount of “projective distortion” and blurriness, thereby improving the accuracy of OCR. *Id.*, 5, 7.

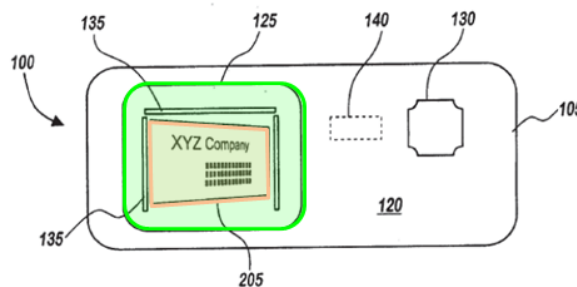


Fig. 2

Id., Fig.2. EX1002-Decl., ¶¶209-11.

g. Claims

1[f]/2[f]/5[f]/6[f]/8[f]/9[f]/10[e]/11[e]/14[e]/15[e]

Garcia/Luo/Meier teach *determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame*. EX1002-Decl., ¶212.

The Garcia/Luo/Meier combination discloses monitoring *a video frame of the live video of the check* for a monitoring criterion. §§X.A.1.a, X.A.2.d, X.A.2.f. EX1002-Decl., ¶213.

Luo further teaches “*automatically captur[ing]*” the image (*i.e.*, a video frame from the camera) “when the straight edge 205 displayed on the preview window 125 is substantially parallel to the corresponding reference line 135”—*i.e.*, after the monitoring criterion is satisfied. EX1004-Luo, 6.; see also *id.*, Abstract, 7 (describing further operation of straight edge), claims. 3, 10. EX1002-Decl., ¶¶214-16.

h. Claims

1[g]/2[g]/5[g]/6[g]/8[g]/9[g]/10[f]/11[f]/14[f]/15[f]

Garcia/Luo/Meier/Cohen teach *when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured*. EX1002-Decl., ¶217.

As discussed in Section X.A.2.g, Garcia/Luo/Meier teaches *when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion*. EX1002-Decl., ¶218.

Garcia/Luo/Cohen each further teach *providing feedback advising the user that the check has been captured*. For example, as noted in Section X.A.2.c, Luo teaches that feedback may be provided to “indicate to the user that an appropriate number of **reference lines** 135 are substantially parallel to the respective **straight edges** 205 of the object depicted in the **preview window** 125,” by sound, light, or image indicators. EX1004-Luo, 6-7, claim 13. Because the image is captured when such criterion is satisfied, Luo’s indications would provide feedback that the image has been captured. Luo also teaches “the system 100 provides the user with an image of a captured object” after the monitoring criterion is satisfied, which would provide further indication that the image is captured. *Id.*, 8. Garcia further teaches making the image of the check available to the user, which also provides feedback to the user that an image has been captured. EX1003-Garcia, 6:6-7, 8:8-11, 11:15-19, 15:6-7. Similarly, Cohen teaches displaying a check image after capture. EX1006-Cohen, [0072], [0078], [0092]. Each of these disclosures provides feedback that an image has been captured. EX1002-Decl., ¶¶219-24.

i. Claims 1[h]/2[h]/10[g]/11[g]/14[g]/15[g]

Garcia/Luo/Meier teach *using a wireless network (e.g., Garcia's communications network), transmitting a digital image of the check from the user's mobile device and submitting the check for mobile check deposit in the bank after automatically capturing the video frame, wherein the digital image is the captured video frame or is based on the captured video frame.* EX1002-Decl., ¶225.

As discussed in Section X.A.2.g, the Garcia/Luo/Meier combination *automatically captures a video frame corresponding to the image of the check.* Garcia further teaches using a “digital image” of the check in its deposit. EX1003-Garcia, 4:1-8, 4:11-18, 5:21-6:7, 6:12-20, 10:10-18, 11:15-19, claim 1. EX1002-Decl., ¶226.

Garcia further teaches *transmitting* the “digital [check] image” over a “mobile telephone communications network, for example a GSM/GPRS network.” EX1003-Garcia, 11:20-12:3; *see also id.*, 1:6-13, 4:11-18 (“[C]apturing and transmitting digital images....”), 5:1-10, 6:3-5, 10:16-18, 11:7:15, claims 1-2. A POSITA would have recognized such networks to be *wireless networks*. The image transmitted by the **mobile device** is *submitt[ed] for “deposit* into the existing account at a **banking institution**” (*i.e., for mobile check deposit*). *Id.*, 4:14-15, 7:20-21, 16:19-20. EX1002-Decl., ¶¶227-29.

j. Claims

1[i]/2[i]/5[i]/6[i]/8[i]/9[i]/10[h]/11[h]/14[h]/15[h]

Garcia/Cohen teach *[before the submitting,] confirming that the mobile check deposit can go forward after optical character recognition is performed on the check in the digital image, a magnetic ink character recognition (MICR) line on the check in the digital image is recognized, and an amount payable on the check in the digital image is validated.* EX1002-Decl., ¶230.

Garcia further teaches that the **banking institution** has equipment necessary for “recognizing, verifying and processing” the check image sent by the user, which includes an “**optical character recognition (OCR) system.**” EX1003-Garcia, 2:7-14, 4:11-18, 5:1-10, 11:7-15, 12:17-22, claim 4. Garcia also discloses “[c]apturing the data associated with the **document**, such as the amount and the check number.” EX1003-Garcia, 10:12-14. A POSITA would have understood this disclosure to teach or render obvious using OCR to capture (or recognize) the **MICR line** and an *amount payable* to guarantee the appropriate funds are withdrawn from the correct bank account. EX1041-559-FWD, 43-44; EX1010-598-FWD, 44, 51-52; EX1047-136-FWD, 28-30. EX1002-Decl., ¶231.

Garcia also teaches “verifying” and “validating” the information on the check image (EX1003-Garcia, 1:6-13, 2:7-14, 4:11-18, 5:1-10, 6:8-10, 11:7-15, 12:17-22, claims 1, 4), and that the user can enter data from the check, such as the

amount. *Id.*, 5:14-20, 9:19-10:13, 12:9-13, claim 1. From these disclosures, a POSITA would have understood Garcia to teach or render obvious verifying and *validating an amount payable* by comparing various data, such as the legal amount and/or courtesy amount read from the check and the amount entered by the user to ensure the correct deposit amount. Indeed, comparing such amounts was well known at the time. EX1049-Gustin, [0005], [0017], [0028], [0211]-[0213], claims 14, 36. EX1002-Decl., ¶¶232-34.

Cohen also teaches performing “**OCR** and parsing” of the “check **amount**” and “**MICR Line** information.” EX1006-Cohen, [0022], [0043]; *see also id.*, [0017], [0019]-[0021], [0059], [0076], Fig.2, claims 8, 14. Cohen further teaches calculating a “confidence level of the accuracy of the OCR results” including the check amount, which a POSITA would have understood to *validate the amount payable*.⁶ *Id.*, [0022], Fig.2. EX1002-Decl., ¶¶235-36.

⁶ This is consistent with how the ’310 patent describes this process, which involves “determin[ing] whether the...amount payable, or the like may be readable such that they may be parsed and processed.” EX1001-USP310, 5:10-12.

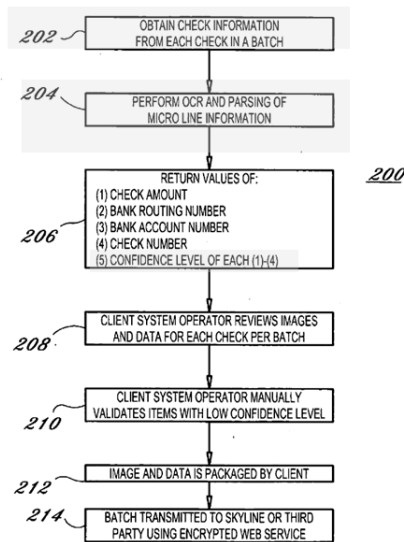


FIG. 2

Id., Fig.2. EX1002-Decl., ¶236.

Cohen teaches three examples of *confirming that the mobile check deposit can go forward*. First, determining high confidence levels for information read from an image confirms that deposit can go forward successfully. EX1006-Cohen, [0022], [0043]-[0044], [0077]-[0088], [0093], Fig. 2. Second, consistent with the '310 patent's disclosure of seeking user confirmation (EX1001-USP310, 12:61-67, claims 1-2, 5-6, 8-11, 14-15), Cohen also displays the image, information read therefrom, and confidence levels to a user, who then approves (*i.e., confirms*) the deposit. EX1006-Cohen, [0022], [0043]-[0044], [0077]-[0088], [0093], Fig.2. Finally, deposit only goes forward after the operator chooses to upload a batch. *Id.*, [0044]. EX1002-Decl., ¶¶237-39.

As discussed in Section X.A.1.b, a POSITA would have found it obvious to perform processing, which would include Garcia's/Cohen's OCR, MICR recognition, and amount validation on the user's device or on the server. Performing such processing on the user's device would therefore be accomplished *before submitting*⁷ the check image for deposit. As discussed in more detail Section X.A.2.1, Cohen discloses displaying the information read from the check image to the user *before submitting* for deposit. Thus, even when performed on the server, the processing would be accomplished *before submitting* the final image and deposit information for deposit. EX1002-Decl., ¶¶240-41.

k. Claims 1[j]/2[j]

Garcia/Cohen teach *receiving the digital image of the check transmitted by the user's mobile device*. EX1002-Decl., ¶242.

As discussed in Section X.A.2.i, Garcia discloses *transmitting* the check image to a **financial institution**. EX1003-Garcia, Abstract, 4:11-18, 5:1-9, 6:3-5, 6:12-20, 10:16-18, 11:10-15, 20-12:3, 12:9-13, claims 1-2. The **institution** “ultimately obtain[s] [*e.g., receives*] a *digital photograph of the check* and a data set that allows it to automatically process the deposit of the check....” *Id.*, 11:7-10,

⁷ The “before the submitting” requirement only appears in limitations 1[i] and 2[i].

5:1-9, 12:17-22. Moreover, Cohen teaches *transmitting* the check image to a **financial institution**. EX1006-Cohen, [0005], [0008], [0019], [0036], claims 1, 13, 17. EX1002-Decl., ¶¶243-45.

I. Claims 1[k]/2[k]

Garcia/Meier/Cohen teach *processing the digital image of the check (e.g., Garcia's and/or Cohen's processing and verifying) including performing optical character recognition on the check in the digital image and verifying that the digital image of the check is acceptable for mobile check deposit, wherein the app, when downloaded and executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations (e.g., Meier's downloadable application) including receiving an indication of a result of the processing before confirming that the mobile check deposit can go forward (e.g., Cohen's displayed information)*. EX1002-Decl., ¶246.

As discussed in Section X.A.2.j, Garcia/Cohen disclose various *processing* steps, *including performing [OCR] on the check in the digital image*. Garcia further teaches “*verifying*” and “*validat[ing]*” the received **document** before deposit (EX1003-Garcia, 1:6-13, 2:7-14, 5:1-10, 6:8-10, 11:7-15, 12:17-22, claims 1, 4), which a POSITA would have understood to teach or render obvious *verifying that the digital image of the check is acceptable for mobile check deposit*. EX1041-559-FWD, 48-51. Moreover, as discussed in Section X.A.2.m, Cohen

teaches “verif[ying]” information including “images” of the check, for example by providing confidence levels for data read therefrom and/or showing the image and information to an operator for review. EX1006-Cohen, [0022], [0032]-[0035], [0043]-[0044], [0077]-[0088], [0093]. EX1002-Dec1., ¶¶247-49.

As discussed in Sections X.A.1.b and X.A.2.j, it would have been obvious to perform the above processing steps either on the **mobile device** or at the **institution**. Moreover, as discussed in Section X.A.2.j, Cohen teaches the *confirming* step based on information read from the check image and further processing of that information to arrive at confidence levels. Therefore, the user’s **device** would need to *receive an indication of a result of the processing*—either from its own internal processing or from the remote server—*before* the user can *confirm* that the information is acceptable. EX1002-Dec1., ¶¶250-51.

Finally, as discussed in Sections X.A.1.a and X.A.2.b-X.A.2.j, Meier teaches that the *downloaded app* that is *executed by the user’s mobile device* and *causes the user’s mobile device to perform additional operations*, such as those described with reference to limitations 1[b]-1[i]. In the combination with Cohen, the downloaded application would also receive the indication of the result of processing in order to then display the image, recognized data, and confidence levels to the user. EX1002-Dec1., ¶¶251-52.

m. Claims 1[l]/2[l]/5[j]/6[j]/8[j]/9[j]/10[i]/11[i]/14[j]/15[j]

Garcia/Cohen teach *updating, by a [bank] computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the submitting the check for mobile check deposit [in the bank], the confirming that the mobile check deposit can go forward[, and the verifying that the [digital] image of the check is acceptable for mobile check deposit] (e.g., a method of check processing (Cohen)).* EX1002-Decl., ¶253.

As discussed in Sections X.A.2.i-X.A.2.j and X.A.2.l, the Garcia/Cohen combination teaches *confirming, verifying, and submitting* steps. Garcia further teaches that after receiving and processing the image (*i.e.*, after *verifying, confirming, and submitting* steps), the **financial institution** “**automatically process the deposit of the check in question into the service user's account,**” which a POSITA would have understood discloses *updating the balance of the user's account to reflect the amount of the check.* EX1003-Garcia, 4:11-18, 7:18-8:3, 12:17-22, claim 4. EX1002-Decl., ¶¶253-56.

n. Claims 1[m]/10[j]/14[k]

As discussed in Sections X.A.2.b-X.A.2.j Garcia/Meier teach *wherein the [downloaded] app, when [downloaded and] executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations comprising.* In the Garcia/Luo/Meier combination, it would have been obvious to

perform the steps/operations described in Sections X.A.2.o and X.A.2.p by executing the downloaded application. *See, supra*, §X.A.1.a. EX1002-Decl., ¶257.

o. Claims 1[n]/5[k]/10[k]/14[l]

Garcia/Luo/Meier teach *before determining that the video frame of the live video of the check satisfies the at least one monitoring criterion, determining that a different video frame of the live video of the check does not satisfy the at least one monitoring criterion.* EX1002-Decl., ¶258.

As discussed in Section X.A.2.f, Garcia/Luo/Meier discloses monitoring live video frames to determine when the edge of a check in the **preview window** displaying live video is parallel to a **reference line**, at which point image capture occurs. Thus, before **alignment** is determined, the **mobile device** determines that each video does *not satisfy the monitoring criterion.* EX1002-Decl., ¶¶259-60.

p. Claims 1[o]/5[l]/10[l]/14[m]

Garcia/Luo teach *after determining that the different video frame of the live video of the check does not satisfy the at least one monitoring criterion, providing feedback to the user.* As discussed in Section X.A.2.h, Garcia/Luo/Meier/Cohen discloses, or at least render obvious, *when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback.* *See also* §X.A.2.o. In the

Garcia/Luo/Meier combination, the **reference line** in its initial color (prior to changing color) is feedback that the image *does not satisfy the monitoring criterion*. In response to observing this unchanged initial color, the user would have understood to move the relative position of the **camera** to the object.

Furthermore, since Luo discloses multiple monitoring **reference lines** (EX1004-Luo, Abstract, 4-7, Fig.2), the contrast between a first **reference line** that has changed color and a second **reference line** that has not is feedback to the user to move the **camera** to satisfy the additional monitoring criterion of the second **reference line**. The same reasoning applies where the flicker is the source of feedback instead of (or in addition to) a color change. EX1002-Decl., ¶¶261-62.

Additionally or alternatively, Luo teaches providing instructions to the user. EX1004-Luo, 6, claims 5, 11, 13, Fig. 6. From this disclosure, a POSITA would have found it obvious to display specific instructions to the user regarding how to satisfy the monitoring criterion, such as text indicating any **reference line(s)** lacking **alignment**, instructing the user to move the **mobile device** to **align** the **document** with all **reference lines**, or any other form of feedback. EX1002-Decl., ¶252. Indeed, providing instructions to device users was well known in the field of computers and **mobile devices**, including instructions during image capture process. EX1004-Luo, 6, claims 5, 11, 13, Fig. 6; EX1045-Zhu, 9; EX1046-Lin, [0154]; EX1017-Acharya, 7:5-13; EX1007-Yoon, [0022], [0026], [0028].

Providing such instructions would have predictably provided the user with more information to obtain a better check image, and would have merely involved adding additional code to conditionally display text based on the monitoring process already disclosed in Luo. EX1002-Decl., ¶263-67.

q. Claims 2[m]/6[k]/11[j]/15[k]

Luo teaches *wherein the at least one monitoring criterion is a plurality of monitoring criteria based on two or more selected from a group consisting of light contrast, light brightness, check positioning, check dimensions, character spacing, skewing, warping, corner detection, edge detection, and magnetic ink character recognition (MICR) line detection*. As discussed in Section X.A.2.f, Luo teaches detecting “**straight edge 205**” (*edge detection*) and monitoring to determine whether the detected **document edge** is parallel to one or more **reference lines**. EX1004-Luo, 7, Fig.5. Luo teaches that doing so helps reduce projective distortion when a **document** is tilted (*i.e., skew[ed]*). EX1004-Luo, 1, 4-6. Luo teaches additional *skewing* detection methods, including those that take advantage of the “vanishing point” effect. EX1004-Luo, 6. Moreover, as shown below, Luo further teaches multiple perpendicular **reference lines** that intersect at the **document** corners. A POSITA would have understood that identifying two perpendicular edges on a **document** performs *corner detection*. EX1002-Decl., ¶¶255-258. Luo also teaches check positioning/check dimensions by placing

multiple **reference lines** at fixed locations on the screen. Finally, Luo repeatedly discusses identifying “**straight**” **edges**, which would rule out *warp[ed]* **documents** that would lack **straight edges**. Luo therefore teaches simultaneously using two or more monitoring criteria, which would have been obvious for the reasons discussed in Section X.A.1.a.

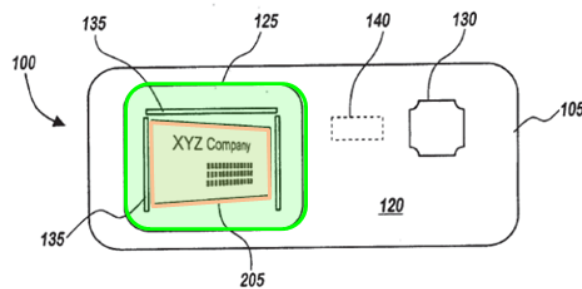


Fig. 2

EX1004-Luo, Fig.2. EX1002-Decl., ¶¶268-76.

r. Claims 5[a]/6[a]/8[a]/9[a]

Garcia/Luo/Meier teach *monitoring a live video of a check in a field of view of a camera with respect to at least one monitoring criterion, wherein the live video is generated by a mobile device of a user, the user's mobile device including the camera and a downloaded app, the downloaded app associated with a bank to control check deposit by controlling the camera, the downloaded app, when executed by the user's mobile device, being configured to cause the user's mobile device to perform operations comprising. See §§X.A.2.b (downloaded app on*

mobile device), X.A.2.d (live video of a check), X.A.2.f (monitoring live video with respect to a monitoring criterion). EX1002-Decl., ¶¶277-81.

s. Claims 5[e]/6[e]/8[e]/9[e]

Garcia/Luo/Meier teach *using a wireless network, submitting the check for mobile check deposit in the bank after a frame of the live video of the check in the field of view of the camera is automatically captured. See §§X.A.2.i (submitting using wireless network), X.A.2.f-X.A.2.h (monitoring/automatically capturing live video).* EX1002-Decl., ¶¶282-85.

t. Claims 5[h]/6[h]/8[h]/9[h]

Garcia/Cohen teach *processing a digital image of the check including performing optical character recognition and verifying that the digital image of the check is acceptable for mobile check deposit, the digital image of the check being the captured video frame or being based on the captured video frame. See §§X.A.2.l (image processing), X.A.2.h (captured video frame).* EX1002-Decl., ¶¶286-89.

u. Claim 8[k]

Garcia/Luo/Meier/Cohen teach *wherein the downloaded app, when executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations comprising the monitoring, the determining, the providing, and the confirming. See §§X.A.2.b, X.A.2.r (downloaded app on*

mobile device), X.A.2.g (determining), X.A.2.c (providing instructions),⁸ X.A.2.h (providing feedback), X.A.2.j (confirming). EX1002-Decl., ¶¶290-93.

v. Claim 9[k]

Garcia/Cohen teaches *wherein the confirming step is performed before the submitting step and the user's mobile device receives an indication of a result of the processing the digital image of the check before the confirming step. See §§X.A.2.j (confirming before submitting), X.A.2.l (indication before confirming). EX1002-Decl., ¶¶294-97.*

w. Claims 14[a]/15[a]

Garcia/Meier/Cohen teach *receiving an image of a check, wherein the image of the check is provided for mobile check deposit in a bank by a mobile device of a user, the user's mobile device including a camera and a memory storing a software abstraction layer and a downloaded app, the downloaded app associated with the bank to control check deposit by controlling the camera through the software abstraction layer, and the downloaded app, when executed by the user's*

⁸ The antecedent basis for the term “the providing” is unclear as “providing” appears in both limitations 8[b] and 8[g]. The prior art discloses this limitation under either interpretation.

mobile device, being configured to cause the user's mobile device to perform operations comprising. See §§X.A.2.b (downloaded app for controlling camera), X.A.2.i (transmitting a digital image of the check for mobile check deposit in a bank), X.A.2.k (receiving the digital image). EX1002-Decl., ¶¶298-301.

x. Claims 14[i]/15[i]

Garcia/Cohen teach performing image processing operations on the image of the check, the image processing operations including performing optical character recognition and verifying that the image of the check is acceptable for mobile check deposit, wherein the image of the check is the digital image transmitted by the user's mobile device or is based on the digital image transmitted by the user's mobile device. See §§X.A.2.i (transmitting image), X.A.2.l (image processing). EX1002-Decl., ¶¶302-305.

3. Dependent Claims 3/12/16

Garcia/Luo/Cohen render obvious wherein the plurality of monitoring criteria includes a criterion based on magnetic ink character recognition (MICR) line detection (claims 3, 16) and wherein the plurality of monitoring criteria being based on magnetic ink character recognition (MICR) line detection and one or both of corner detection and edge detection (claim 12). As discussed in Sections X.A.1.a, X.A.2.f, and X.A.2.q, the Garcia/Luo combination renders obvious using various monitoring criteria to determine when to automatically capture an image of

a check to increase the readability of the resulting image, including using corner and edge detection. Cohen further teaches that when depositing a check using its image, a readable **MICR line** is “required” data. EX1006-Cohen, [0075], [0079]. As discussed in Section X.A.2.j, Cohen thus teaches reading the **MICR**, calculating an accuracy confidence level, and presenting the check image and read/calculated information to a user for confirmation that there are no errors and before submitting the check. *See* EX1006-Cohen, [0022], [0043]-[0044], [0077]-[0088], [0093]. A user must rescan images that have insufficient quality. *Id.*, [0042], [0072]. EX1002-Decl., ¶¶306-10.

In light of these teachings, a POSITA would have found it obvious to use **MICR line** detection as an additional monitoring criterion. A POSITA would have recognized that the **MICR line** is crucial data for deposit, and that a check image without it would have been unusable. Therefore, once Luo’s monitoring criteria are satisfied, a POSITA would have been motivated to further confirm that the **MICR line** can be detected before capturing the image. EX1002-Decl., ¶¶309-311. Doing so before further reading the rest of the text on the image, submitting the image, and processing the image at a remote bank server would have provided the same benefits as Luo’s other monitoring criteria—for example reducing bandwidth usage and transmission delays. EX1004-Luo, 6-7. A POSITA would have recognized that waiting to capture the image until the **MICR** is detected

would improve a user's experience by avoiding the need to retake the image after it is later determined the **MICR line** cannot be read. EX1002-Decl., ¶¶309-11.

A POSITA would have also had a reasonable expectation of success adding **MICR** detection as a monitoring criterion. Luo already teaches techniques that increase the readability of the captured image (EX1004-Luo, 1, 5, 7, Fig.4), so a POSITA would have expected that the **MICR** could be detected once Luo's criteria are satisfied. As discussed in Section X.B, other references like Yoon teach using additional monitoring criteria, which would lead a POSITA to expect that combining multiple criteria would be successful. Indeed, it was already known to *automatically* capture an image after an important element—for example OCREd text, a barcode, a human face/smile, movement, and/or another device's screen—was successfully detected. EX1050-Pilu, [0050] (OCRed text); EX1043-Attia, 6:19-27, 4:13-18 (barcode); EX1051-Jeong, [0036] (human face); EX1052-VX-11000, 5 (smile); EX1053-Landschaft, [0014] (movement); EX1054-Gejdos, [0022] (screen). And by 2007, live text tracking for **cameras**-based imaging **devices** was already available. EX1055-Merino. 10-11, 13-17. Thus, adding **MICR line** detection would have simply been the application of other known autocapture techniques to the field of check deposit. EX1002-Decl., ¶¶310-15.

Adding **MICR** detection as a monitoring criterion would have simply involved writing code to identify the **MICR** in the image—as taught by Garcia and

Cohen—before capturing the image. Performing **MICR** detection in real time would have been within the capabilities of existing devices. Indeed, by 2008 it was already known to analyze live images by performing OCR, detecting a barcode, to recognize gestures, and to produce image-based augmented reality all on a **mobile device**. EX1050-Pilu, [0050]; EX1043-Attia, 4:13-18, 6:19-27; EX1056-Haro, 2, 4; EX1057-Handel, 8:62-9:14. The '310 patent itself recognizes that “[a]ny known **MICR line** detection technique(s) may be used by the **camera** 207, the **mobile device** 106, and/or the **financial institution**,” EX1001-USP310, 8:59-62, which confirms that **MICR line** detection techniques were known and within the level of ordinary skill. *Uber*, 957 F.3d at 1339. EX1002-Decl., ¶¶314-15.

B. Ground II: Claims 4/7/13 are Obvious Over Garcia with Luo, Meier, Cohen, and Yoon

Garcia/Luo/Yoon render obvious *[t]he method of claim 2, wherein the plurality of monitoring criteria includes criteria based on light brightness, skewing, and warping*. EX1002-Decl., ¶¶316-17.

As discussed in Section X.A.2.q, Luo teaches numerous monitoring criteria, including *skewing* and *warping*. EX1004-Luo, 1, 4-6; EX1007-Yoon, [0022], [0023]. Luo further teaches that an image requires light to propagate through the **camera** lens (EX1004-Luo, 4), which would have lead a POSITA to other

references that teach evaluating brightness as a monitoring criterion. EX1002-Decl., ¶318.

Yoon specifically identifies image brightness as one factor that can limit readability of an imaged small rectangular **document**, such as a business card. EX1007-Yoon, [0007]. To address this problem, Yoon teaches a portable terminal (shown in Figure 1) that uses image brightness as a monitoring criterion to determine when an image can be automatically captured. For example, Yoon's technique "converts the brightness of an image received from the **camera** sensor into measurable brightness data,...checks a brightness environment under which the business card is to be photographed, and controls whether to perform automatic photographing on the business card." EX1007-Yoon, [0019]-[0020]. Yoon further teaches "comparing the brightness data with a reference brightness value for recognizing the business card." *Id.*, [0025]. Yoon further teaches providing feedback if the image brightness is not satisfactory, rather than capturing an image. *Id.*, [0026]. Thus, Yoon's controller uses the "brightness data" as a monitoring criterion and determines whether to capture an image based on this criterion, among others. *Id.* Fig.2. EX1002-Decl., ¶319.

A POSITA would have found it obvious to combine Garcia/Luo/Meier and Yoon to incorporate Yoon's teaching to use brightness as an additional monitoring criterion. **First**, like Garcia/Luo/Meier, Yoon is analogous art to the Challenged

Claims because it is in the same field as the Challenged Claims—capturing and processing **document** images. EX1007-Yoon, Abstract, [0003], [0006]-[0007], [0032], Fig.2. EX1002-Decl., ¶¶320-21.

Second, a POSITA would have been motivated to implement Yoon’s brightness monitoring criteria in Garcia’s mobile check deposit method for the same reasons discussed in Section X.A.1.a with respect to Luo’s monitoring criteria and autocapture approach. For example, like Luo, Yoon teaches that using brightness as a criterion before capturing an image increases the readability of a captured **document** (EX1007-Yoon, [0006], [0019], [0025]-[0026], [0032], Fig.2), which a POSITA would have understood would be directly applicable to Garcia’s mobile check deposit method, and would have further improved the images captured using Yoon’s method. EX1002-Decl., ¶322.

Implementing Garcia’s mobile check deposit method using Yoon’s additional brightness-based monitoring criteria would have amounted to applying a known technique/method (*e.g.*, Yoon’s brightness monitoring techniques) to a known device/method (*e.g.*, Garcia’s **mobile device** equipped with a **camera** for capturing a check image) ready for improvement (*e.g.*, to improve OCR of Garcia’s images) to yield predictable results (*e.g.*, a better check image). *KSR*, 550 U.S., 417 (2007). EX1002-Decl., ¶323.

Third, a POSITA would have reasonably expected success in implementing the Garcia/Luo/Yoon combination. Like Garcia and Luo, Yoon is directed to **mobile devices** with **cameras** and image capture software (EX1007-Yoon, Abstract, [0019], [0032], claim 1), which suggests the teaching from one reference would have been applicable to the others. Moreover, Garcia/Luo/Yoon teach capturing images of the same subject—a small paper **document** with text, like a business card or check. EX1003-Garcia, 12:4-7; EX1004-Luo, 1, 6. *Id.*, 4; EX1007-Yoon, Abstract, [0018]-[0019]. And as discussed in Section X.A.1.a, Garcia assumes a POSITA could implement image capture details like those in Luo/Yoon using simple computer code. EX1007-Yoon, [0031] (discussing “computer readable code”). Moreover, a POSITA would have expected Luo/Yoon’s monitoring criteria to work together to further improve image capture, since Yoon itself discloses using **reference lines** like Luo’s as an additional monitoring criterion. EX1007-Yoon, [0019], [0022], [0024]-[0030], Fig. 2. EX1002-Decl., ¶¶324-28.

Finally, the Board has already found obvious the combination of a similar mobile check deposit reference like Garcia with Luo’s *and* Yoon’s image capture techniques to be obvious. EX1009-571-FWD, 73-74. The Garcia/Luo/Yoon combination would have been obvious for the same reasons.

C. Ground III: Claims 1-3, 5-6, 8-12, 14-16 are Obvious Over Garcia with Luo/Goyal/Cohen

1. Garcia in view of Luo/Goyal/Cohen

As discussed in Section X.A, Garcia/Luo/Meier/Cohen render claims 1-3, 5, 6, 8-12, 14-16 obvious. For similar reasons, the Garcia/Luo/Goyal/Cohen combination renders claims 1-3, 5-6, 8-12, 14-16 obvious. EX1002-Decl., ¶¶329-32.

a. Garcia in view of Luo and Goyal

First, like Garcia/Luo, Goyal is analogous art to the Challenged Claims because it is in the same field as the Challenged Claims—capturing and processing **document** images. EX1008-Goyal, 1, 127 (disclosing software toolkit that access the **mobile device camera** for “captur[ing] snapshots or full videos,” which could be of a **document**). EX1002-Decl., ¶333.

Second, a POSITA would have been motivated to implement Goyal’s downloaded application and APIs for controlling **mobile device cameras** in Garcia’s mobile check deposit method and Luo’s monitoring criteria and autocapture approach for the same reasons discussed in Section X.A.1.a with respect to Meier. Like Meier, Goyal teaches a downloaded application and APIs for controlling **mobile device cameras**, which a POSITA would have understood that these would be the software components needed to implement Garcia’s mobile check deposit method/Luo’s images capturing method. Accordingly, a POSITA

would have been motivated to apply teachings from the prior art like Goyal to fill in implementation details in the Garcia/Luo combination. EX1002-Decl., ¶334.

Goyal fills in those implementation details with well-known and readily available software components. Goyal is a guide to building applications and teaches developers how to “take full advantage of the [mobile] device’s features” including the device camera. EX1008-Goyal, 127. Goyal explains that mobile applications can be downloaded onto the device and that such applications can “capture snapshots or full videos.” *Id.*, 1, 66-67, 127. To that end, Goyal teaches when the MMAPI is implemented on a device, the developers are “in full control of the [device’s] capabilities that it wants enabled and can do so with a single API interface” such as the camera. *Id.*, 127; *see also id.*, 12, 128-30, 174-79 (summarizing “MMAPIs”). Indeed, Goyal refers to video APIs as MMAPI’s “biggest advantage.” *Id.*, 127. EX1002-Decl., ¶¶335-36.

A POSITA would have been motivated to implement the Garcia/Luo combination with Goyal’s downloadable application and Camera APIs. By the mid-2000s, mobile applications were becoming increasingly popular, including those that accessed camera functionality. *See, supra*, §§V.C, V.D; EX1008-Goyal, 1, 3, 6, 127, 174, back cover. As detailed in Section X.A.1.a, downloaded applications provide numerous benefits. downloaded applications also facilitate access to device features like the camera without writing mobile device software

from the ground up. EX1008-Goyal, 1, 66, 127, 174-79. Downloaded applications with APIs for controlling image capture were already used for desktop check deposit (EX1036-Westerman; EX1037-EasCorp; EX1038-eServices), so a POSITA would have been motivated to use the equivalent architecture for **mobile devices**. *See generally* EX1039-Hariharan. Indeed, Java ME was the mobile equivalent to the well-known Java environment for downloaded desktop applications. EX1002-Decl., ¶¶337-40.

A POSITA would have been motivated to look to guides like Goyal to implement the teachings of Garcia and Luo on a mobile platform, like Java ME. In the Garcia/Luo/Goyal combination, Goyal's downloadable application and Camera API would include the software required for Garcia's/Luo's teachings. For example, the downloaded application would facilitate Luo's **preview window** and image capture using the Camera API that provides third-party mobile applications access to video preview from a **device camera** (e.g., using the Canvas feature on devices like Motorola C975 or BenQ M75) and the ability to capture a picture from that video feed (e.g., using `getSnapshot()`). EX1004-Luo, Abstract, 5-7, claims 5, 11, 13, Fig. 6; EX1008-Goyal, 174; *see also id.*, 13-14, 66, 175-79, 191. Moreover, Goyal provides numerous other implementation details, such as how to initialize the **camera** and control its settings. *See, e.g.*, EX1008-Goyal, 1, 13-14, 174-79, 253. EX1002-Decl., ¶341.

Implementing Garcia's/Luo's software using Goyal's teaching of a downloaded application and API would have amounted to applying a known technique/method (*e.g.*, Goyal's well-known software architecture) to a known device/method (*e.g.*, Garcia/Luo's mobile check capture and processing software) ready for improvement (*e.g.*, facilitating Garcia/Luo's functionality without requiring repeated downloads and writing **camera** control software) to yield predictable results (*e.g.*, capturing/processing a check image with a **mobile device**). *KSR*, 550 U.S., 416. EX1002-Decl., ¶342.

Third, the similarity between the references and the teachings therein would have led a POSITA to reasonably expect success in implementing the Garcia/Luo combination with Goyal's software architecture. All three are directed to **mobile devices** with **cameras** and image capture software (EX1003-Garcia, 1:7-13, 11:1-6; EX1004-Luo, 6; EX1008-Goyal, 1, 127, 174), which suggests the teaching from one reference would have been applicable to the others. EX1002-Decl., ¶343.

Regarding the references themselves, Garcia teaches a "computer application" in a **mobile device** that engages in an interactive session with a **financial institution** for a check deposit without expressing difficulties implementing such features. EX1003-Garcia, 9:19-10:18. Thus, Garcia assumes that implementing known details like Luo's image capture process or Goyal's software architecture would have been well within the level of skill of a POSITA,

and could have been accomplished using computer code. EX1004-Luo, 1, 3, 7, 8; EX1008-Goyal, 1, 127, 174. Other contemporaneous evidence confirms that controlling a **mobile device camera** using an API was known and “trivial.” EX1040-CodeGuru, 1 (stating “[a] number of Windows Mobile 5.0 APIs (for example, SHCameraCapture) make it trivial for a mobile application developer to access a **camera**”).⁹ Moreover, Goyal teaches that embedding video in an application is “the biggest advantage that MMAPI brings” and MMAPI is “a single, simple yet powerful medium” that “provides the means [to] using your **device**.” EX1008-Goyal, 127. Accordingly, it would have been obvious for a POSITA to combine the teachings of Garcia with Luo and Goyal to incorporate into Garcia Luo’s and Goyal’s teachings regarding monitoring, monitoring criterion, capturing the image when the image passes the monitoring criterion, feedback to a user, and a software application for download to Garcia’s mobile check deposit method that incorporates a **camera**. EX1002-Decl., ¶¶344-45.

⁹ The ’310 patent similarly assumes a POSITA would understand how to implement the claimed image capture process and software architecture. *See, supra*, n. 4.

Finally, the Board has already found obvious the combination of a similar mobile check deposit reference like Garcia with Luo's image capture techniques to be obvious (EX1009-571-FWD, 23-72), and the combination of Garcia with another prior art disclosure regarding downloaded applications similar to Goyal (EX1010-598-FWD, 20-25). The Garcia/Luo/Goyal combination would have been obvious for the same reasons.

b. Garcia in view of Cohen

As discussed above, a POSITA would have been motivated to combine the teachings of Garcia with Cohen's teachings regarding performing OCR, reading the **MICR line**, confirmation/verification steps, and image processing location to achieve the claimed invention for the reasons explained in Section X.A.1.b.

EX1002-Decl., ¶346.

2. Claims 1-3, 5, 6, 8-12, 14-16

a. Goyal Renders Obvious a Downloaded Applications (limitations

1[a]/1[c]/1[k]/1[m]/2[a]/2[c]/2[k]/5[a]/5[c]/6[a]/6[c]/8[a]/8[c]/8[k]/9[a]/9[c]/10[a]/10[c]/10[j]/11[a]/11[c]/14[a]/14[c]/14[k]/15[a]/and 15[c])

As discussed in Sections X.A.2.b, X.A.2.d, X.A.2.l, X.A.2.n, X.A.2.r, X.A.2.u, and X.A.2.w, Goyal renders obvious the use of a downloaded application. Goyal renders these limitations obvious for similar reasons. EX1002-Decl., ¶347.

As discussed in Section X.A.2.b, Garcia discloses a **mobile device** with a **camera** that takes image of a check using a “computer application.” EX1003-Garcia, 9:19-10:18. Goyal discloses a downloadable application like that described in Garcia that can implement the capturing of an image of a check from a **mobile device**. EX1008-Goyal, 1, 66, 127. EX1002-Decl., ¶348.

First, Goyal teaches that developers can write Java-based mobile applications called “MIDlets” that can access a **device camera** and which a POSITA would have found obvious to download. EX1008-Goyal, 1, 3-4, 66-67, 127, 174-79. Downloaded applications were well known, *see, supra*, §V.D., and by 2004 skilled artisans were already downloading Java API-based software applications. EX1058-Series60; EX1059-Topley, 75-76. When faced with the choice of whether the software is preinstalled on the **mobile device** or downloaded from the web, a POSITA would have understood that downloading an application is beneficial because it allows users to choose which applications they want on their **device**, allows third parties to deploy applications outside of a manufacturer’s software update, prevents the **mobile device** from being overloaded with unnecessary software, and is easier than plugging the **mobile device** into another computer or storage medium to obtain new software. EX1002-Decl., ¶¶349-50.

Second, Goyal discloses deploying mobile applications (MIDlets) using OTA (EX1008-Goyal, 66-67), which a POSITA would have understood to disclose

downloading applications. *See, e.g.*, EX1059-Topley, 75 (“[OTA] is the most common way in which MIDlets are downloaded to **cell phones** and similar **wireless devices**”). Moreover, for the reasons described above, a POSITA would have found it obvious to use this well-known and common way for installing an application on a **mobile device**. *See, supra*, §X.C.1.a. EX1002-Decl., ¶¶351-52.

In the Garcia/Goyal combination, the application would be *provid[ed]* by and *associated with a bank* for the same reasons discussed in Sections X.A.2.b, X.A.2.r. *Id.*; *see also* EX1003-Garcia, 4:1-8. EX1002-Decl., ¶352.

b. Goyal Renders Obvious a Software Abstraction Layer that Controls a Device Camera (limitations 1[a]/1[c]/2[a]/2[c]/5[c]/6[c]/8[c]/9[c]/10[a]/10[c]/11[a]/11[c]/14[a]/14[c]/15[a], 15[c])

As discussed in Sections X.A.2.b, X.A.2.d, X.A.2.w, Meier renders obvious the use of a software abstraction layer to control a **mobile device camera**. Goyal renders these limitations obvious for similar reasons. EX1002-Decl., ¶353.

Goyal further teaches that a downloadable application can use an API (*software abstraction layer*) of the **mobile device** “to hook into a **device camera**,” for example to “capture snapshots or full videos.” EX1008-Goyal, 127, 174; *see also id.*, 1, 66, 130, 173, 179, 191. Goyal teaches that developers can use the Canvas and CaptureVideoCanvas APIs “to display the video through the viewfinder to the user.” EX1008-Goyal, 174. Goyal discloses another API

(getSnapshot) that can capture a snapshot from the displayed video. *Id.*, 174, 178, 191. Therefore, Goyal’s APIs and associated software, *when executed, cause[s] the user’s mobile device to perform operations*, such as control “the exposure, the flash, focus, zoom, and burst shooting of snapshots” and “shutter control, camera rotation....” EX1008-Goyal, 253. In combination with Garcia/Luo/Cohen, the software would perform additional operations. §§X.C.2.a-X.C.2.b; §X.C.1. EX1002-Decl., ¶¶354-56.

In the combination with Goyal, the image capture and processing steps described below with reference to limitations 1[b]-1[i] would have been performed by the downloaded application. EX1002-Decl., ¶357.

**c. Goyal Renders Obvious Live Video Frames
(limitations 1[pre]/1[c]-1[h]/1[n]/1[o]/2[pre]/2[c]-
2[h]/5[pre]/5[a]/5[c]-5[h]/5[k]/5[l]/6[pre]/6[a]/6[c]-
6[h]/8[pre]/8[a]/8[c]-8[h]/9[pre]/9[a]/9[c]-
9[h]/10[pre]/10[c]-10[g]/10[k]/10[l]/11[pre]/11[c]-
11[g]/14[pre]/14[c]-14[g]/14[l]/14[m]/15[pre]/15[c]-
15[g])**

As discussed in Sections X.A.2.a, X.A.2.d-X.A.2.i, X.A.2.o, X.A.2.p, X.A.2.r-X.A.2.t, Meier renders obvious live video frames. Goyal renders these limitations obvious for similar reasons. EX1002-Decl., ¶358.

As discussed in Section X.C.2.b, Goyal discloses “previewing video” before capturing an image. EX1008-Goyal, 174; *see also id.*, 13-14, 66, 175-79, 191. A

POSITA would have understood “viewfinder” to display live video. Because the Camera API (*software abstraction layer*) controls access to the **camera** hardware to control image preview and capture, the downloaded application in the Garcia/Luo/Goyal combination would *caus[e] the live video to be generated by controlling the camera through the software abstraction layer (e.g., API)*. See EX1008-Goyal, 174-78; *supra* §X.C.2.b. EX1002-Decl., ¶¶359-60.

As also discussed in Section X.C.2.b, Goyal further teaches that an API of a **mobile device** can “provide means to capture snapshots or full videos.” EX1008-Goyal, 127; *see also id.*, 1, 130, 173, 179. For example, Goyal teaches capturing an image/frame from the video displayed on a viewfinder. EX1008-Goyal, 174 (“[T]he `getSnapshot()` method is a method of the `VideoControl` class, you can take an image of any video that is playing on a **device** screen, not just captured video.”). EX1002-Decl., ¶¶360-61.

Goyal therefore teaches or renders obvious the additional limitations in the Challenged claims that require the use of live video frames for similar reasons that Meier teaches or renders obvious such limitations. EX1002-Decl., ¶362.

d. Additional Limitations

A POSITA would have found the remaining limitations in claims 1-3, 5-6, 8-12, 14-16 obvious in view of Garcia/Luo/Goyal/Cohen for the same reasons

discussed in Sections X.A.2.c, X.A.2.j, X.A.2.k, X.A.2.m, X.A.2.q, X.A.2.v, X.A.2.x, and X.A.3. EX1002-Decl., ¶363.

D. Ground IV: Claims 4/7/13 are Obvious Over Garcia in Combination with Luo, Goyal, Cohen, and Yoon

As discussed in Section X.B, Garcia/Luo/Meier/Cohen/Yoon render claims 4, 7, and 13 obvious. For similar reasons, the Garcia/Luo/Goyal/Cohen/Yoon combination renders claims 4, 7, and 13 obvious. EX1002-Decl., ¶364.

XI. Conclusion

Petitioner respectfully request institution of an *inter partes* review to cancel claims 1-16 of the '310 patent.

Respectfully submitted,

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Counsel for Petitioner

CERTIFICATE OF COMPLIANCE

I hereby certify that the foregoing, Petition for *Inter Partes* Review, contains 13,864 words as measured by the word processing software used to prepare the document, in compliance with 37 C.F.R. Section 42.24(d), excluding the parts of the Petition exempted from the word count by 37 C.F.R. Section 42.24(a)(1).

/Alexander J. Nemtzow/
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CERTIFICATE OF SERVICE

I hereby certify that on July 30, 2025, I caused a true and correct copy of the foregoing materials:

- Petition for Inter Partes Review of U.S. Patent No. 12,159,310
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LISTING OF CLAIMS

Claim 1	
Limitation	Claim Language
1[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
1[a]	providing an app for download to a mobile device of a user, the user's mobile device including a camera and a memory storing a software abstraction layer for controlling the camera, the app associated with a bank to control check deposit by controlling the camera through the software abstraction layer, wherein the app, when downloaded to the user's mobile device and executed by the user's mobile device, is configured to cause the user's mobile device to perform operations comprising:
1[b]	providing instructions to the user for capturing an image of a check;
1[c]	generating a live video of the check in a field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera through the software abstraction layer;

1[d]	overlaying an alignment guide on the live video of the check in the field of view of the camera;
1[e]	monitoring the live video of the check in the field of view of the camera with respect to at least one monitoring criterion;
1[f]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
1[g]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;
1[h]	using a wireless network, transmitting a digital image of the check from the user's mobile device and submitting the check for mobile check deposit in the bank after automatically capturing the video frame, wherein the digital image is the captured video frame or is based on the captured video frame; and
1[i]	before the submitting, confirming that the mobile check deposit can go forward after optical character recognition is performed on the check in the digital image, a magnetic ink character

	recognition (MICR) line on the check in the digital image is recognized, and an amount payable on the check in the digital image is validated;
1[j]	receiving the digital image of the check transmitted by the user's mobile device;
1[k]	processing the digital image of the check including performing optical character recognition on the check in the digital image and verifying that the digital image of the check is acceptable for mobile check deposit, wherein the app, when downloaded and executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations including receiving an indication of a result of the processing before confirming that the mobile check deposit can go forward; and
1[l]	updating, by a computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the submitting the check for mobile check deposit in the bank, the confirming that the mobile check deposit

	can go forward, and the verifying that the digital image of the check is acceptable for mobile check deposit,
1[m]	wherein the app, when downloaded and executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations comprising:
1[n]	before determining that the video frame of the live video of the check satisfies the at least one monitoring criterion, determining that a different video frame of the live video of the check does not satisfy the at least one monitoring criterion; and
1[o]	after determining that the different video frame of the live video of the check does not satisfy the at least one monitoring criterion, providing feedback to the user.

Claim 2	
Limitation	Claim Language
2[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
2[a]	providing an app for download to a mobile device of a user, the user's mobile device including a camera and a memory storing a

	software abstraction layer for controlling the camera, the app associated with a bank to control check deposit by controlling the camera through the software abstraction layer, wherein the app, when downloaded to the user's mobile device and executed by the user's mobile device, is configured to cause the user's mobile device to perform operations comprising:
2[b]	providing instructions to the user for capturing an image of a check;
2[c]	generating a live video of the check in a field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera through the software abstraction layer;
2[d]	overlaying an alignment guide on the live video of the check in the field of view of the camera;
2[e]	monitoring the live video of the check in the field of view of the camera with respect to at least one monitoring criterion;
2[f]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;

2[g]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;
2[h]	using a wireless network, transmitting a digital image of the check from the user's mobile device and submitting the check for mobile check deposit in the bank after automatically capturing the video frame, wherein the digital image is the captured video frame or is based on the captured video frame; and
2[i]	before the submitting, confirming that the mobile check deposit can go forward after optical character recognition is performed on the check in the digital image, a magnetic ink character recognition (MICR) line on the check in the digital image is recognized, and an amount payable on the check in the digital image is validated;
2[j]	receiving the digital image of the check transmitted by the user's mobile device;
2[k]	processing the digital image of the check including performing optical character recognition on the check in the digital image and

	verifying that the digital image of the check is acceptable for mobile check deposit, wherein the app, when downloaded and executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations including receiving an indication of a result of the processing before confirming that the mobile check deposit can go forward; and
2[l]	updating, by a computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the submitting the check for mobile check deposit in the bank, the confirming that the mobile check deposit can go forward, and the verifying that the digital image of the check is acceptable for mobile check deposit,
2[m]	wherein the at least one monitoring criterion is a plurality of monitoring criteria based on two or more selected from a group consisting of light contrast, light brightness, check positioning, check dimensions, character spacing, skewing, warping, corner detection, edge detection, and magnetic ink character recognition (MICR) line detection.

Claim 3

The method of claim 2, wherein the plurality of monitoring criteria includes a criterion based on magnetic ink character recognition (MICR) line detection.

Claim 4

The method of claim 2, wherein the plurality of monitoring criteria includes criteria based on light brightness, skewing, and warping.

Claim 5

Limitation	Claim Language
5[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
5[a]	monitoring a live video of a check in a field of view of a camera with respect to at least one monitoring criterion, wherein the live video is generated by a mobile device of a user, the user's mobile device including the camera and a downloaded app, the downloaded app associated with a bank to control check deposit by controlling the camera, the downloaded app, when executed by

	the user's mobile device, being configured to cause the user's mobile device to perform operations comprising:
5[b]	providing instructions to the user for capturing an image of the check;
5[c]	generating the live video of the check in the field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera;
5[d]	overlaying an alignment guide on the live video of the check in the field of view of the camera; and
5[e]	using a wireless network, submitting the check for mobile check deposit in the bank after a frame of the live video of the check in the field of view of the camera is automatically captured;
5[f]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
5[g]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;

5[h]	processing a digital image of the check including performing optical character recognition and verifying that the digital image of the check is acceptable for mobile check deposit, the digital image of the check being the captured video frame or being based on the captured video frame;
5[i]	confirming that the mobile check deposit can go forward after optical character recognition is performed on the check in the digital image, a magnetic ink character recognition (MICR) line on the check in the digital image is recognized, and an amount payable on the check in the digital image is validated;
5[j]	updating, by a bank computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the check is submitted for mobile check deposit in the bank, confirming that the mobile check deposit can go forward, and verifying that the digital image of the check is acceptable for mobile check deposit;
5[k]	before determining that the video frame of the live video of the check satisfies the at least one monitoring criterion, determining

	that a different video frame of the live video of the check does not satisfy the at least one monitoring criterion; and
5[l]	after determining that the different video frame of the live video of the check does not satisfy the at least one monitoring criterion, providing feedback to the user.

Claim 6	
Limitation	Claim Language
6[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
6[a]	monitoring a live video of a check in a field of view of a camera with respect to at least one monitoring criterion, wherein the live video is generated by a mobile device of a user, the user's mobile device including the camera and a downloaded app, the downloaded app associated with a bank to control check deposit by controlling the camera, the downloaded app, when executed by the user's mobile device, being configured to cause the user's mobile device to perform operations comprising:

6[b]	providing instructions to the user for capturing an image of the check;
6[c]	generating the live video of the check in the field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera;
6[d]	overlaying an alignment guide on the live video of the check in the field of view of the camera; and
6[e]	using a wireless network, submitting the check for mobile check deposit in the bank after a frame of the live video of the check in the field of view of the camera is automatically captured;
6[f]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
6[g]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;
6[h]	processing a digital image of the check including performing optical character recognition and verifying that the digital image

	of the check is acceptable for mobile check deposit, the digital image of the check being the captured video frame or being based on the captured video frame;
6[i]	confirming that the mobile check deposit can go forward after optical character recognition is performed on the check in the digital image, a magnetic ink character recognition (MICR) line on the check in the digital image is recognized, and an amount payable on the check in the digital image is validated; and
6[j]	updating, by a bank computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the check is submitted for mobile check deposit in the bank, confirming that the mobile check deposit can go forward, and verifying that the digital image of the check is acceptable for mobile check deposit,
6[k]	wherein the at least one monitoring criterion is a plurality of monitoring criteria based on two or more selected from a group consisting of light contrast, light brightness, check positioning, check dimensions, character spacing, skewing, warping, corner

	detection, edge detection, and magnetic ink character recognition (MICR) line detection.
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Claim 7	
The method of claim 6, wherein the plurality of monitoring criteria includes criteria based on light brightness, skewing, and warping.	

Claim 8	
Limitation	Claim Language
8[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
8[a]	monitoring a live video of a check in a field of view of a camera with respect to at least one monitoring criterion, wherein the live video is generated by a mobile device of a user, the user's mobile device including the camera and a downloaded app, the downloaded app associated with a bank to control check deposit by controlling the camera, the downloaded app, when executed by

	the user's mobile device, being configured to cause the user's mobile device to perform operations comprising:
8[b]	providing instructions to the user for capturing an image of the check;
8[c]	generating the live video of the check in the field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera;
8[d]	overlaying an alignment guide on the live video of the check in the field of view of the camera; and
8[e]	using a wireless network, submitting the check for mobile check deposit in the bank after a frame of the live video of the check in the field of view of the camera is automatically captured;
8[f]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
8[g]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;

8[h]	processing a digital image of the check including performing optical character recognition and verifying that the digital image of the check is acceptable for mobile check deposit, the digital image of the check being the captured video frame or being based on the captured video frame;
8[i]	confirming that the mobile check deposit can go forward after optical character recognition is performed on the check in the digital image, a magnetic ink character recognition (MICR) line on the check in the digital image is recognized, and an amount payable on the check in the digital image is validated; and
8[j]	updating, by a bank computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the check is submitted for mobile check deposit in the bank, confirming that the mobile check deposit can go forward, and verifying that the digital image of the check is acceptable for mobile check deposit,
8[k]	wherein the downloaded app, when executed by the user's mobile device, is configured to cause the user's mobile device to perform

	additional operations comprising the monitoring, the determining, the providing, and the confirming.
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Claim 9	
Limitation	Claim Language
9[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
9[a]	monitoring a live video of a check in a field of view of a camera with respect to at least one monitoring criterion, wherein the live video is generated by a mobile device of a user, the user's mobile device including the camera and a downloaded app, the downloaded app associated with a bank to control check deposit by controlling the camera, the downloaded app, when executed by the user's mobile device, being configured to cause the user's mobile device to perform operations comprising:
9[b]	providing instructions to the user for capturing an image of the check;

9[c]	generating the live video of the check in the field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera;
9[d]	overlaying an alignment guide on the live video of the check in the field of view of the camera; and
9[e]	using a wireless network, submitting the check for mobile check deposit in the bank after a frame of the live video of the check in the field of view of the camera is automatically captured;
9[f]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
9[g]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;
9[h]	processing a digital image of the check including performing optical character recognition and verifying that the digital image of the check is acceptable for mobile check deposit, the digital

	image of the check being the captured video frame or being based on the captured video frame;
9[i]	confirming that the mobile check deposit can go forward after optical character recognition is performed on the check in the digital image, a magnetic ink character recognition (MICR) line on the check in the digital image is recognized, and an amount payable on the check in the digital image is validated; and
9[j]	updating, by a bank computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the check is submitted for mobile check deposit in the bank, confirming that the mobile check deposit can go forward, and verifying that the digital image of the check is acceptable for mobile check deposit,
9[k]	wherein the confirming step is performed before the submitting step and the user's mobile device receives an indication of a result of the processing the digital image of the check before the confirming step.

Claim 10	
Limitation	Claim Language
10[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
10[a]	providing an app for download to a mobile device of a user, the user's mobile device including a camera and a memory storing a software abstraction layer, the app associated with a bank to control check deposit by controlling the camera through the software abstraction layer, wherein the app, when downloaded to the user's mobile device and executed by the user's mobile device, is configured to cause the user's mobile device to perform operations comprising:
10[b]	providing instructions to the user for capturing an image of a check;
10[c]	generating a live video of the check in a field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera through the software abstraction layer;

10[d]	monitoring the live video of the check in the field of view of the camera with respect to at least one monitoring criterion;
10[e]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and the automatically capturing the video frame;
10[f]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;
10[g]	using a wireless network, transmitting a digital image of the check from the user's mobile device and submitting the check for mobile check deposit in the bank after automatically capturing the video frame, wherein the digital image is the captured video frame or is based on the captured video frame; and
10[h]	before the submitting, confirming that the mobile check deposit can go forward after optical character recognition is performed on the check, a magnetic ink character recognition (MICR) line on the check is recognized, and an amount payable on the check is validated; and

10[i]	updating, by a computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the submitting the check for mobile check deposit and the confirming that the mobile check deposit can go forward,
10[j]	wherein the app, when downloaded and executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations comprising:
10[k]	before determining that the video frame of the live video of the check satisfies the at least one monitoring criterion, determining that a different video frame of the live video of the check does not satisfy the at least one monitoring criterion; and
10[l]	after determining that the different video frame of the live video of the check does not satisfy the at least one monitoring criterion, providing feedback to the user.

Claim 11	
Limitation	Claim Language

11[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
11[a]	providing an app for download to a mobile device of a user, the user's mobile device including a camera and a memory storing a software abstraction layer, the app associated with a bank to control check deposit by controlling the camera through the software abstraction layer, wherein the app, when downloaded to the user's mobile device and executed by the user's mobile device, is configured to cause the user's mobile device to perform operations comprising:
11[b]	providing instructions to the user for capturing an image of a check;
11[c]	generating a live video of the check in a field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera through the software abstraction layer;
11[d]	monitoring the live video of the check in the field of view of the camera with respect to at least one monitoring criterion;

11[e]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
11[f]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;
11[g]	using a wireless network, transmitting a digital image of the check from the user's mobile device and submitting the check for mobile check deposit in the bank after automatically capturing the video frame, wherein the digital image is the captured video frame or is based on the captured video frame; and
11[h]	before the submitting, confirming that the mobile check deposit can go forward after optical character recognition is performed on the check, a magnetic ink character recognition (MICR) line on the check is recognized, and an amount payable on the check is validated; and
11[i]	updating, by a computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated

	with the check submitted for mobile check deposit by the user's mobile device, after the submitting the check for mobile check deposit and the confirming that the mobile check deposit can go forward,
11[j]	wherein the at least one monitoring criterion is a plurality of monitoring criteria based on two or more selected from a group consisting of light contrast, light brightness, check positioning, check dimensions, character spacing, skewing, warping, corner detection, edge detection, and magnetic ink character recognition (MICR) line detection.

Claim 12

The method of claim 11, wherein the plurality of monitoring criteria being based on magnetic ink character recognition (MICR) line detection and one or both of corner detection and edge detection.

Claim 13

The method of claim 11, wherein the plurality of monitoring criteria includes criteria based on light brightness, skewing, and warping.

Claim 14	
Limitation	Claim Language
14[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
14[a]	receiving an image of a check, wherein the image of the check is provided for mobile check deposit in a bank by a mobile device of a user, the user's mobile device including a camera and a memory storing a software abstraction layer and a downloaded app, the downloaded app associated with the bank to control check deposit by controlling the camera through the software abstraction layer, and the downloaded app, when executed by the user's mobile device, being configured to cause the user's mobile device to perform operations comprising:
14[b]	providing instructions to the user for capturing the check;

14[c]	generating a live video of the check in a field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera through the software abstraction layer;
14[d]	monitoring the live video of the check in the field of view of the camera with respect to at least one monitoring criterion;
14[e]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
14[f]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one monitoring criterion, providing feedback advising the user that the check has been captured;
14[g]	using a wireless network, transmitting a digital image of the check from the user's mobile device and submitting the check for mobile check deposit in the bank after automatically capturing the video frame, wherein the digital image is the captured video frame or is based on the captured video frame; and

14[h]	before the submitting, confirming that the mobile check deposit can go forward after optical character recognition is performed on the check, a magnetic ink character recognition (MICR) line on the check is recognized, and an amount payable on the check is validated;
14[i]	performing image processing operations on the image of the check, the image processing operations including performing optical character recognition and verifying that the image of the check is acceptable for mobile check deposit, wherein the image of the check is the digital image transmitted by the user's mobile device or is based on the digital image transmitted by the user's mobile device; and
14[j]	updating, by a computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the submitting the check for mobile check deposit in the bank, the confirming that the mobile check deposit can go forward, and the verifying that the image of the check is acceptable for mobile check deposit,

14[k]	wherein the downloaded app, when executed by the user's mobile device, is configured to cause the user's mobile device to perform additional operations comprising:
14[l]	before determining that the video frame of the live video of the check satisfies the at least one monitoring criterion, determining that a different video frame of the live video of the check does not satisfy the at least one monitoring criterion; and
14[m]	after determining that the different video frame of the live video of the check does not satisfy the at least one monitoring criterion, providing feedback to the user.

Claim 15	
Limitation	Claim Language
15[pre]	A method enabling mobile check deposit auto-capture functionality via video frame processing, the method comprising:
15[a]	receiving an image of a check, wherein the image of the check is provided for mobile check deposit in a bank by a mobile device of a user, the user's mobile device including a camera

	and a memory storing a software abstraction layer and a downloaded app, the downloaded app associated with the bank to control check deposit by controlling the camera through the software abstraction layer, and the downloaded app, when executed by the user's mobile device, being configured to cause the user's mobile device to perform operations comprising:
15[b]	providing instructions to the user for capturing the check;
15[c]	generating a live video of the check in a field of view of the camera, the downloaded app causing the live video to be generated by controlling the camera through the software abstraction layer;
15[d]	monitoring the live video of the check in the field of view of the camera with respect to at least one monitoring criterion;
15[e]	determining that a video frame of the live video of the check satisfies the at least one monitoring criterion and then automatically capturing the video frame;
15[f]	when the video frame of the live video of the check in the field of view of the camera is determined to satisfy the at least one

	monitoring criterion, providing feedback advising the user that the check has been captured;
15[g]	using a wireless network, transmitting a digital image of the check from the user's mobile device and submitting the check for mobile check deposit in the bank after automatically capturing the video frame, wherein the digital image is the captured video frame or is based on the captured video frame; and
15[h]	before the submitting, confirming that the mobile check deposit can go forward after optical character recognition is performed on the check, a magnetic ink character recognition (MICR) line on the check is recognized, and an amount payable on the check is validated;
15[i]	performing image processing operations on the image of the check, the image processing operations including performing optical character recognition and verifying that the image of the check is acceptable for mobile check deposit, wherein the image of the check is the digital image transmitted by the user's

	mobile device or is based on the digital image transmitted by the user's mobile device; and
15[j]	updating, by a computer, a balance of an account at a financial institution of the user to reflect an amount of funds associated with the check submitted for mobile check deposit by the user's mobile device, after the submitting the check for mobile check deposit in the bank, the confirming that the mobile check deposit can go forward, and the verifying that the image of the check is acceptable for mobile check deposit,
15[k]	wherein the at least one monitoring criterion is a plurality of monitoring criteria based on two or more selected from a group consisting of light contrast, light brightness, check positioning, check dimensions, character spacing, skewing, warping, corner detection, edge detection, and magnetic ink character recognition (MICR) line detection.

Claim 16

The method of claim 15, wherein the plurality of monitoring criteria includes a criterion based on magnetic ink character recognition (MICR) line detection.

TABLE OF EXHIBITS

Exhibit Number	Description
1001	U.S. Patent No. 12,159,310 (“USP310”)
1002	Declaration of Dr. Daniel Lopresti (“Decl.”)
1003	International Patent Application Publication No. WO 2005/043857 and Declaration of Translation (“Garcia”)
1004	Chinese Patent Application Publication No. CN 1897644A and Declaration of Translation (“Luo”)
1005	Meier, Reto, Professional Android™ Application Development, June 25, 2008 (“Meier”)
1006	U.S. Patent Application Publication No. 2007/0194102 (“Cohen”)
1007	U.S. Patent Application Publication No. 2007/0262148 (“Yoon”)
1008	Goyal, Vikram, Pro Java ME MMAPi: Mobile Media API for Java Micro Edition, June 14, 2006 (“Goyal”)
1009	PTAB-IPR2021-01073 Final Written Decision (“571-FWD”)
1010	PTAB-IPR2022-00076 Final Written Decision (“598-FWD”)
1011	U.S. Patent No. 7,590,275 (“Clarke”)
1012	US Patent Publication No. 2006/0186194 (“Richardson”)
1013	“FDIC: Check Clearing for the 21st Century Act (Check 21),” FED. DEPOSIT INS. CORP., Apr. 25, 2016 (retrieved from https://web.archive.org/web/20161005124304/https://www.fdic.gov/consumers/assistance/protection/check21.html) (“FDIC”)
1014	EP Patent Publication No. 0984410 (“Slater”)
1015	Whitney et al., <i>Reserve Banks to Adopt DSTU X9.37-2003 Format for Check 21 Image Services</i> (May 18, 2004) (retrieved from https://web.archive.org/web/20040609221704/http://www.frbsecurities.org/Retail/pdf/PRFormatForCheck21ImageSvcs.pdf) (“DSTU”)
1016	Excerpts from Motomanual MotoRokr™ E6 GSM, 2006, https://motorola.manymanuals.com/mobile-phones/e6/user-manual-8407 (“MotoRokr-Manual”)
1017	U.S. Patent No. 8,768,836 (“Acharya”)
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1019	Parikh, Tapan S., <i>Using Mobile Phones for Secure, Distributed Document Processing in the Developing World</i> , 4 IEEE PERVASIVE COMPUTING 74 (2005) (“Parikh”)

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1021	Mitek Systems, “ImageNet Mobile Deposit,” presented at “FSTC’s 2008 Annual Conference” (June 2008), available at https://slideplayer.com/slide/9438811/ (“Mitek”)
1022	Bruene, Jim, <i>WV United Federal Credit Union is First with iPhone-based Remote Check Scan & Deposit</i> (July 12, 2009), available at https://finovate.com/wv_united_federal_credit_union_is_first_with_i_phone-based_remote_check_scan_deposit/ (“Bruene”)
1023	Edwards, Benj, <i>The Golden Age of PDAs</i> , PC MAG (Nov. 20, 2018), https://www.pcmag.com/news/the-golden-age-of-pdas (“Edwards”)
1024	Rajeswari, S., <i>An Overview of Handwriting Recognition Systems</i> , 12 MIDDLE-EAST J SCI. RSCH., 1861 (2012) (“Rajeswari”)
1025	Slocombe, Mike, <i>O2 Xda Exec Mobile PDA With 3G Launched</i> (Sept. 13, 2005), available at https://digital-lifestyles.info/2005/09/13/o2-xda-exec-mobile-pda-with-3g-launched/ (“Slocombe”)
1026	Press Release, <i>Apple Reinvents the Phone with iPhone</i> (Jan. 9, 2007), https://www.apple.com/newsroom/2007/01/09Apple-Reinvents-the-Phone-with-iPhone/ (“Apple”)
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1030	Aiello, Marco, “Introduction to Symbian OS” (2005), available at https://dsg.tuwien.ac.at/Teaching/Courses/symbian/SymbianOS.pdf (“Aiello”)

1031	Raento, Mika et al., <i>ContextPhone: A Prototyping Platform for Context-Aware Mobile Applications</i> , 4 IEEE PERVASIVE COMPUTING 51 (2005) (“Raento”)
1032	Patrick, Beau, Dylan Austin, & Charles O. Connor, <i>The Effect of Smartphone on the Society</i> , 4 IDOSR J. COMP. & APPLIED SCI, at 2 (2019) (“Patrick”)
1033	U.S. Patent No. 12,159,310 File History (“FH310”)
1034	Excerpts from Yuan, Michael Juntao & Kevin Sharp, <i>Developing Scalable Series 40 Applications: A Guide For Java Developers</i> (Dec. 2004) (“Yuan”)
1035	Siegemund, Frank, and Muhammad Haroon, <i>Using Digital Cameras for Text Input on Mobile Devices</i> , in Fifth Annual IEEE Int’l Conference on Pervasive Computing and Communications (PerCom’07) 1-8 (2007) doi: 10.1109/PERCOM.2007.38 (“Siegemund”)
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1037	EasCorp, “EasCorp News” (Nov. 13, 2007), available at https://web.archive.org/web/20071113205105/http://www.eascorp.org:80/ (“EasCorp”)
1038	EasCorp, “eServices” (May 16, 2008), available at https://web.archive.org/web/20080516093021/http://www.eascorp.org/prodserv/ProdEServ.aspx (“eServices”)
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1040	CodeGuru Staff, <i>Using a Camera with Windows Mobile 5</i> , codeguru.com, July 21, 2006, available at https://www.codeguru.com/multimedia/using-a-camera-with-windows-mobile-5/ (“CodeGuru”)
1041	PTAB-IPR2021-01077 Final Written Decision (“559-FWD”)
1042	USAA v. PNC Bank N.A., No. 23-2171 (Fed. Cir. Jan. 30, 2025) (nonprecedential) (“PNC”)
1043	U.S. Patent No. 7,156,311 (“Attia”)
1044	U.S. Patent No. 7,978,900 (“Nepomniachtchi”)

1045	Chinese Patent Application Publication No. CN 1967565A and Declaration of Translation (“Zhu”)
1046	U.S. Patent Application Publication No. 2010/0082444 (“Lin”)
1047	PTAB-IPR2022-00075 Final Written Decision (“136-FWD”)
1048	U.S. Patent Application Publication No. 2006/0106717 (“Randle”)
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