吸收除唤醒词 之外的无关语音，使用和训练音素模型同样的数据库，通过计算各音素模型之间的相似性， 将各音素分为20类，使用每类音素对应的所有训练数据融合起来，采用MLE准则训练对应 的Garbage模型，这样即得到20类Garbage模型。Garbage模型采用了聚类的音素训练数 据混合训练，有两种用途，在唤醒词检测网络中用来吸收除唤醒词之外的其他语音，在唤醒 词确认网络中用来计算确认网络的得分。

[0039] (2)声学特征提取4:通过语音输入1获取语音信号输入，提取可以具有一 定区分性的，并且是基于人耳听觉特性提取的特征，一般选取语音识别中用到的MFCC (Mel-Frequency Cepstrum Coeff icient，美尔频率倒谱系数）特征。

[0040] (3)唤醒词检测5 ：将提取得到的声学特征，使用声学模型8在唤醒词检测网络7 上计算声学得分，如果得分最优的路径中包含要检测的唤醒词，则检出唤醒词，进入下一步 操作；否则重新提取声学特征操作。为了保证唤醒词能够被正常的检出，同时无效的语音又 能被有效的吸收。唤醒检测网络的构建主要由用户选定的唤醒词和Garbage模型组成，如 2 CN 图3所示，这种网络在语音识别中也称为识别网络，由于唤醒检测网路结构非常简单，可以 通过简单的程序或则手工构建都可以。由于实际使用环境的复杂性，在很多情况下，接收到 的唤醒语音被噪声污染了，此时唤醒语音对应的声学的特征在音素声学模型上的得分就会 降低的很多，而由于Garbage模型是使用较多音素混合训练得到，其本身不是很精确，声学 特征在Garbage模型上的得分降低的幅度有限，此时唤醒语音就被Garbage模型误吸收，系 统唤醒率就会降低。

[0041] 为了防止上述情况的发生，在唤醒词检测网络上解码时，对Garbage所在的弧的 解码得分做一定的惩罚，即Penalty，使其不能和音素声学模型公平竞争，以保证有被噪声 污染的唤醒语音也能被正常检出。具体的惩罚幅度需要针对不同的唤醒词作经验性的调 m iF. o [0042] 唤醒词检测网络7的实现方法是采用最优得分路径计算得出。

[0043] 最优得分路径的获取采用经典的贝叶斯公式，如下所示： [0044] [0045] 上式中X代表从输入语音中提取的声学特征向量，W代表得分最大的最优词序列。

条件概率P (XIW)为声学模型得分，可以通过训练好的音素声学模型和废料模型计算得到， 先验概率P(W)为语言模型得分，这里可以理解为对不同的声学模型所加的Penalty。P(X) 为全概率，当声学模型和唤醒词检测网络确定下来后就是定值，因此公

phonemes phonemes identification;. [0019] b use to detect and wake-word the same features, to give the corresponding acoustic score, and accurate to the frame a (Scoreframel, Scoreframe2,..., Sc0reframeM), which features M for the total sentence length of time, in units of frames; [0020] c is calculated for each phoneme confirmation wake word score, calculated as follows: iend [. 0021] CMphonei = (Scoreplwnej - Scorefmmek) / (Kiend [0022] wherein Kistot and Kimd are the i-th phoneme start time and end time; [0023] CMphonei represents confirmation of the i-th phoneme score represents the subscript phonei the i-th phoneme, decoding Scorephonei as shown above the i-th Phone scoring, Scoreframek Claim word score represents the wake-up network of the k-th decoded frame;. [0024] d calculated final confirmation of the wake-up word score calculation Information is as follows:. 1 N [0025] CMword = -YjCMphonm iv j = i [0026] The operating system modules voice wake modules can be ported to be ported to Windows, Linux, 2 CN Android, IOS platform.

[0027] advantages of the present invention over the prior art in that: [0028] (1) The term of the present invention as a wakeup trigger sources via user-specific voice, even in a noisy environment, without requiring the user with both hands operation, only to quickly realize the wake-up function using a voice command, the next step interaction.

[0029] (2) is to bring value to the present invention, the use of the system can be agreed upon by saying the word turn voice voice wake wake-up function, without prior pause audio playback, verified by actual test, the rate of correct identification wake It can reach 90 percent.

[0030] (3) of the present invention is to realize, low cost, easy code migration, and has good application value.

[0031] (4) of the present invention, the voice wake-up function through the software algorithm, and the algorithm can easily be ported to Windows, Linux, Android, IOS and other platforms.

BRIEF DESCRIPTION [0032] FIG. 1 a schematic diagram of the structure of the present invention; [0033] FIG. 2 is a schematic of the voice wake module block diagram; 3 is to build word detection network diagram wake invention [0034] FIG;

式（1)可写为： [0046] W = aí.g max P{W)P(X \ W) C2) [0047] (4)唤醒词确认6 ：由于声学模型的本身存在不精确性以及实际使用环境的复杂 性,通过唤醒词检测环 节得到的唤醒词不一定是真实的唤醒词。为了能降低非唤醒带来的 误唤醒以及后面会导致的问题，需要对检测得到的唤醒词作进一步的确认。本发明采用图 4的方式构建唤醒词确认网络9，唤醒词确认网络和唤醒词检测网络一样，都属于语音识别 中的识别网络，确认网络中只包含Garbage模型，可以使用简单的程序或手工构建。

[0048] 唤醒词确认的主要步骤如下： [0049] a)将唤醒词检测得到唤醒词解码到音素一级，并记录其所有的得分 (Scorephonel, Scoreph0ne2,...，Sc0reph_N)，其中N为唤醒词中总的音素个数。

[0050] b)使用和唤醒词检测同样的特征，在唤醒词确认网络上得到相应的声学得分，并 精确到帧一级（Scoreftamel，Scoreframe2,...，SCore&ameM)，其中M为该句特征总的时长，以帧为 单位。

[0051] c)计算得到唤醒词每个音素的确认得分，计算方式如下： [0052] ^iend CMphouej 二 [Scorephomi - ^ Scorefmmek) / (Kiend - Kistart)(3) [0053] 其中Kistot和Kimd分别为第i个音素的起始时间和结束时间。

[0054] d)计算得到该唤醒词的最终确认得分，计算方式如下所示： 2 CN [0055] CMword=- YjCMphonei (4) 丄 N /=i [0056] e)判断该唤醒词是否为真实的唤醒词，对比该唤醒词的最终确认得分和预先设定 的门限，如果确认得分CMwæd大于门限T则认为该唤醒词为真实的唤醒词，唤醒成功；如果 CMword小于门限T则认为该唤醒词为虚假的唤醒词，重新进行声学特征提取。

[0057] 通过以上工作实现语音唤醒功能，最终将结果反馈给唤醒执行3，执行唤醒操作。

[0058] 本发明工作过程如下： [0059] 第一、部署唤醒词定制模块11，实现训练声学模型8和构建唤醒词检测网络7，该 模型部署到服务器中，用户输入命令词文本，如“茄子茄子”，输出构建唤醒词检测网络7和 声学模型8。

[0060] 第二、通过编程语言实现语音唤醒模块，语音唤醒模块实现主要包含如下逻辑模 块（图2)，语音信号输入接口、语音信号的声学特征提取4、唤醒词检测5、唤醒词确认6和唤 醒执行3命令的输出。集成语音唤醒模块代码到操作系统模块10，开启运行，等待音频模块 13传入的录音数据。

[0035] FIG. 4 of the present invention to build network diagram wake-word confirmation.

DETAILED DESCRIPTION [0036] 1, the present invention starts the speech FIG camera system comprising: an operating system module 10, customization module wakeup word 11, camera module 12, audio module 13 and storage module 14, operating system modules 10 Run Wake voice module.

[0037] As shown in Figure 2, the voice wake-up module includes a voice input, voice wake Algorithm 2 and 3 wake execution. Voice wake Algorithm 2 realized mainly by acoustic feature extraction 4, 5 wake-word detection, Wake words confirm 6, construct wake word detection network 7, 8, and build the acoustic model training wake word Confirm Network 9 is completed, the specific implementation process are: [0038] (1) acoustic model training 8: training the acoustic model is divided into two parts, namely phoneme acoustic model and scrap models (ie Garbage models). Phoneme acoustic models using the traditional speech recognition acoustic model training method, select the appropriate database, use based on the following MLE (Maximum Likelihood Estimation, maximum likelihood estimation) and MPE (Minimum Phone Error, the smallest phoneme error) discriminative training guidelines get. Garbage model-independent voice except for absorbing wake of the word, using the same database and training phoneme model, each phoneme model by calculating the similarity between, each phoneme is divided into 20 categories, each category using the corresponding phoneme all training integrate data using MLE criteria Garbage corresponding training model, so that the model had 20 class Garbage. Garbage phoneme model using training data clustering mixed training, there are two purposes, in the wake of the word detection network to absorb the other voice except wake of the word, in the wake of the word used to calculate confirm Confirm network network score.

[0039] (2) acoustic feature extraction 4: 1 to obtain a voice through the voice input signal input, extracts may have a certain distinction in nature, and is based on the human auditory characteristics of the extracted features, generally used in the selected speech recognition MFCC (Mel-Frequency Cepstrum Coeff icient, Mel Frequency Cepstral) features.

Petitioner Exhibit 1004, Page 1047 of 1518

[0061] 第三、进入拍照模块12，开启摄像头，等待操作系统模块10传递过来的启动拍照 指令，与此同时，音频模块13开启录音设备，并实时将录音数据输入到操作系统模块10，语 音唤醒模块在接收操作系统模块10中的录音数据后开始匹配运算。

[0062] 第四、当用户需要启动拍照时，说出音频模块13采集到“茄子茄子”的录音数据 后，语音唤模块法将发出启动指令，操作系统模块10向拍照模块发出拍照指令，并且向音 频模块13发出播报提示音指令，拍照模块12进入倒计时，调整焦点，开始拍照，并将采集到 的图像数据存储在存储模块14。

[0063] 本发明的技术核心是通过软件算法实现，成本低、模块移植方便，适合在各类消费 类电子产品上使用，具有很高的推广价值。

[0064] 本发明说明书中未作详细描述的内容属于本领域专业技术人员公知的现有技术。

[0065] 以上所述仅是本发明的优选实施方式，应当指出，对于本技术领域的普通技术人 员来说，在不脱离本发明原理的前提下，还可以做出若干改进和润饰，这些改进和润饰也应 视为本发明的保护范围。

[0040] (3) Wake-word detection 5: The extracted acoustic features obtained using the acoustic model 8 in the wake of the 7 word detecting network computing acoustic score, if the score optimal path contains word to be detected wake, the detection of wake-up word, enter the next step; otherwise, the operation to re-extract acoustic features. To ensure the normal wake-up word that can be detected, while ineffective voice can be effectively absorbed. Build a network wake-up detector consists of a user-selected words and Garbage wake model composition, as shown in FIG. 2 CN, such a network is also referred to in the speech recognition to identify the network 3, the wake-up detector network structure is very simple, you can simple procedures or the manual build can be. Due to the complexity of the actual use environment, in many cases, received wake-up speech contaminated by noise, then wake speech characteristic corresponding to the acoustic model in the acoustic phoneme score is reduced a lot, and because the model is Garbage phoneme get mixed use more training, which itself is not very precise, acoustic characteristics of finite amplitude score lower on Garbage model, this time it was mistakenly wake absorbed Garbage voice model, the system wake-up rate will be reduced.

[0041] In order to prevent this from happening, when decoding in the wake word detection network, the arc where the decoding of Garbage do score a penalty, namely Penalty, we can not and phoneme acoustic model of fair competition, in order to ensure There is noise pollution wake normal voice can also be detected. Specific penalties amplitude modulation needs to be empirically m iF for different wake-up word. O [0042] wake word detection networks 7 is calculated using the best score path.

[0043] get using the classic formula for the optimal Bayesian scoring path, as follows: [0044] [0045] In the above formula X represents extracted from the input speech acoustic feature vector, W on behalf of the biggest score optimal word sequence.

Conditional probability P (XIW) for the acoustic model score, can be trained acoustic models and phoneme model waste calculated, the prior probability P (W) is the language model score, for this can be understood as different acoustic models added Penalty. P (X) for the whole probability, when the wake-up word acoustic

model and detect network determined that value, so the equation (1) can be written as: [0046] W = ai.g max P {W) P (X \ W) C2) [0047] (4) Wake words confirm 6: Due to the inaccuracy of the acoustic model itself and the complexity of the actual use of the environment, links were detected by word wake wakeup word is not necessarily real wake-up word. In order to reduce non-wake-up waking up and bring back will cause problems, it is necessary to detect the resulting wake word for further confirmation. The present invention is constructed by way of FIG. 4 Confirm the network wakeup word 9, Wake words confirm the network and detect network wake-word, as are speech recognition to identify the network, make sure the network Garbage contains only model, you can use a simple procedure or manual build.

[0048] The main steps are as follows confirmation wake word: [0049] a) word will wake detection decoding to get the wake-up word phoneme-level, and record all of its scoring (Scorephonel, Scoreph0ne2,..., Sc0reph_N), where N to wake up the word in the total number of phonemes.

The same characteristics [0050] b) Use and wake-up word is detected, the wake-up word to confirm the corresponding acoustic score on the network, and frame-accurate level (Scoreftamel, Scoreframe2,..., SCore and ameM), where M is The total length of the sentence characteristics, in units of frames.

[0051] c) is calculated for each phoneme recognition wake word score, calculated as follows: [0052] iend CMphouej two [Scorephomi - Scorefmmek) / (Kiend - Kistart) ? [0053] wherein Kistot and Kimd start time and end time are the i-th phoneme.

[0054] d) the calculated final confirmation of the wake-up word score, calculated as follows: 2 CN [0055] CMword = -YjCMphonei (4) Shang N / = i [0056] e) determine the wake-up word whether real wake-up word, compared to the wake-up word final score and a threshold set in advance, if it is confirmed the score CMwaed greater than the threshold T is that the wake-up word for real wake-up word, wake-up success; if CMword less than the threshold T is considered The wake-up word for word a false wake again acoustic feature extraction.

[0057] Through the above work to achieve voice wake-up function, the final results back to wake

execution 3, the wake-up operation.

[0058] operation of the present invention is as follows: [0059] First, deploy a custom module wakeup word 11, to achieve the acoustic model training and building 8 7 Wake word detection network, deploy the model to the server, the user enters the command word text such as "eggplant eggplant", output wake build word detection network 7 and 8 acoustic models.

[0060] Secondly, the programming language for voice wake-up module, voice wake-up module contains the following main logic module (Fig. 2), the acoustic characteristics of the speech signal input interface, speech signal extracted 4, 5 wake-word detection, wake Words confirm 6 and wake execute 3 commands output. Integrated Voice wake module code to the operating system module 10, turned to run, wait for the incoming audio module 13 recorded data.

[0061] third, into the camera module 12, open the camera, wait for the operating system module 10 is passed over the start photographing instruction, at the same time, an audio module 13 open recording equipment and record data in real time input to the operating system module 10, the speech after receiving the wake-up module operating system module 10 begin recording data matching operation.

[0062] Fourth, when the user needs to start taking pictures, say 13 collected audio module "eggplant eggplant" recording data, voice call modular approach will issue the start command, the operating system module 10 camera to camera module issue instruction, and to broadcast audio module 13 issues instructions tone, camera module 12 countdown, adjust the focus, started taking pictures and collecting image data stored in the memory module 14.

[0063] the core technology of the present invention is realized by software algorithms, low cost, easy to transplant the module is suitable for use on all types of consumer electronic products, promotion of high value.

[0064] The present description of the invention are not described in detail the contents of skilled professional and technical personnel belonging to well-known in the art.

[0065] The above are only preferred embodiments of the present invention, it should be noted that those of ordinary skill in the art, in the present invention without departing from the principle of the premise, you can also make a number of improvements and modifications These improvements and modifications are to be considered the scope of the invention.

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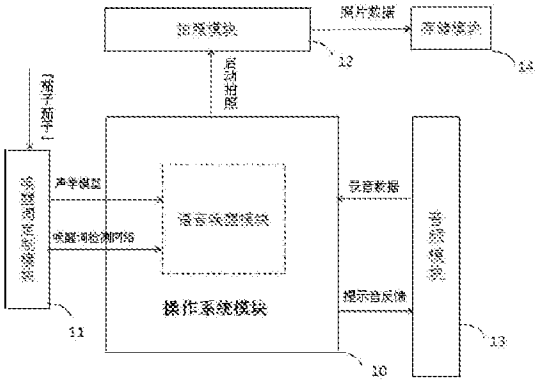
权利要求书 2 页 说明书 5 页 附图 2 页

(54)发明名称

一种语音启动拍照系统

(57)摘要

一种语音启动拍照系统，包括：操作系统模块(10)、唤醒词定制模块(11)、拍照模块(12)、音频模块(13)和存储模块(14)；其中：操作系统模块(10)中运行语音唤醒模块；所述语音唤醒模块包括语音输入(1)、语音唤醒算法(2)和唤醒执行(3)；语音唤醒算法(2)获取语音输入(1)的语音信号，进行语音唤醒处理后，将结果输出给唤醒执行(3)，从而完成唤醒操作；所述语音唤醒算法(2)通过声学特征提取(4)、唤醒词检测(5)、唤醒词确认(6)、构建唤醒词检测网络(7)、训练声学模型(8)和构建唤醒词确认网络(9)来实现。本发明可以根据用户需求进命令词定制，人机交换更人性化启动的准确度更高，抗干扰性更强。



CN 103021409 A

Petitioner Exhibit 1004, Page 1052 of 1518

1. 一种语音启动拍照系统，其特征在于包括：操作系统模块(10)、唤醒词定制模块(11)、拍照模块(12)、音频模块(13)和存储模块(14)；其中：

操作系统模块(10)中运行语音唤醒模块；所述语音唤醒模块包括语音输入(1)、语音唤醒算法(2)和唤醒执行(3)；语音唤醒算法(2)获取语音输入(1)的语音信号，进行语音唤醒处理后，将结果输出给唤醒执行(3)，从而完成唤醒操作；所述语音唤醒算法(2)通过声学特征提取(4)、唤醒词检测(5)、唤醒词确认(6)、构建唤醒词检测网络(7)、训练声学模型(8)和构建唤醒词确认网络(9)来实现，具体实现过程如下：

第一步，声学特征提取(4)：通过语音输入(1)获取语音信号输入，提取具有区分性的、并且是基于人耳听觉特性提取的特征，通常选取语音识别中用到的MFCC（Mel-Frequency Cepstrum Coefficient，美尔频率倒谱系数）特征作为声学特征；

第二步，唤醒词检测(5)：将提取得到的声学特征，采用训练的声学模型(8)在唤醒词检测网络(7)上计算声学得分，如果声学得分最优的路径中包含要检测的唤醒词，则确定已检出唤醒词，进入第三步操作，否则回到第一步重新进行提取声学特征(4)；

第三步，唤醒词确认(6)：将提取得到的声学特征，采用训练的声学模型(8)在唤醒词确认网络(9)上进行唤醒词确认，得到最终确认得分；判断该检出的唤醒词是否为真实的唤醒词，即将该唤醒词的最终确认得分和预先设定的门限，如果最终确认得分大于等于门限，则认为该唤醒词是真实的唤醒词，语音唤醒成功，将结果输出给唤醒执行(3)，从而完成语音唤醒操作；如果最终确认得分小于门限，则认为该唤醒词为虚假的唤醒词，重新回到第一步重新进行声学特征提取(4)；

唤醒词定制模块(11)，接收用户输入的唤醒词，输出操作系统模块(10)中语音唤醒模块所需的声学模型(8)和唤醒词检测网络(7)；

拍照模块(12)，具有拍照功能的系统模块，接收操作系统模块(10)的拍照指令，并在拍照后将图像的数字信号发送到存储模块(14)；

音频模块(13)，具有录音采集和音频播报功能，录音功能主要是采集环境中音频数据，并传送到操作系统模块(10)，播音功能主要是接收系统模块(10)发出提示反馈后，播报提示音功能；

存储模块(14)，具有永久存储能力的存储介质，对拍照模块生成的数字图像信息进行存储。

2. 根据权利要求1所述的语音启动拍照系统，其特征在于：所述声学模型(8)的训练分为两部分，分别为音素声学模型和废料模型(即Garbage模型)；音素声学模型采用传统的语音识别中的声学模型训练方法，选取数据库，利用基于MLE（Maximum Likelihood Estimation，最大似然估计）和MPE（Minimum Phone Error，最小音素错误）区分性训练准则下得到；Garbage模型用于吸收除唤醒词之外的无关语音，使用和训练音素模型同样的数据库，通过计算各音素模型之间的相似性，将各音素分为20类，使用每类音素对应的所有训练数据融合起来，采用MLE准则训练对应的Garbage模型，便得到20类Garbage模型。

3. 根据权利要求1所述的语音启动拍照系统，其特征在于：所述唤醒词检测网络(7)的实现采用最优得分路径计算得出，所述最优得分路径的计算公式是：

$$W = \arg\max_{W} P(W)P(X|W)$$

Petitioner Exhibit 1004, Page 1053 of 1518

其中 X 代表从输入语音中提取的声学特征向量，W 代表得分最大的最优词序列；条件概率 P(X|W) 为声学模型得分，通过训练好的声学模型(8)计算得到；先验概率 P(W) 为语言模型得分，即为对不同的声学模型所加的 PenaltyP(X)为全概率，当声学模型和唤醒词检测网络确定下来后即是定值。

4. 根据权利要求 1 所述的语音启动拍照系统，其特征在于：所述唤醒词确认网络(9)实现是：

a. 将检出的唤醒词解码到音素一级，并记录所有的得分($Score_{phone1}$, $Score_{phone2}$, …, $Score_{phoneN}$)，其中 N 为唤醒词中总的音素个数，$Score_{phone1}$, $Score_{phone2}$, …, $Score_{phoneN}$ 分别表示该唤醒词中所有音素的是解码得分，其中下标表示音素的 N 个音素的标识；

b. 使用和唤醒词检测同样的特征，得到相应的声学得分，并精确到帧一级($Score_{frame1}$, $Score_{frame2}$, …, $Score_{frameM}$)，其中 M 为该句特征总的时长，以帧为单位；

c. 计算得到唤醒词每个音素的确认得分，计算方式如下：

$$CM_{phonei} = (Score_{phonei} - \sum_{k=K_{istart}}^{K_{iend}} Score_{framek}) / (K_{iend} - K_{istart})$$

其中 K_{istart} 和 K_{iend} 分别为第 i 个音素的起始时间和结束时间；

CM_{phonei} 表示第 i 个音素的确认得分，下标 phonei 表示第 i 个音素，$Score_{phonei}$ 如上面所示第 i 个 phone 的解码得分，$Score_{framek}$ 表示使用唤醒词确认网络解码得到的第 k 帧的得分；

d. 计算得到该唤醒词的最终确认得分，计算方式如下所示：

$$CM_{wordi} = \frac{1}{N} \sum_{i=1}^{N} CM_{phonei}$$

5. 根据权利要求 1 所述的语音启动拍照系统，其特征在于：所述操作系统模块(10)中的语音唤醒模块能够被移植到被移植到 Windows、Linux、Android、IOS 系统平台。

Petitioner Exhibit 1004, Page 1054 of 1518

一种语音启动拍照系统

技术领域

[0001] 本发明涉及一种语音启动拍照系统，可以用于含有拍照功能的消费类电子产品领域。

背景技术

[0002] 随着消费类电子产品快速的发展，各种包含拍照功能的设备使用越来越频繁，人们对拍照的人性化要求越越来越高，语音作为人类最基本的方式，将语音识别技术应用到消费类电子产品中，实现通过自然语音来控制此类产品功能是未来发展的趋势。

发明内容

[0003] 本发明技术解决问题：提供一种语音启动拍照系统，克服了现有按钮式、触控式启动方式带来的不便利，操作方式受限和拍照抖动等不足，具有操作简单更人性化，启动拍照不受限，防抖动等优点。现有的一些语音启动技术，是利用特点语音如口哨，误启动率搞，输入语音命令单一等缺陷，本发明可以根据用户需求进命令词定制，人机交换更人性化启动的准确度更高，抗干扰性更强。

[0004] 本发明是通过以下技术方案实现的：一种语音启动拍照系统，包括：操作系统模块 10、唤醒词定制模块 11、拍照模块 12、音频模块 13 和存储模块 14；其中：

[0005] 操作系统模块 10 中运行语音唤醒模块；所述语音唤醒模块包括语音输入 1、语音唤醒算法 2 和唤醒执行 3；语音唤醒算法 2 获取语音输入 1 的语音信号，进行语音唤醒处理后，将结果输出给唤醒执行 3，从而完成唤醒操作；所述语音唤醒算法 2 通过声学特征提取 4、唤醒词检测 5、唤醒词确认 6、构建唤醒词检测网络 7、训练声学模型 8 和构建唤醒词确认网络 9 来实现，具体实现过程如下：

[0006] 第一步，声学特征提取 4：通过语音输入 1 获取语音信号输入，提取具有区分性的、并且是基于人耳听觉特性提取的特征，通常选取语音识别中用到的 MFCC（Mel-Frequency Cepstrum Coefficient，美尔频率倒谱系数）特征作为声学特征；

[0007] 第二步，唤醒词检测 5：将提取得到的声学特征，采用训练的声学模型 8 在唤醒词检测网络 7 上计算声学得分，如果声学得分最优的路径中包含要检测的唤醒词，则确定已检出唤醒词，进入第三步操作，否则回到第一步重新进行提取声学特征 4；

[0008] 第三步，唤醒词确认 6：将提取得到的声学特征，采用训练的声学模型 8 在唤醒词确认网络 9 上进行唤醒词确认，得到最终确认得分；判断该检出的唤醒词是否为真实的唤醒词，即将该唤醒词的最终确认得分和预先设定的门限，如果最终确认得分大于等于门限，则认为该唤醒词是真实的唤醒词，语音唤醒成功，将结果输出给唤醒执行 3，从而完成语音唤醒操作；如果最终确认得分小于门限，则认为该唤醒词为虚假的唤醒词，重新回到第一步重新进行声学特征提取 4；

[0009] 唤醒词定制模块 11，语音唤醒模块的资源生成模块接收用户输入的唤醒词，输出操作系统模块 10 中语音唤醒模块所需的声学模型 8 和唤醒词检测网络 7；

Petitioner Exhibit 1004, Page 1055 of 1518

[0010] 拍照模块 12，具有拍照功能的系统模块，接收操作系统模块 10 的拍照指令，并在拍照后将图像的数字信号发送到存储模块 14；

[0011] 音频模块 13，具有录音采集和音频播报功能，录音功能主要是采集环境中音频数据，并传送到操作系统模块 10，播音功能主要是接收系统模块 10 发出提示反馈后，播报提示音功能；

[0012] 存储模块 14，具有永久存储能力的存储介质，对拍照模块生成的数字图像信息进行存储。

[0013] 所述声学模型 8 的训练分为两部分，分别为音素声学模型和废料模型(即 Garbage 模型)；音素声学模型采用传统的语音识别中的声学模型训练方法，选取数据库，利用基于 MLE（Maximum Likelihood Estimation，最大似然估计）和 MPE（Minimum Phone Error，最小音素错误）区分性训练准则下得到；Garbage 模型用于吸收除唤醒词之外的无关语音，使用和训练音素模型同样的数据库，通过计算各音素模型之间的相似性，将各音素分为 20 类，使用每类音素对应的所有训练数据融合起来，采用 MLE 准则训练对应的 Garbage 模型，便得到 20 类 Garbage 模型。

[0014] 所述唤醒词检测网络 7 的实现采用最优得分路径计算得出，所述最优得分路径的计算公式是：

[0015] $$W = \arg\max_{W} P(W)P(X|W)$$

[0016] 其中 X 代表从输入语音中提取的声学特征向量，W 代表得分最大的最优词序列；条件概率 P(X|W) 为声学模型得分，通过训练好的声学模型 8 计算得到；先验概率 P(W)为语言模型得分，即为对不同的声学模型所加的 PenaltyP(X)为全概率，当声学模型和唤醒词检测网络确定下来后即是定值。

[0017] 所述唤醒词确认网络 9 实现是：

[0018] a. 将检出的唤醒词解码到音素一级，并记录所有的得分($Score_{phone1}$, $Score_{phone2}$, …, $Score_{phoneN}$)，其中 N 为唤醒词中总的音素个数，$Score_{phone1}$, $Score_{phone2}$, …, $Score_{phoneN}$ 分别表示该唤醒词中所有音素的是解码得分，其中下标表示音素的 N 个音素的标识；

[0019] b. 使用和唤醒词检测同样的特征，得到相应的声学得分，并精确到帧一级($Score_{frame1}$, $Score_{frame2}$, …, $Score_{frameM}$)，其中 M 为该句特征总的时长，以帧为单位；

[0020] c. 计算得到唤醒词每个音素的确认得分，计算方式如下：

[0021] $$CM_{phonei} = (Score_{phonei} - \sum_{k=K_{istart}}^{K_{iend}} Score_{framek}) / (K_{iend} - K_{istart})$$

[0022] 其中 K_{istart} 和 K_{iend} 分别为第 i 个音素的起始时间和结束时间；

[0023] CM_{phonei} 表示第 i 个音素的确认得分，下标 phonei 表示第 i 个音素，$Score_{phonei}$ 如上面所示第 i 个 phone 的解码得分，$Score_{framek}$ 表示使用唤醒词确认网络解码得到的第 k 帧的得分；

[0024] d. 计算得到该唤醒词的最终确认得分，计算方式如下所示：

[0025] $$CM_{word} = \frac{1}{N}\sum_{i=1}^{N} CM_{phonei}$$

[0026] 所述操作系统模块中的语音唤醒模块能够被移植到被移植到 Windows、Linux、

Petitioner Exhibit 1004, Page 1056 of 1518

Android、IOS 系统平台。

[0027] 本发明与现有技术相比的优点在于：

[0028] (1) 本发明通过用户特定的语音唤醒词作为触发源，即使是在嘈杂的环境下，也无需用户利用双手操作，仅通过语音命令快速实现唤醒功能，进行下一步交互操作。

[0029] (2) 本发明带来的价值是，使用本系统后可通过说约定的语音唤醒词开启语音唤醒功能，无需事先暂停音频播放，同时通过实际测试验证，正确识别唤醒率可以达到 90% 以上。

[0030] (3) 本发明实现，成本低，代码移植方便，具有很好的推广应用价值。

[0031] (4) 本发明中的语音唤醒功能均通过软件算法实现，并且算法可以很方便的被移植到 Windows、Linux、Android、IOS 等系统平台。

附图说明

[0032] 图 1 为本发明的结构示意图；

[0033] 图 2 为本发明中的语音唤醒模块实现框图；

[0034] 图 3 为本发明的构建唤醒词检测网络示意图；

[0035] 图 4 为本发明的构建唤醒词确认网络示意图。

具体实施方式

[0036] 如图 1 所示，本发明的语音启动拍照系统包括：操作系统模块 10、唤醒词定制模块 11、拍照模块 12、音频模块 13 和存储模块 14、操作系统模块 10 中运行语音唤醒模块。

[0037] 如图 2 所示，语音唤醒模块包括语音输入 1、语音唤醒算法 2 和唤醒执行 3。语音唤醒算法 2 实现主要由声学特征提取 4、唤醒词检测 5、唤醒词确认 6、构建唤醒词检测网络 7、训练声学模型 8 和构建唤醒词确认网络 9 完成，具体实现过程是：

[0038] (1) 训练声学模型 8：声学模型的训练分为两部分，分别为音素声学模型和废料模型(即 Garbage 模型)。音素声学模型采用传统的语音识别中的声学模型训练方法，选取合适的数据库，利用基于 MLE(Maximum Likelihood Estimation，最大似然估计)和 MPE(Minimum Phone Error，最小音素错误) 区分性训练准则下的得到。Garbage 模型用于吸收除唤醒词之外的无关语音，使用和训练音素模型同样的数据库，通过计算各音素模型之间的相似性，将各音素分为 20 类，使用每类音素对应的所有训练数据融合起来，采用 MLE 准则训练对应的 Garbage 模型，这样即得到 20 类 Garbage 模型。Garbage 模型采用了聚类的音素训练数据混合训练，有两种用途，在唤醒词检测网络中用来吸收除唤醒词之外的其他语音，在唤醒词确认网络中用来计算确认网络的得分。

[0039] (2) 声学特征提取 4：通过语音输入 1 获取语音信号输入，提取可以具有一定区分性的，并且是基于人耳听觉特性提取的特征，一般选取语音识别中用到的 MFCC (Mel-Frequency Cepstrum Coefficient，美尔频率倒谱系数) 特征。

[0040] (3) 唤醒词检测 5：将提取得到的声学特征，使用声学模型 8 在唤醒词检测网络 7 上计算声学得分，如果得分最优的路径中包含要检测的唤醒词，则检出唤醒词，进入下一步操作；否则重新提取声学特征操作。为了保证唤醒词能够被正常的检出，同时无效的语音又能被有效的吸收。唤醒检测网络的构建主要由用户选定的唤醒词和 Garbage 模型组成，如

Petitioner Exhibit 1004, Page 1057 of 1518

图 3 所示，这种网络在语音识别中也称为识别网络，由于唤醒检测网路结构非常简单，可以通过简单的程序或则手工构建都可以。由于实际使用环境的复杂性，在很多情况下，接收到的唤醒语音被噪声污染了，此时唤醒语音对应的声学的特征在音素声学模型上的得分就会降低的很多，而由于 Garbage 模型是使用较多音素混合训练得到，其本身不是很精确，声学特征在 Garbage 模型上的得分降低的幅度有限，此时唤醒语音就被 Garbage 模型误吸收，系统唤醒率就会降低。

[0041] 为了防止上述情况的发生，在唤醒词检测网络上解码时，对 Garbage 所在的弧的解码得分做一定的惩罚，即 Penalty，使其不能和音素声学模型公平竞争，以保证有被噪声污染的唤醒语音也能被正常检出。具体的惩罚幅度需要针对不同的唤醒词作经验性的调整。

[0042] 唤醒词检测网络 7 的实现方法是采用最优得分路径计算得出。

[0043] 最优得分路径的获取采用经典的贝叶斯公式，如下所示：

[0044]

$$W = \arg\max_{W} P(W \mid X) = \arg\max_{W} \frac{P(W)P(X \mid W)}{P(X)} \qquad (1)$$

[0045] 上式中 X 代表从输入语音中提取的声学特征向量，W 代表得分最大的最优词序列。条件概率 P(X|W) 为声学模型得分，可以通过训练好的音素声学模型和废料模型计算得到，先验概率 P(W) 为语言模型得分，这里可以理解为对不同的声学模型所加的 Penalty。P(X) 为全概率，当声学模型和唤醒词检测网络确定下来后就是定值，因此公式（1）可写为：

[0046] $$W = \arg\max_{W} P(W)P(X \mid W) \qquad (2)$$

[0047] （4）唤醒词确认 6：由于声学模型的本身存在不精确性以及实际使用环境的复杂性，通过唤醒词检测环节得到的唤醒词不一定是真实的唤醒词。为了能降低非唤醒带来的误唤醒以及后面会导致的问题，需要对检测得到的唤醒词作进一步的确认。本发明采用图 4 的方式构建唤醒词确认网络 9，唤醒词确认网络和唤醒词检测网络一样，都属于语音识别中的识别网络，确认网络中只包含 Garbage 模型，可以使用简单的程序或手工构建。

[0048] 唤醒词确认的主要步骤如下：

[0049] a）将唤醒词检测得到唤醒词解码到音素一级，并记录其所有的得分（$Score_{phone1}$, $Score_{phone2}$, …, $Score_{phoneN}$），其中 N 为唤醒词中总的音素个数。

[0050] b）使用和唤醒词检测同样的特征，在唤醒词确认网络上得到相应的声学得分，并精确到帧一级（$Score_{frame1}$, $Score_{frame2}$, …, $Score_{frameM}$），其中 M 为该句特征总的时长，以帧为单位。

[0051] c）计算得到唤醒词每个音素的确认得分，计算方式如下：

[0052]

$$CM_{phonei} = (Score_{phonei} - \sum_{k=K_{istart}}^{K_{iend}} Score_{framek}) / (K_{iend} - K_{istart}) \qquad (3)$$

[0053] 其中 K_{istart} 和 K_{iend} 分别为第 i 个音素的起始时间和结束时间。

[0054] d）计算得到该唤醒词的最终确认得分，计算方式如下所示：

Petitioner Exhibit 1004, Page 1058 of 1518

[0055] $$CM_{word}=\frac{1}{N}\sum_{i=1}^{N}CM_{phonei} \quad (4)$$

[0056] e）判断该唤醒词是否为真实的唤醒词，对比该唤醒词的最终确认得分和预先设定的门限，如果确认得分 CM_{word} 大于门限 T 则认为该唤醒词为真实的唤醒词，唤醒成功；如果 CM_{word} 小于门限 T 则认为该唤醒词为虚假的唤醒词，重新进行声学特征提取。

[0057] 通过以上工作实现语音唤醒功能，最终将结果反馈给唤醒执行 3，执行唤醒操作。

[0058] 本发明工作过程如下：

[0059] 第一、部署唤醒词定制模块 11，实现训练声学模型 8 和构建唤醒词检测网络 7，该模型部署到服务器中，用户输入命令词文本，如“茄子茄子”，输出构建唤醒词检测网络 7 和声学模型 8。

[0060] 第二、通过编程语言实现语音唤醒模块，语音唤醒模块实现主要包含如下逻辑模块（图 2），语音信号输入接口、语音信号的声学特征提取 4、唤醒词检测 5、唤醒词确认 6 和唤醒执行 3 命令的输出。集成语音唤醒模块代码到操作系统模块 10，开启运行，等待音频模块 13 传入的录音数据。

[0061] 第三、进入拍照模块 12，开启摄像头，等待操作系统模块 10 传递过来的启动拍照指令，与此同时，音频模块 13 开启录音设备，并实时将录音数据输入到操作系统模块 10，语音唤醒模块在接收操作系统模块 10 中的录音数据后开始匹配运算。

[0062] 第四、当用户需要启动拍照时，说出音频模块 13 采集到“茄子茄子”的录音数据后，语音唤模块法将发出启动指令，操作系统模块 10 向拍照模块发出拍照指令，并且向音频模块 13 发出播报提示音指令，拍照模块 12 进入倒计时，调整焦点，开始拍照，并将采集到的图像数据存储在存储模块 14。

[0063] 本发明的技术核心是通过软件算法实现，成本低、模块移植方便，适合在各类消费类电子产品上使用，具有很高的推广价值。

[0064] 本发明说明书中未作详细描述的内容属于本领域专业技术人员公知的现有技术。

[0065] 以上所述仅是本发明的优选实施方式，应当指出，对于本技术领域的普通技术人员来说，在不脱离本发明原理的前提下，还可以做出若干改进和润饰，这些改进和润饰也应视为本发明的保护范围。

Petitioner Exhibit 1004, Page 1059 of 1518

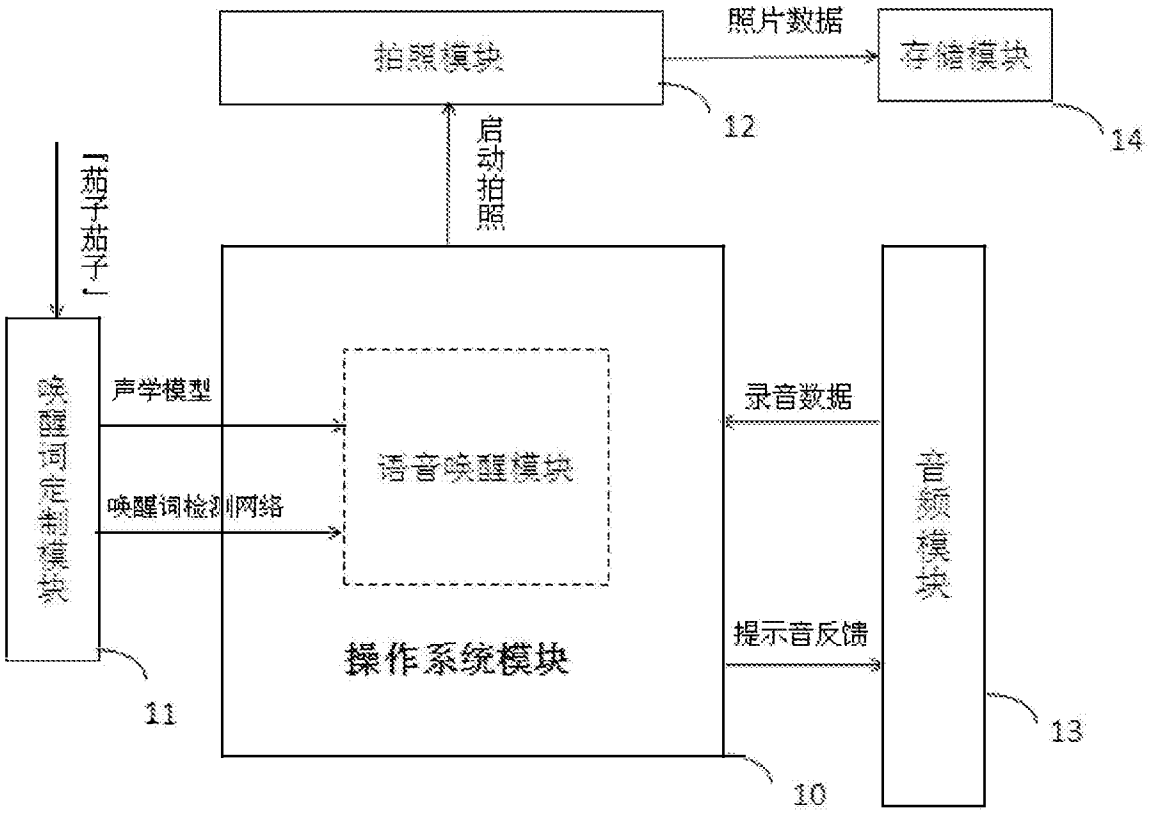


图 1

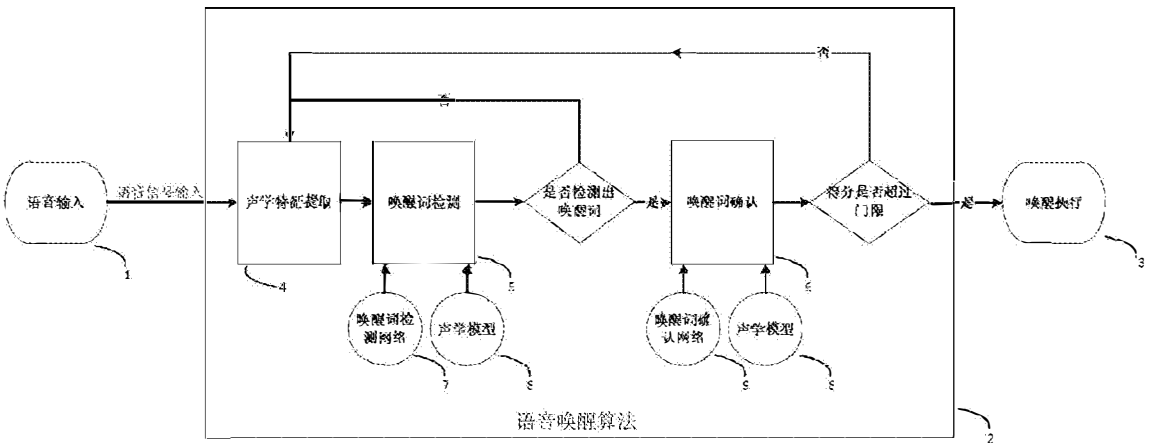


图 2

Petitioner Exhibit 1004, Page 1060 of 1518

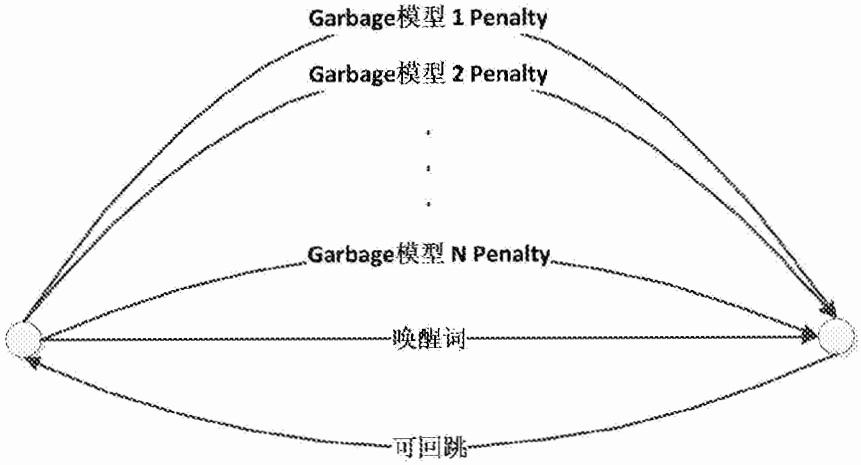


图 3

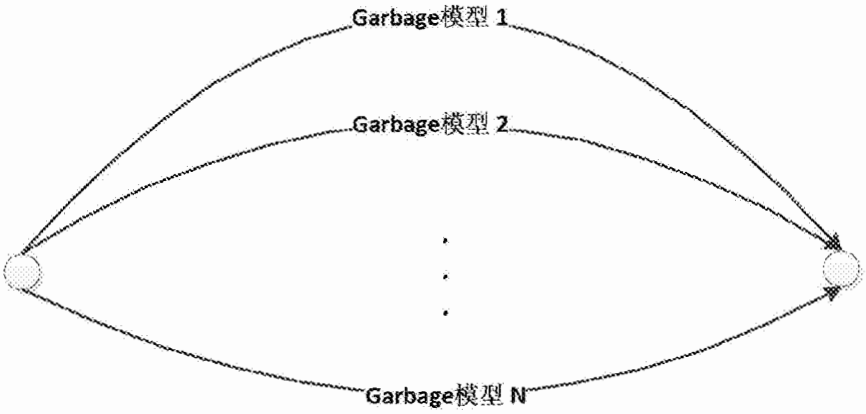


图 4

Petitioner Exhibit 1004, Page 1061 of 1518

Electronic Acknowledgement Receipt

EFS ID:	36929637
Application Number:	13795933
International Application Number:	
Confirmation Number:	2321
Title of Invention:	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND
First Named Inventor/Applicant Name:	William F. Ganong
Customer Number:	91337
Filer:	Charles Nicholas Ruggiero/Joanne Romaniello
Filer Authorized By:	Charles Nicholas Ruggiero
Attorney Docket Number:	N0484.71090US01
Receipt Date:	20-AUG-2019
Filing Date:	12-MAR-2013
Time Stamp:	17:18:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		20190820_0013359USU1_4705A_Transmittal_POA_Statement.pdf	281847 c22bf523d1685940b0c156b8ad4f2a32d28a5346	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Power of Attorney	1	1
	Power of Attorney	2	2
	Assignee showing of ownership per 37 CFR 3.73	3	4

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Information:

2	Application Data Sheet	20190820_0013359USU1_4705A_Corrected_ADS.pdf	133844 3447aaa4770f310b7b60fa4ed1267c86ff974f14	no	9

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Total Files Size (in bytes):	415691

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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

PTO/AIA/82B (07-13)
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POWER OF ATTORNEY BY APPLICANT

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

Application Number	Filing Date

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

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 000157176

OR

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

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

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

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

NUANCE COMMUNICATIONS, INC.

☐ Inventor or Joint Inventor (title not required below)

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

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

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

SIGNATURE of Applicant for Patent

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

Signature		Date (Optional)	April 24, 2019
Name	Leanne Fitzgerald		
Title	VP, Associate General Counsel		

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

☑ Total of 1 forms are submitted.

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

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~N0484.71090US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	William	F.	GANONG	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Brookline	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	118 Sumner Road		
Address 2			
City	Brookline	State/Province	MA
Postal Code	02146	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Paul	Adrian	Van MULBREGT	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Wayland	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	30 Bow Road		
Address 2			
City	Wayland	State/Province	MA
Postal Code	01778	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Vladimir		SEJNOHA	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~N0484.71090US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

City	Lexington	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	10 Flintlock Road		
Address 2			
City	Lexington	State/Province	MA
Postal Code	02420	Country	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Glen	Edward	WILSON	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Maynard	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	13 Sherman Sreet		
Address 2			
City	Maynard	State/Province	MS
Postal Code	01754	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	~~91337~~ 157176		
Email Address	DOCKETING@OGRP.COM	Add Email	Remove Email

Application Information:

Title of the Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND		
Attorney Docket Number	~~N0484.71090US01~~ 0013359USU1/4705A	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~119484.71000US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	~~31357~~ 157,176		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~N0484.71090US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~N0484.71090US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

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

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

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

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

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

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

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

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~N0484.71000US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	NUANCE COMMUNICATIONS, INC.		
Mailing Address Information For Applicant:			
Address 1	One Wayside Road		
Address 2			
City	Burlington	**State/Province**	MA
Country	US	Postal Code	01803
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~N0484.71000US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	NUANCE COMMUNICATIONS, INC.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	One Wayside Road		
Address 2			
City	Burlington	**State/Province**	MA
Country	US	Postal Code	01803
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Charles N.J. Ruggiero/			Date (YYYY-MM-DD)	2018-08-20
First Name	Charles N.J.	Last Name	Ruggiero	Registration Number	28468

Additional Signature may be generated within this form by selecting the Add button.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	~~N0484.71088US01~~ 0013359USU1/4705A
	Application Number	13/795,933
Title of Invention	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Nuance Communications, Inc.

Application No./Patent No.: 13/795,933 Filed/Issue Date: 2013-03-12

Titled: METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND

Nuance Communications, Inc., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventors To: Nuance Communications, Inc.

   The document was recorded in the United States Patent and Trademark Office at

   Reel 030096, Frame 0850, or for which a copy thereof is attached.

2. From: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Charles N.J. Ruggiero/	2019-08-20
Signature	Date
Charles N.J. Ruggiero	28,468
Printed or Typed Name	Title or Registration Number

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

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

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

Application Number	13/795,933
Filing Date	2013-03-12
First Named Inventor	GANONG, William F.
Title	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND
Art Unit	2644
Examiner Name	Ho, Huy C.
Attorney Docket Number	0013359USU1/4705A

SIGNATURE of Applicant or Patent Practitioner

Signature	/Charles N.J. Ruggiero/	Date (Optional)	2019-08-20
Name	Charles N.J. Ruggiero	Registration Number	28,846
Title (if Applicant is a juristic entity)	Attorney for Applicant		
Applicant Name (if Applicant is a juristic entity)	Nuance Communications, Inc.		

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

☑ *Total of 1 forms are submitted.

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRPART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/795,933	03/12/2013	2644	1740	0013359USU1/4705A	20	3

CONFIRMATION NO. 2321

CORRECTED FILING RECEIPT

157176
Ohlandt Greeley Ruggiero & Perle, L.L.P.-VoiceBox
One Landmark Square, 10th Floor
Stamford, CT 06901

OC000000110609368

Date Mailed: 08/22/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

William F. Ganong III, Brookline, MA;
Paul Adrian Van Mulbregt, Wayland, MA;
Vladimir Sejnoha, Lexington, MA;
Glen Wilson, Maynard, MA;

Applicant(s)

Nuance Communications, Inc., Burlington, MA;

Assignment For Published Patent Application

Nuance Communications, Inc., Burlington, MA

Power of Attorney: The patent practitioners associated with Customer Number 000157176

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

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

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

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

If Required, Foreign Filing License Granted: 04/02/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/795,933**
Projected Publication Date: Not Applicable
Non-Publication Request: No
Early Publication Request: No
Title

METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND

Preliminary Class

455

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

NOT GRANTED

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

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/795,933	03/12/2013	William F. Ganong III	N0484.71090US01

CONFIRMATION NO. 2321

POWER OF ATTORNEY NOTICE

91337
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

OC000000110609095

Date Mailed: 08/22/2019

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/20/2019.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

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

/ldvan/

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/795,933	03/12/2013	William F. Ganong III	0013359USU1/4705A

CONFIRMATION NO. 2321

157176
Ohlandt Greeley Ruggiero & Perle, L.L.P.-VoiceBox
One Landmark Square, 10th Floor
Stamford, CT 06901

POA ACCEPTANCE LETTER

OC000000110609098

Date Mailed: 08/22/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/20/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

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

/ldvan/

Electronic Acknowledgement Receipt

EFS ID:	37621988
Application Number:	13795933
International Application Number:	
Confirmation Number:	2321
Title of Invention:	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND
First Named Inventor/Applicant Name:	William F. Ganong
Customer Number:	157176
Filer:	Andrew J. Tibbetts/Theressa Bresnahan
Filer Authorized By:	Andrew J. Tibbetts
Attorney Docket Number:	0013359USU1/4705A
Receipt Date:	31-OCT-2019
Filing Date:	12-MAR-2013
Time Stamp:	15:23:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		N048471090US01-POA-AJT.pdf	87813 7592c707313e969a24ef9f887794869c07a700ea	yes	2

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Power of Attorney	1	1
	Power of Attorney	2	2

Warnings:

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Information:

Total Files Size (in bytes):	87813

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

Doc Code: PA.
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

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

Application Number	Filing Date

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

[X] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 91337

OR

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

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

[X] The address associated with the above-mentioned Customer Number

OR

[ ] The address associated with Customer Number:

OR

[ ] Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

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

Nuance Communications, Inc.

[ ] Inventor or Joint Inventor (title not required below)

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

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

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

SIGNATURE of Applicant for Patent

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

Signature	Scott Ouellette	Date (Optional)	
Name	Scott Ouellette		
Title	Senior Director -- Intellectual Property		

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

[ ] Total of forms are submitted.

7648792.1

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

PTO/AIA/82A (07-13)
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Application Number	13/795,933-Confirmation No. 2321
Filing Date	March 12, 2013
First Named Inventor	William F. Ganong, III
Title	METHODS AND APPARATUS FOR DETECTING A VOICE COMMAND
Art Unit	2644
Examiner Name	H. C. Ho
Attorney Docket Number	N0484.71090US01

SIGNATURE of Applicant or Patent Practitioner

Signature	/Andrew J. Tibbetts/	Date (Optional)	October 31, 2019
Name	Andrew J. Tibbetts	Registration Number	65,139
Title (if Applicant is a juristic entity)	Attorney		
Applicant Name (if Applicant is a juristic entity)	Nuance Communications, Inc.		

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

☐ *Total of _____ forms are submitted.

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Dated: October 31, 2019 Electronic Signature for Theresa A. Bresnahan: /Theresa A. Bresnahan/

7654500.1

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13/795,933	Ganong et al.
	Examiner	Art Unit
	HUY C HO	2644

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

CLAIMS

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

CLAIM		DATE								
Final	Original	10/29/2019	10/29/2019	10/29/2019	10/29/2019	10/29/2019	10/29/2019			
	1	✓	✓	✓	✓	✓	✓			
	2	✓	✓	✓	✓	✓	✓			
	3	✓	✓	✓	✓	-	-			
	4	✓	✓	✓	✓	✓	✓			
	5	✓	✓	✓	✓	✓	✓			
	6	✓	✓	✓	✓	✓	✓			
	7	✓	✓	✓	✓	✓	✓			
	8	✓	✓	✓	✓	✓	✓			
	9	✓	✓	✓	✓	✓	✓			
	10	✓	✓	✓	✓	✓	✓			
	11	✓	✓	✓	✓	✓	✓			
	12	✓	✓	✓	✓	✓	✓			
	13	✓	✓	✓	✓	✓	✓			
	14	✓	✓	✓	✓	✓	✓			
	15	✓	✓	✓	✓	✓	✓			
	16	✓	✓	✓	✓	✓	✓			
	17	✓	✓	✓	✓	✓	✓			
	18	✓	✓	✓	✓	✓	✓			
	19	✓	✓	✓	✓	✓	✓			
	20	✓	✓	✓	✓	✓	✓			