

S-Pda: A Smart Pda For Agricultural Advancement

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Abstract: Agriculture is the science and art of cultivating plants and crops which is the key development for the human civilization. Statistics says that population of farmers in India was about 55% in 2006 and it has been steadily decreased to 43% in the year 2018. Government provides different agricultural fund schemes for raising the standard of agriculture. Young farmers failed to achieve success in this field because of the lack of knowledge. In order to provide them sufficient information, we put forward the device 'Smart-bot'. In our project, we intend to create two devices, one at the farmyard (Smart-sense) and other in the farmers hand called smart-bot. Smart-sense is easy to use which can be placed on the farm field to sense the atmospheric data, soil parameters, light values. This device sends the data retrieved to the cloud platform. The handy Smart-bot fetches these sensed data from the cloud and give the voiced output to the young farmers who are new to the agricultural occupation. The handy smart-bot is designed to support Artificial Intelligence. It is programmed in such a way that it can listen and answer the questions asked by the farmers in their language.

Index Terms: Cloud, ESP8266, IOT, PDA, Precision agriculture, Sensors.

1 INTRODUCTION

Agriculture is one of the rare area in which the technology has not reached in wide. Agriculture areas are getting replaced by urbanization day by day and the number of farmers is also getting declined. They left job and moved to different jobs. This decreases the crop production and there is a boom in this field now. Young farmers started moving towards agriculture but they don't have enough idea about cultivation. They expect technology to go hand in hand. In order to help young farmers, we have planned to develop a smartbot which act as a personal digital assistant. The system comprises of two modules, one at the farm site (smart-sense) and other at the farmers hand (smart-bot). The smart-sense the temperature, humidity etc and sends these factors to the cloud. Smartbot is a device that works using Raspberri-pi which can retrieve data from cloud. Smartbot has a language translator which can answer the questions asked by the farmers. Without proper knowledge on crops and crop field, it is difficult for the young farmers to sustain. So, precision agriculture [14,15] is most important and information regarding which fertilizer to be used for which kind of crop, which fertilizer has to be used for particular crop field, when to irrigate the field...etc. In traditional farming process, farmers irrigate the field periodically. The drawback in this method is sometimes the crops may not need water, or sometimes the amount of water poured may be more which leads to inefficient outcome from crops. So to overcome such issue this paper presents a soil moisture detection sensor to get soil moisture content so that crop can be irrigated accordingly. This also helps in preventing the over irrigation because apart from water Wastage, over irrigation can sometimes leads to diseases in crop. Like soil moisture, temperature and relative humidity along with light illumination around the plant is also a key parameter to control.

2 LITERATURE SURVEY

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Jani Mantjarvi et al. within the year 2005, projected a model "Identifying users of moveable devices from gait pattern with accelerometers" for distinguishing users of moveable devices from gait signal noninheritable with three-dimensional accelerometers. 3 approaches - correlation, frequency domain and knowledge distribution statistics were used. Test subjects (N=36) walked with quick, traditional and slow walking speeds in registration and take a look at sessions on separate days carrying the measuring instrument device on their belt, at back. distinguishing the users with this novel gait recognition technique showed to be potential. Best equal error rate (EER=7%) was achieved with signal correlation technique, whereas frequency domain technique and 2 variations of information distribution statistics technique made EER of 10%, eighteen and nineteen, severally. though these results square measure terribly promising, it's clear that they need to be improved for creating sensible applications feasible. Also, fusing results of many strategies would possibly improve the identification performance. It ought to be noted that we tend to don't see gait biometry as the sole user authentication technique for moveable devices, however rather as a complementary technique for existing ones. The potential drawbacks of the method are partly common to all gait based methods: effect of changes in the speed of walking, shoes and ground; also drunkenness and injuries affect gait [3]. The effect of positioning the personal device holding the accelerometers in different places and positions, such as pockets must be studied. Even though this PDA[7,8] caters to the social cause, it can be used for only one application specific device. W. Herbordt et al. in the year 2006, proposed a Personal Digital Assistant(PDA) "Handsfree speech recognition and communication on PDAs using microphone array technology" [4]. It is through with a electro-acoustic transducer array mounted on the personal digital assistant. associate outlier-Robust Generalized Sidelobe Canceller(RGSC) and a Minimum Mean-Squared Error(MMSE) reckoner for log Mel-spectral energy coefficients employing a mathematician mixture model(GMM) for clean speech ar enforced in period of time and evaluated for speech recognition supported atiny low experimental multichannel information. it's shown that the joint system of beam-former and monophonic noise suppression extremely improves the noise lustiness of a large-vocabulary speech recognizer so right down to SNR=5dB over ninety one word accuracy is obtained.The hands-free interface consists of a real-time

implementation of a combination of an outlier-robust generalized sidelobe canceller and a MMSE estimator for log Mel-spectral energy coefficients of clean speech. Based on a small experimental database recorded with the PDA microphone array, it was found that both noise suppression methods have similar performance and that the joint system highly improves the word accuracy of a large vocabulary. However this PDA is not IOT enabled. Ruhi Sarikaya, in the year 2017, proposed the "Technology behind the personal digital assistants" where the PDA has the promise of enhancing a user's productivity by either proactively providing the information the user desires within the right context (i.e., time and place) or reactively responsive a user's queries and finishing tasks through language. Tasks are often associated with device practicality, applications, or web services. These PDAs are built to help the user get things done and provide easy access to personal/external structured data, web services, and applications. They additionally assist the user in his or her daily schedule and routine by serving notifications and alerts supported discourse info, such as time, user location, and feeds/information produced by various web services, given the user's interests. Collectively, these functionalities are expected to make the user more productive in managing his or her work and personal life. The speech recognition component maps the human speech represented in acoustic signals to a sequence of words represented in text. These PDAs make use of some core set of technologies, such as machine learning, speech recognition, LU, question answering (QA), dialog management (DM), language generation (LG), text-to-speech (TTS) synthesis, data mining, analytics, inference, and personalization. These PDAs will surface on many different devices and environments. This will create new signal processing challenges, such as accurate speaker separation and tracking in multi-speaker environments (e.g., home, car), robustness with respect to different device types, and robust speech recognition across age, gender, and accent. Advances in algorithms, signal processing, and machine learning would be needed to solve these problems. And it can only control small number of devices. It is likely that true natural language human-computer interaction with gadgets may take another decade to be second nature.

3 EXISTING SYSTEM

There are a number of personal digital assistants that are in existence in today's market. A few of them are discussed below:



Fig. 1 Existing models of PDA

3.1 Siri by Apple Inc.

Siri is an intelligent personal assistant, part of Apple Inc.'s iOS, watchOS, macOS, and tvOS operating systems. Siri was initially released as an app for iOS in February 2010, and it was acquired by Apple two months later[12]. The assistant uses voice queries and a language programme to aim to answer queries, make recommendations, and perform actions by delegating requests to a set of Internet services. The software system adapts to users' individual language usages, searches, and preferences, with continuing use. Returned results are individualized. Siri has become an integral part of Apple's products, having been adapted into newer iPhone models, as well as iPad, iPod Touch, Mac, AirPods, Apple TV and HomePod. Siri supports a large vary of user commands, including performing phone actions, checking basic information, scheduling events and reminders, handling device settings, searching the Internet, navigating areas, finding information on amusement, and is able to engage with iOS-integrated apps.

3.2 Cortana by Microsoft Inc.

Cortana was incontestable for the primary time at the Microsoft BUILD Developer Conference (April 2–4, 2013) in San Francisco but the development of Cortana started in 2009 in the Microsoft Speech products team[13]. It has been launched as a key ingredient of Microsoft's future operating systems for Windows Phone and Windows. It is named when Cortana, a synthetic intelligence character in Microsoft's Halo video game franchise, with Jen Taylor, the character's voice actress, returning to voice the personal assistant's US-specific version. Cortana will set reminders, recognize natural voice without the requirement for keyboard input, and answer questions using information from the Bing search engine. Cortana will integrate with third-party apps on Windows ten or directly through the service.

3.3 Alexa by Amazon Inc.

Alexa is Associate in Nursing intelligent personal assistant developed by Amazon, first used in the Amazon Echo and the Amazon Echo Dot devices developed by Amazon Lab126. Most devices with Alexa enable users to activate the device employing a wake-word, other devices require the user to push a button to activate Alexa's listening mode. It is capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic, and other real-time information, such as news. Alexa can even management many sensible devices exploitation itself as a home automation system.

3.4 Google Assistant by Google Inc.

Google currently was a feature of Google Search giving prophetic cards with info and daily updates within the Google app for golem and iOS. It was initial enclosed in golem four.1 ("Jelly Bean"), which launched on July 9, 2012, and was first supported on the Galaxy Nexus smartphone. Google Now competes against assistants such as Apple's Siri and Microsoft's Cortana[15]. Google currently was enforced as a side of the Google Search application. It recognized repeated actions that a user performs on the device to display more relevant information to the user in the form of "cards". Google

currently proactively delivered info to users to predict info they will want. While the product doesn't exist any longer as Google Now, the functionality is still available on the Google app and its feed. Google Now has now been renamed as Google Assistant.

4 PROPOSED MODEL

The proposed model has two modules. In our project, we intend to create two devices, one at the farmyard (Smartsense) and other in the farmers hand called smart-bot. Smart-sense is easy to use which can be placed on the farm field to sense the atmospheric data, soil parameters, light values. This device sends the data retrieved to the cloud platform. The handy Smart-bot fetches these sensed data from the cloud and give the voiced output to the young farmers who are new to the agricultural occupation.

4.1 Working of Smart-sense:

Smart-sense is considered as IoT [12] gadget focusing on real time monitoring of environmental data in terms of Temperature, Moisture, humidity and other types depending on the sensors used in it. Five sensors used are - soil moisture sensor, LDR sensor, Temperature sensor, DHT 11 humidity sensor and ultrasonic sensor. Smart-sense is implemented with a solar panel and battery. Smart-sense is a plug and sense module in which the device can be kept in the field and these sensed data can be feed in the smart-bot through cloud platform. We use an aduino board integrated with different sensors to collect the soil related parameters. The sensed data is send over the internet to Thingspeak cloud such that the data can be accessed remotely anywhere at anytime.

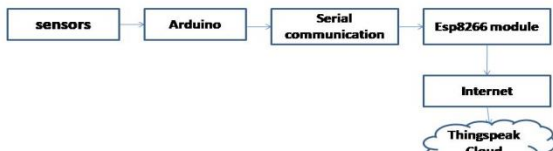


Fig.2: Block diagram of smart-sense

4.2 Working of Smartbot:

The data sensed by Smart-sense is send to cloud. 'Smartbot'- The device in the hands of farmers provides information based on the farmers request by retrieving data from the cloud. Any information related to soil including the type of fertilizer to be used, type of crop to be grown, which plant is suitable for which season, all these information will be provided by smart-bot based on the voice request provided by farmer by fetching the data from the cloud sensed by sensors. It answers to any general question asked by farmers by fetching data from internet. Smart-bot is programmed in such a way that it can listen and answer the questions asked by the farmers in their language.

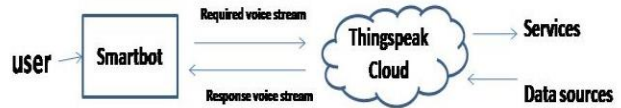
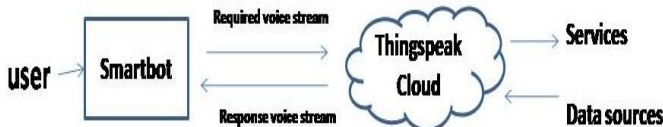


Fig.3: Block diagram of smart-bot

This intelligent personal assistant learns from us every time we use it and by the information provided there, it adapts to user's language usages, searches and preferences. Our device recognizes our speech [1] using Speech recognition [2] and processes it by Language Understanding (LU) and identifies the type of the command and provides the result in speech by the help of Text to Speech (TTS) synthesis. It

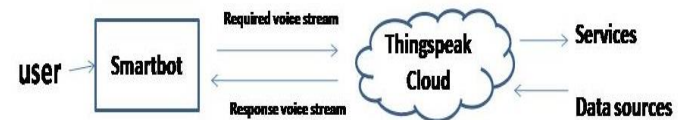
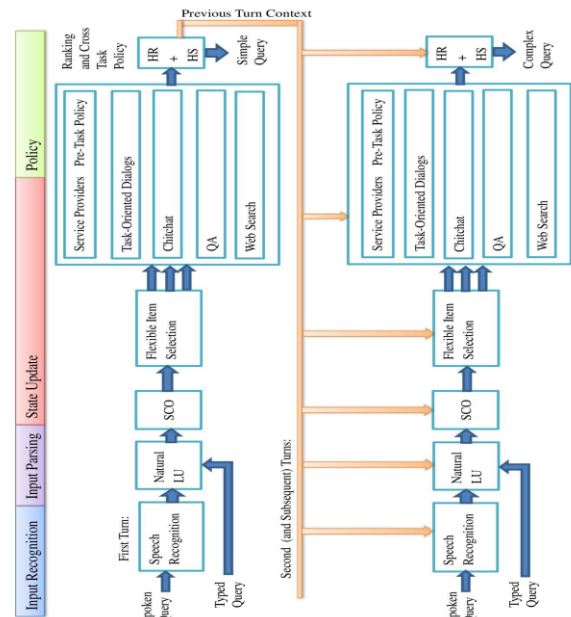


Fig 4: Architecture block diagram of Smartbot

4.2.1 Functional blocks

Reactive assistance is traditionally known as the conversational understanding system. The conversational understanding system for PDAs[10] spans a wide spectrum of domains, including goal-/task- oriented dialogs, chitchat, QA, and classical web search answers. The conversational understanding system also handles additional input modalities besides speech, such as typing and/or touch. Each of these domains is commonly referred to as an answer (A). Some of the domains involve device functionality (e.g., alarm, SMS, reminder), while others may involve web services. and applications (e.g., directions to a particular location, stock

input. This intelligent personal assistant learns from us every time we use it and by the information provided there, it adapts to user's language usages, searches and preferences. Our device recognizes our speech using Speech recognition[6] and processes it by Language Understanding (LU) and identifies the type of the command and provides the result in speech by the help of Text to Speech (TTS) synthesis. It organizes our day which can make our busy life easier to manage. Here, complex work is concentrated on adding a natural user interface to the device so that it can interact with the user. Unlike other past personal digital assistants, our Smart-Bot can support multiple devices and operating systems. It is less expensive since it has an open source hardware and software. It is more secure as it does not support data mining and data breaching.

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