Felicity-A Personal Home Automation System

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ABSTRACT

Felicity is a virtual personnel assistant that is android based that provides assistance to your daily activities. Felicity achieves this by breaking down complex activities to simpler ones and then customizes it according to the user needs. Felicity implements a habit learning technique that automatically learns what the user likes and dislikes. Basically felicity will be equipped with 100+ sets of small simpler tasks. Felicity uses speech recognition technology of Google. Felicity consists for an android app, a server and an IoT enabled microcontroller controlled hub situated at your home. Felicity integrates both IoT and personal assistance to provide best user experience. Felicity can be your alarm to your home keeper. Almost any devices can be connected to felicity and controlled from your smartphone through voice commands. What sets felicity apart is its ability understands sentences and then extracting the context. The user will have to first sign up for an account and register their controller hub in order to be able to access it. Felicity has high security and ability to retain the user customizations and preferences even if the smartphone app is uninstalled. All the user data is stored in our server and all the processing happens inside the server. The server then communicates with the hub to control the device..

Index Term— Internet of Things, Home automation

1. INTRODUCTION

The Internet of Things (IoT) refers to the ever-growing network of physical objects that can access Internet and communicate with other devices. IoT enabled home appliances helps in seamless home keeping and power saving. A thing, in the Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network. Kevin Ashton, cofounder and executive director of the Auto-ID Center at MIT, first mentioned the Internet of Things in a presentation he made to Procter & Gamble in 1999.

Practical applications of IoT technology can be found in many industries today, including precision agriculture, building management, healthcare, energy and transportation. But the most innovative and sort after technologies of IoT focuses on home automation. Although home automation has been around since the 1970's, it did not achieve high market penetration due to high costs, proprietary communication standards, and reliance on installers/users with high-tech

savvy. With the use of miniaturized modules that leverage 802.11bgn Wi-Fi home networks, and run at ultra-low powers, it won't be long before every device in the home is connected to the home network and accessible directly, over the home network, and even remotely from across the world. These connected home devices will be able to coordinate energy usage, consumer convenience, and possibly accurately and consistently anticipate the needs of the people who dwell in the homes. Many analysts believe that the point of inflection has been reached where the cost of enabling products for the home with Wi-Fi is outweighed by the advanced features, updates, user convenience, and data collection and analytics (and possible subscription revenue) that could come from devices connected to the internet and ultimately to cloud services. It is no longer a matter of if, but of how soon. Consumers are beginning to look for wireless capability on their devices they buy for their home, and new home construction is increasingly installing wireless enabled devices as the default installation choice.

Several stellar smart home IoT devices have already hit the market and made their way into thousands of houses around the world. The cost of the IoT devices was further reduced as it eliminated a dedicated remote control device by using smartphones. Most of the current systems consist of an app client, a server and an IoT enabled central hub where all the appliances and sensors are connected. But the main problem is that these apps have either a touch user interface or support only a handful of voice commands limiting the flexibility of usage.

Felicity consists for an android app, a server and an IoT enabled microcontroller controlled hub situated at your home. Felicity integrates both IoT and personal assistance to provide best user experience. Felicity can be your alarm to your home keeper. Almost any devices can be connected to felicity and controlled from your smartphone through voice commands. What sets felicity apart is its ability understands sentences and then extracting the context. For example current voice command enabled apps require you to say specific words like "Turn the lights ON" or "Lights ON" ,but felicity will respond to any sentences that specify that meaning like "It's a bit dark in here" or "Can you turn the light ON" or "Turn the lights" . Felicity have a flexible way to accept commands the more you use it and the more mistakes it makes

it learns and remembers it the next time. Felicity achieves this by breaking down complex activities to simpler ones and then customizes it according to the user needs. Felicity implements a habit learning technique that automatically learns what the user likes and dislikes. Basically felicity will be equipped with 100+ sets of small simpler tasks. Some of them are automatic alarm setting, changing room specifics according to situation, reminders, app launching, turning ON and OFF appliances. Felicity uses speech recognition technology of Google and implements custom text to action algorithms.

The user will have to first sign up for an account and register their controller hub in order to be able to access it. The user will have the advantage that felicity has high security and ability to retain the user customizations and preferences even if the smartphone app is uninstalled. All the user data is stored in our server and all the processing happens inside the server. The server then communicates with the hub to control the device.

2. FRAME WORK

The objective of the plan proposed in this paper is to make a user control appliances and equipment's easy to be used everywhere anytime. For example, a user in a room can control all the appliances installed in other rooms as well as the room itself. Fig. 1 shows the proposed framework for home appliance control. An IoT board is installed at home and acts as a home appliance control center.
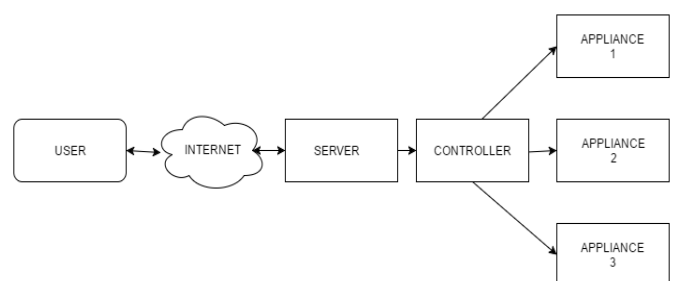

Fig-1: System Architecture.

The proposed system consists of the following:

- Android Application
- Controller
- Server

2.1 Android Application

The feature of our remote control system is that the system has human friendly interface just as persons communicate with each other. For example, when the system did not recognize a person's speech command, the system asks

once more for a voice command to repeat what a person said. We designed and produced the remote control system in order to realize the human friendly interface. The application has not only speech recognition but also textual input box. Both helps user to automate the appliances at home.

2.2 Controller

The controller is a stand-alone device that controls all the appliances at home. The controller is extensible according to the users need. It also consists of sensors that can monitor the ambiance of each room. It gets its input from the server and acts accordingly on the appliances to which it is connected.

2.3 Server

The server manages all the clients connected to it. Each user acts as a client and also each user has a unique profiling of his/her house. At the beginning each user sign up with the felicity server. Now a preloaded set of instructions are provided to the new user. The user can now train the application according to his needs and add information to the artificial intelligence.

Each time the user log in using his account, he gets a session id, using which the future communication during that particular session occurs. This is particularly to increase the security of the system.

3.   IMPLEMENTATION

A.   Control Box

In relation to this research project, a controller box was made that controls appliances. The controller box consists of raspberry pi, a relay board and power source. The raspberry pi runs on windows 10 IoT that provides basic facilities like access to internet and runtime for the controller program we designed. The raspberry pi gets commands from app via server and then sends ON/OFF signal to relay board.

B.   Public Server

The public server provides the cloud processing for artificial intelligence and also helps to connect the app to controller from anywhere. It also stores the user related data like customization data, room configuration etc.

C.   App

The application provides the speech recognition, text to speech and basic user interface to interact with devices. The application connects with server in order to communicate with the controller.

4.   CONCLUSION

Our proposed system introduces a new concept of binding personal assistance and home automation seamlessly into single app. Our system also provides high security and flexibility by incorporating advanced text to action algorithms and Google's voice recognition technology. Together Felicity aims at revolutionizing the way people interact with devices and how they manage their day to day activities. Felicity have a flexible way to accept commands the more you use it and the more mistakes it makes it learns and remembers it the next time. Felicity achieves this by breaking down complex activities to simpler ones and then customizes it according to the user needs. Felicity implements a habit learning technique that automatically learns what the user likes and dislikes. Felicity uses speech recognition technology of Google and implements custom text to action algorithms.

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