

Intelligent User Interface in a Smart Home Using Internet-of-things

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ABSTRACT

This paper describes a system that provides smart home automation. Home automation is nothing but making a house smart. To make a house smart we have to use different sensors, protocols and user interface. The user interface of the smart home should be smart enough to enable the user's comfort zone by providing various facility. The present paper discusses on a smart application of home automation which makes the user interface consumer friendly.

Keywords: Home Automation, Internet of Things, Power Consumption, Control/Monitor, User Interface, Refrigerators, Television, Washing Machines, Phone, Kitchen Gas Stove, Air conditioning System, Lighting System

1. INTRODUCTION

The present invention relates to the field of Internet of things (IOT) in Home Automation.

The goal of this research is to develop a smart system for home management. Automation and centralized monitoring have many benefits for family members and family caregivers. Smart homes have advantages on optimizing the energy consumption and enabling energy saving. The system therefore enables a greener environment on a long run.

Internet-of-Things enables a smart home with the integration of digital and wireless technologies.

Our research team has developed a smart system that challenges the current system and provides the following advantages for a smarter home.

1. An input module that is capable of receiving information from a plethora of sensors that are capable of recording the health-status of the utility devices;
2. A processing module that processes the data and simultaneously informs the home-supervisor regarding the health status of the utility devices;
3. A display module that can act as a means to control the interconnected devices and raise service requests in case of any failure, malfunction.

The implementation and description of home automation would be discussed in the preceding sections of this paper.

2. DESCRIPTION

The paper discusses in detail on a smart user interface that monitors, controls, automates and assist in servicing home-based electronic, static and mobile devices/instruments.

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The intelligent user interface may be a smart phone, laptop, tablet or a standalone device. But in this present disclosure a smart app to control, monitor and assist home automation is installed within the above all user interface to make the user interface user friendly and effective. By using the smart app for home automation multiple users can control the equipment's of the house.

The application for the smart home is designed for the particular home which is associated with the specific sensors, protocols used in that particular home which can make the application unique for each home. The user can set a specific password for the application which can be shared among the family members through which each member can access the smart home application to monitor, control and assist different equipment of the home.

Additionally, the user can access the application from different user interface at the same time by entering the password. The advantage of this present disclosure is multiple users can monitor, control the equipment with multiple user interface.

The smart system utilises internet of things to design an intelligent User Interface. The intelligent user interface will facilitate the connection and networking of household utility devices such as refrigerators, television, washing machines, fixed phone, radio, kitchen gas stove, air conditioning system and lighting system.

The intelligent user interface that is designed to monitor, control, automate and assist in servicing of home-based utility devices comprise of three module i.e. input module, processing module, display module.

For the input module the system uses a plethora of sensors such as gas detection sensor, smoke detector sensor, temperature sensor, infrared sensor, motion detection sensor. These sensors are placed in various places in the home for various purposes.

The Infrared sensors are placed at the main doors, windows to detect the unauthorized entry. This sensor uses LED and photo detector to detect any intrusion.

One of the most popular sensor technologies for home automation systems is the motion detector. The Pyro-electric Infrared (PIR) Motion Sensor Module use (PIR) Sensor Module for human body detection. It uses fire alarm sensor like optical sensor to detect any fire in the house as the sensor uses light beams and if any smoke generated from fire interrupt the light beam then alarm will be raised.

Another sensor used in the smart home is temperature sensor: It is used to check the temperature inside kitchen. Similarly, LPG Gas sensor; MQ-6 gas used to detect different combustible gas as this is highly sensitive to methane.

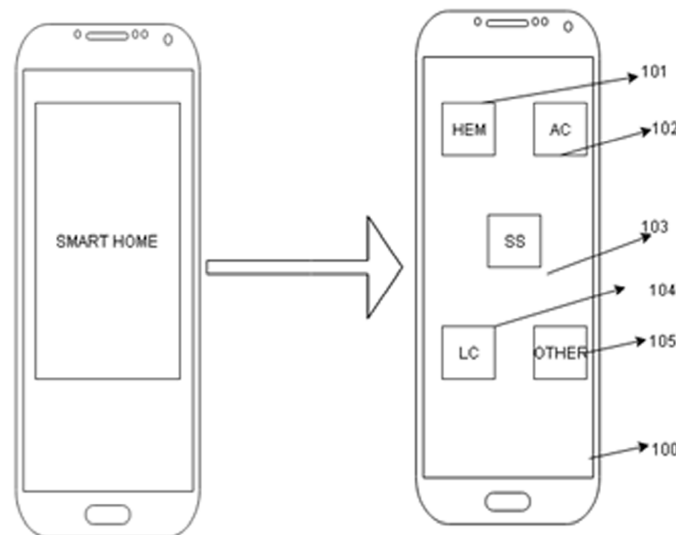


Figure 1: Smart Application and the different options on the Smart Application Page

Whenever the input module detects / senses anything it will inform the processing module. The processing module processes the data and simultaneously informs the smart user interface. The processing module uses near field communication device such as zigbee, Bluetooth device along with the GSM protocol, the processing module after receiving the data from input module will intimate the output module with messaging system or alarm system.

Then the processing module will send the information to the output module which is the smart user interface application. The system provides a user friendly interface at the user end which allows them to monitor the status. Fig.1 illustrates the smart application and the different option on the smart application page 100. When the user login to the smart app, the smart application page 100 opens which is having the option of home energy monitor 101, appliance control 102, security system 103, lighting control 104 and others 105. By clicking on the specific option the user can control or monitor the status of every system.

After opening each option there will be two options such as manual and automatic. By choosing the manual option user can operate the equipment. If the automatic option is being chosen, then the device can be operated automatically based on the value and setting done by the user. For example, it will cut off the power supply to a room or to a particular equipment by tripping the power supply whenever it senses any problem regarding the current flow, controlling the brightness of the lighting system based on the climate or presence of a human, control the duration for which a landline is used and may disconnect the call after a pre-set time period to avoid raising the cost factor.

Fig.2 illustrates the block diagram of complete working scenario of the smart application. When the user login to the smart app, the smart application page 100 opens which is having the option of home energy monitor 101, appliance control 102, security system 103, lighting control 104, others 105. When the user clicks on each option on the screen it will show the details of every system.

When the user clicks on the energy monitor option, it will show the detail of how much electricity each of your appliances, gadgets and electrical systems is using overall, and at any emergency time, informs the user to reduce the energy consumption.

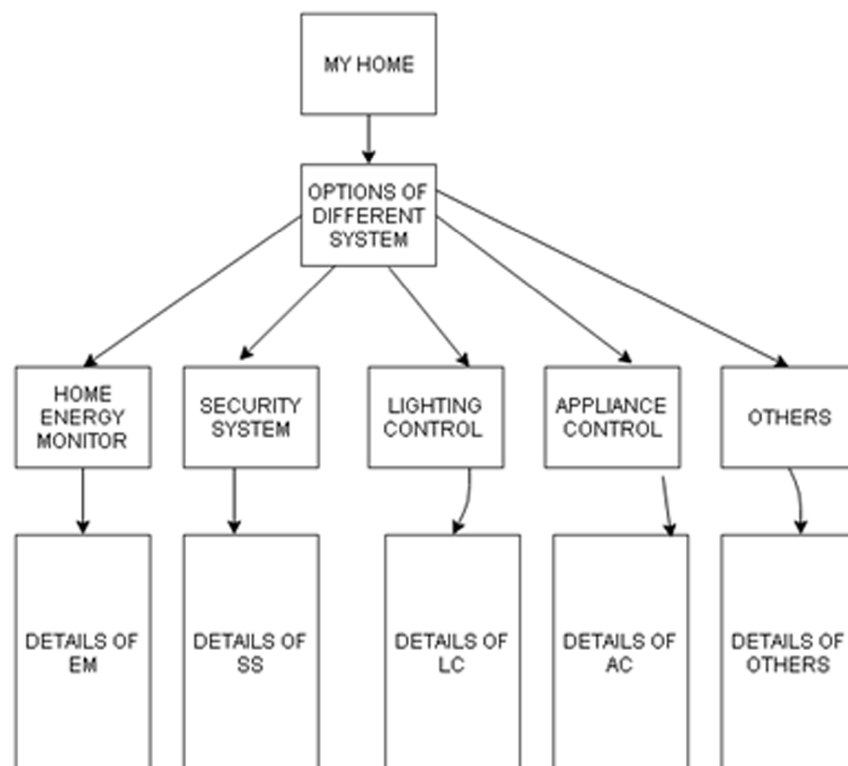


Figure 2: Working Scenario of the Smart Application

When the user clicks on lighting control option, the details about the light sensors and motion sensor will be shown on the screen. The automatic on/off of light and operation of security lights after dark, or make outdoor lighting come on automatically at dusk can be controlled by the user.

When the user clicks on appliance control option, then the entire appliance name will open on the screen. By choosing each of the appliance option users can control the devices.

When the user clicks on security option the details of the security sensor will appears on the screen and user can modify the security option based on his desire.

3. IMPLEMENTATION

The present invention and its advantages can be implemented as described below. Objects of this present disclosure describes a smart application of home automation to be used by multiple users of the family using multiple user interfaces.

The current research utilises internet of things to design an intelligent User Interface that is going to monitor, control, automate and assist in servicing home-based electronic, static and mobile devices/instruments

A smart home is based on three modules such as input module, processing module and output module. The input module includes various types of sensor to make the smart home, the processing module includes the GSM protocol and the output module includes a smart application.

4. APPLICATIONS

The invention as described in the drawing finds applications in Home, Office and Industry.

5. CONCLUSION

The present invention provides a system to enable a smart home wherein a network of all the equipment in a home are connected through internet-of-things. The user interface connects assists, monitors and controls all the equipment in the home enabling an intelligent home automation.

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