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Architecture for Internet of Things (IOT) for Home Automation

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Abstract: *Today's, smart objects in Internet of Things (IOT) are able to detect their state and share it with other objects across the Internet, thus collaboratively making intelligent decisions on their own. Humans always find alternatives around them to carry out their work smoothly. Service provisioning in IOT should also be made capable of providing similar or alternate objects that are aligned with user requirements, current context and previous knowledge without any human intervention. With advancement of Automation technology, life is getting simpler and easier in all aspects. Now a day's Automatic systems are being preferred over manual system. Traditional methods of household chores are replaced by automation system which is adaptable with the modern world. The manual systems are not more acceptable by the new generation peoples, so traditional methods are to be replaced. We have reported an effective implementation for Internet of Things used for monitoring regular domestic conditions by sensing system. Architecture of home automation is based on the appliances fault detection unit, kitchen safety unit, grocery monitoring unit. This smart object in Internet of Things (IOT) is able to detect their state and share it with other objects across the Internet, thus collaboratively making intelligent decisions on their own.*
Keywords: XBEE Wireless sensor network, Signal Conditioner, ADC (Analog To Digital Converter), Microcontroller.

1. Introduction

Many existing, well-established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance. Wireless systems can be of great help for automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere. In this project we are implementing the home automation process as a wireless system by making use of the sensors. Homes of the 21st century will become more and more self-controlled and automated due to the comfort it provides, especially in busy human life. A home automation system is a means that

Allow users to control appliance fault detection unit, grocery monitoring unit and kitchen safety unit [1].

We are using XBEE protocol for wireless communication which is connected between server and micro controller, ADC and signal conditioner. Home automation systems face four main challenges; these are high cost of ownership, in flexibility, poor manageability, and difficulty in achieving security. The main purpose to design and implement a home automation system using IOT that is controlling and automating most of the house appliances through an easy manageable web interface. The proposed system has a great flexibility by using Wi-Fi technology to interconnect its distributed sensors to home automation server. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration. Automating home helps in reduces manual labour, increase reliability and efficiency, and also helps in providing security. IOT is rightly defined as: The Internet of Things allows people and things to be connected Anytime, Anyplace, with Any-thing and any one, ideally using any path/network and any service [2].

1.1 ADVANTAGES

1. Reduce human efforts: As this system works by automatically human do not require to apply more efforts.
2. Multitasking: Multiple functions are doing at the same time without efforts of the human.
3. Reduce time: As this system is multitasking so the time require will be less.

1.2 APPLICATIONS

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1. Lighting control system: The voltage of the LED or tubes is high or low.
2. Security: It provides the security for fire and smoke.
3. Leak detection: It will detect the leakage of gas cylinder in kitchen.

1. Architecture of home automation system

To design a intelligent home automation system to reduce the human efforts and save time by overcoming the traditional methods of detecting the faults in home appliances and fixing it by using sensors.

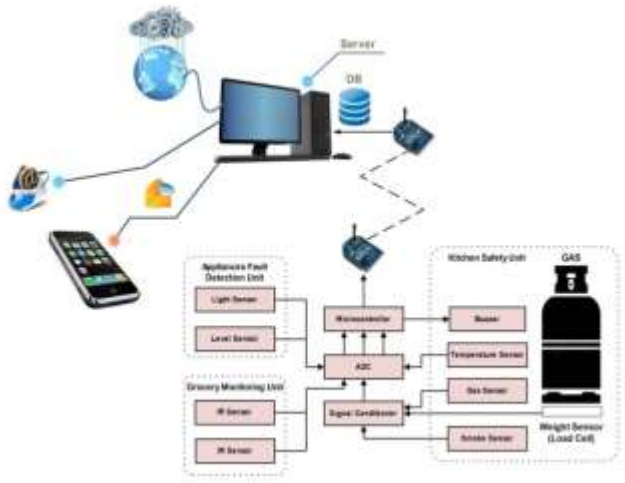

Figure : Architecture of home automation system

In architecture of home automation system there are three units which consist of eight sensors. These eight sensors send the value in analog form to the signal conditioner. Signal conditioner does the amplification and send the analog value to the ADC. ADC converts these analog values in digital form and sends to the microcontroller. Microcontroller sends these digital values to the server through the XBEE wireless sensor. Here we are using two XBEE wireless sensors one for the sender and another is for receiver. Server is handling all the system after receiving the sensors value it will check or compare these value to the actual value which is already store in the database as well cloud. Here we are using a private cloud for the backup. If the receive value is greater than the actual value it will send the alert message to the particular shop or the agency as well as the admin.

2.1 SIGNAL CONDITIONER

In electronics, signal conditioning means manipulating an analog signal in such a way that it meets the requirements of the next stage for further processing. Most common use is in analog to digital converters.

In control engineering applications, it is common to have a sensing stage(which consist of sensor), a signal conditioning signal is done)and a processing stage(normally carried out by an ADC and a microcontroller). Operational amplifiers are commonly in the signal conditioning stage.

2.2 ADC

An analog to digital converter(ADC)is very useful feature that converts an analog value to a digital value. By converting the analog value to digital value, we can begin to use electronics interfaces to the analog world around us.

2.3 XBEE SENSOR

XBEE sensor are compact, battery powered environmental sensor for XBEE networks. They provide real time temperature, light and humidity information for verity of applications including automation and security, energy management vehicle monitoring and many more. XBEE adapters provide wireless connectivity to electronic devices.

XBEE is a wireless sensor. It communicates between server and microcontroller. We need WI-FI or internet continuously to communicate between severs to XBEE and XBEE to microcontroller. We are using two XBEE for communication.

Figure : XBEE Wireless Sensor

2.4 MICROCONTROLLER

Microcontroller is a small computer on a single integrated circuit. Microcontroller contains one or more CPU's along with memory and programmable input/output peripherals. Microcontroller is used in automatically controlled products and devices.

2.5 AVR

AVR is a family of microcontroller. AVR is a modified Harvard architecture machine, where program and data are stored in separate physical memory system that appear in different address spaces, but having the ability to read data

atoms from program memory using special instructions. AVR have 32 single-byte registers.

2.6 APPLICATION OF FAULT DETECTION UNIT

LIGHT SENSOR

Light sensor is an electronic device used to detect light. A light sensor is something that it can used to detect the current ambient light level that is how dark or bright it is.

It is used to detect fault detection like if LED i.e. light of homes are going to dead it will detect it and inform to the system and as well as the admin after that system will inform to the electrician whose information is stored in our database from which he will come at home and repair it.

LEVEL SENSOR

It is used for the level detection like purifier or any tank which is used in home we will set the level of the tank according to the mark of the level it will inform to the system the particular thing is going to over system will give the alert message to the admin.

2.7 FAULT DETECTION UNIT

IR SENSOR

IR sensor is the infrared sensor. We are using IR sensor for the grocery detection we are using two IR sensor for this we are setting the level of the container to check the amount of the grocery according to this it will make the list of the grocery item and inform to the shopkeeper whose detail is already stored in database.

2.8 KITCHEN SAFETY UNIT

BUZZER

Buzzer is used in kitchen safety unit whenever there is chance of fire buzzer will be sound. If the degree of the temperature gets higher then also it will sound.

TEMPRATURE

It continuously checks the temperature of the kitchen. It will detect the degree of temperature of kitchen and if temperature is high it will inform to the system.

GAS SENSOR

Gas sensor is using in kitchen safety unit. It is use to check the leakage of gas. When the gas will leak it will detect it and inform to the system as well admin.

SMOKE SENSOR

It is use in kitchen safety unit. It is use for to detect the fire if the smoke is high and also temperature is high there is a chance of the fire it will detect it and inform to the system as well as admin.

WEIGHT SENSOR

Weight sensor is used in kitchen safety unit to detect the amount of gas in LPG. Whenever the gas is going up to finish point it will observe its weight and give this status to the system and system will inform in LPG office.

1. CONCLUSIONS

In this paper , we proposed a system that focuses on rapidly searching objects in IOT that are relevant to the user to minimize their work at home using home automation system this will help the user to analyze the condition of various units that are application fault detection unit, kitchen safety unit and grocery monitoring unit in the home any time.

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