Home Automation System by using IoT

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Abstract: **With the advent of IOT technologies and Smart Buildings, the need for Building Automation Systems (BAS) that automatically performs computations without the intervention of humans have also increased. This Paper deals with controlling the various electrical appliances in any building. With the help of this system, remote monitoring of the building as well as leveraging control on the indoor parameters through HVAC control systems is possible at real-time. Finally performs mass combination to derive a conclusion about the occupancy status in a room. A probability mass assignment function has been proposed for this purpose. Multiple observations if correctly fused and associated then the combination of two or more sensors. Can implement the system for college automation system based on occupancy sensor and also includes gas sensor, temperature sensor and light sensor with real time IoT Environments.**

Keywords: **Arduino microcontroller, Sensors, IoT, Wi-Fi Panel, Relays, Cloud Implementation.**

1. Introduction

The raise of IoT technologies can lead to control the smart devices without the help of human intervention. One of the Basic Application is used to control the Electrical Appliances in a Room by Using the Occupancy Sensing in a Room. By Implementing the IoT technologies in the building we can easily monitor the any electrical appliances by using the cloud Environment. The Occupancy Sensing is the main term that we monitor the all electrical Appliances in the Building. For example, Any Natural disaster or Fire in the room or Building the occupancy sensing in building can Automatically detect the Smog level and Cut off Power Supply by electrical appliances. The Occupancy sensing can also be used to Control the light, fan etc., in the room. By controlling these electrical appliances through Occupancy sensing we can save lot energy and unwanted usage of power consumption may be avoided. For example, we can control light and fan in the room by using Motion detector s and Occupancy sensing in the room. If the person enter in the room the heat can automatically detected by occupancy sensing and motion detectors it automatically control the light and Fan in the Room by using this concept. We can Use Temperature Sensor, Occupancy Sensor, Humidity Sensor, Gas Sensor, Light sensor, Water level sensor. The Water Level Sensor is for Controlling the Motor.

2. Literature Review

[1] Rui Zhang, This Paper Used Accelerated Statistical Learning Technique (ASL). It can be Implement in Open Spaces Buildings Only. It can count Only Values. Direct Sensing Cannot Be Implemented.

[2] E. Zervas, This Paper approaches SCIER (Sensor and Computing Infrastructure for Environmental Risks) framework. It can detect Only Fire. But Cannot Assure the Fire Can be Detected Only By the Fire. It Can Provide Only Uncertain Data.

[3] Osman S, This Paper Deals with Thershold Value. This is mainly for Fire Detection. Thershold Method Produces False negative Values, Which Means the Value Produced by Each Sensors Cannot Accurate.

[4] Syed Muhammad Sajjada, This Paper Deals with Packet Generattion Rate Algorithm. We can Give Only Simulation as an Output We cannot implement in the Real Time Environments.

[5] Susan Mckeever, This Paper approaches DAG (Direct Acyclic Graph) technique. We can Implement Each Sensor as a Separate. So it is expensive and more cost.

[6] Pawar Pallavi Tatyasaheb, B.E. Shinde, Arudino Technolgy can be used. Multiple Sensors can be connected.

[7] Subhankar Chattoraj, Arudino can be act as mega controller or master controller. More sensors can be connected.

3. Problem statement and system definition

In this paper we consider a problem of occupancy sensing which is formulated as a classification problem where each class is characterized by a distinct set of attributes or parameters. The Fusion of sensors and the Information derived from the sensor sources were not possible in the past. This is because of manual automation system takes place in sensor reaction. The architecture has to be re-trained for a new environment. It is expensive. In this paper it has been proposed that the system can be implemented even in huge buildings as a single unit. An external decision maker is needed for overall decision to monitor the unit entirely. Occupancy detection is primarily a classification problem, where a set of features characterize the behaviour of a particular class. Exponential distribution between the vacancy intervals which means the automatically allocated between each interval. Integrated framework for cloud with embedded system integrated framework is nothing but combination of embedded fog along with the cloud. This paper deals with detection of occupancy in a room in college from various ambient sources like temperature, humidity, light, water level and gas. With the help

International Journal of Research in Engineering, Science and Management
Volume-2, Issue-7, July-2019
www.ijresm.com | ISSN (Online): 2581-5792

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of this system, remote monitoring of the floor as well as leveraging control on the indoor parameters through HVAC (Heat Ventilation Air Conditioning) equipment needs a control system to regulate the operation of HVAC system. This system can also be simulated in a single room as well as can be implemented in real-time for a huge building. It is purely IOT based system and is used to view the status in Cloud and mobile.

4. Existing system

Problem of occupancy sensing is formulated as a classification problem where each class is characterized by a distinct set of attributes or parameters; The value of which is obtained by effectively fusing. the information derived from the sensor sources. The decision to perform the statistical computations within the building itself Manual automation system can be followed in the existing system.

5. Proposed smart controller automation system functions

The proposed Smart controller automation system can control the following components:
- Temperature
- Humidity
- Motion detection
- Fire Detection
- Smoke Detection
- Light level

The proposed system can control the following electrical appliances in homes and building.
- Light on/off
- Fan on/off
- Motor on/off

6. Modules description

- Embedded Design
- Sensor Implementation
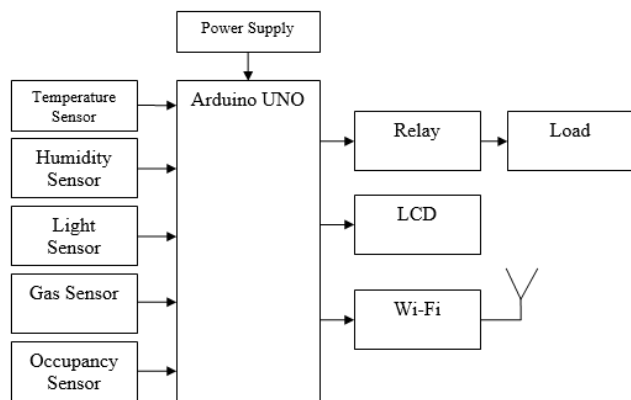- Cloud Implementation
- Arduino Based Monitoring

Fig. 1. Block diagram of smart controller automation system

A. Embedded design

An embedded system is a computer system with a dedicated function within an electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Now-a-days embedded systems control many devices which is in common use. In this section, design embedded system using Arduino controller is carried out. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read input signal emitted as a light on a sensor. It can also sense other inputs such as CO_2, temperature, heat, water etc.
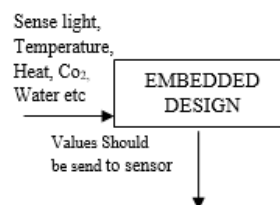

Fig. 2. Embedded design

B. Sensor implementation

A sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomenon. This section contains various sensors such as temperature sensor, object sensor, light sensor, water level sensor and gas sensor. The Arduino board is connected with the temperature sensor to sense the surrounding temperature. The positive volts A0, GND is connected with Arduino board. The ADC converts analog values in to a digital approximation based on the formula.

$$ADC \ (value)=Sample * 1024/ref.$$

The gas sensors use a small heater inside with an electro-chemical sensor. They are sensitive for a range of gasses and are used as indoors at room temperature. The output is an analog signal and can be read with an analog input of the Arduino. Gas Sensor module is useful for gas leakage detecting in home and industry. It can then detect LPG, i-butane, propane, methane, alcohol, hydrogen and smoke. V_{cc} to Arduino 5V pin GNG to Arduino GND pin output to Arduino Analog A0 pin. An IR sensor is an electronic instrument used to sense certain characteristics of its surroundings by either emitting and/or detecting Infra-red radiation. Infra-red sensors can also measure heat emitted by an object and detect motion.
- Night Vision Devices
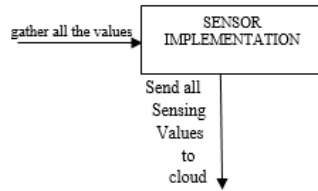- Line Follower Arrays
- Motion Detectors

International Journal of Research in Engineering, Science and Management
Volume-2, Issue-7, July-2019
www.ijresm.com | ISSN (Online): 2581-5792

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Fig. 3. Sensor implementation

C. Cloud implementation

Matlab provides cloud space to store the data in cloud. These modules design the cloud system to monitor the details using HTTPS service which includes WIFI panel to embed with cloud service. Smart controller system using the IoT device is regarded as IoT gadget focusing on live monitoring of surrounding data in terms of temperature, moisture and other types depending on sensors integrated with it. Smart building system using IoT provides the concept of "kit & sense" in which the user can directly implement in smart buildings. As such insertion the sensor on the room and getting live data on various.
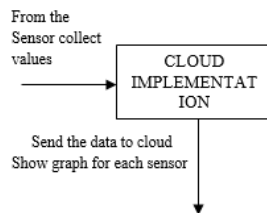

Fig. 4. Cloud implementation

D. Android based monitoring

Embedding the proposed system with android system to view the monitor details using java coding for mobile application. Using WIFI panel to pair the android device with embedded kit Android application can be implemented using IDE. In the android side, user view the kit details.
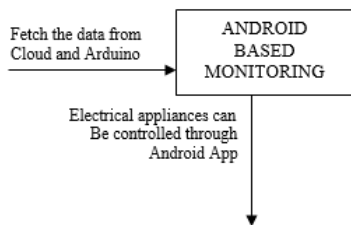

Fig. 5. Android based monitoring

Devices like smart-phones, tablets etc., and data generated via sensors can be easily shared anywhere and viewed by room consultants remotely via cloud computing technology.

7. Implementation

Smart Home Automation System is to design and implement for controlling and monitoring system for smart Home. It gives idea of how to control various Home appliances. The main objective of this project is to design and implement a Home automation system using IoT that is capable of controlling and automating most of the Home appliances through an easily manageable web interface and mobile phones. A lot of energy and power is wasted for a limited number of persons available in the classrooms, laboratories and other places. To prevent this power consumption, we use this perception. Here 6 sensors can be used over here.

- Temperature sensor.
- Humidity sensor.
- Light sensor.
- Gas sensor.
- Occupancy sensor.
- Water level sensor.

If the count for persons working in a particular area detected by the occupancy sensor, then the heat will be detected by using temperature sensor. Then the light to the corresponding location will become ON by using the light sensor. If there is any shortage in wiring it can be detected by using the fire and smoke detection sensor and also power supply will be put off in particular place. It can also be intimated through the sensor and sends alert messages to the respective mobile phones. The Water level sensor is used to sense the water level inside the over tank of a building. When the water level goes below/above the threshold level the motor will be automatically ON/OFF. The system can also be monitored and controlled using mobile phones / web interface. All the six sensors (temperature sensor, humidity sensor, light sensor, gas sensor, occupancy sensor and water level sensor) are all connected to the Arduino micro-controller.

The Arduino micro-controller controls the entire sensor. The Arduino micro-controller is connected to relay, Wi-Fi, web interface and mobile phone. The user can monitor the electric appliances such as A/Cs, lights, fans etc., through the web server. The monitoring process such as electrical appliances ON/OFF status, electric circuit shortage can be done through the mobile phone or by simply typing the IP address on the internet.

8. Results

After the Successful connection the data of the sensor will be sending to the server and monitoring the system. We have provided with certain IP address for controlling the activities. By Give IP Address in the Browser we can on/off the Electrical appliances from the Cloud Environment. By Android App Also We can monitor the Electrical appliances. We have user Name and Password. By Individual Login We can control the control the electrical appliances.

9. Conclusion and future work

A. Conclusion

Smart home Automation provides useful for Handicapped and Visually changed People for controlling the Electrical appliances from with the place itself. It is experimentally proven for controlling some small appliances through Internet

and Mobile Application.

B. Future work

In the future we can control some Other Appliances like Television, CCTV Camera's and Maintaining all Records.

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