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Multi-Featured Smart Home System

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Abstract: This project aims to introduce a smarter way of lifestyle for the people. It provides a smarter way to control the home appliances. It saves the power that is wasted due to the careless behavior of humans by enabling the user to control the home appliances through the android based web application remotely from any part of the world. The app will also show the status of all the appliances and will also have a module for automatically watering the garden when the moisture level in the soil goes low. It uses a LM-35 soil moisture sensor. It will also send and alert to the user's phone in case of fire by detecting the presence of smoke by using a MQ-135 smoke sensor. The implementation is not limited only to homes but can also be applied to offices, hospitals, shops etc.

Keywords: IOT, master-slave, wifi, microcontroller.

I. INTRODUCTION

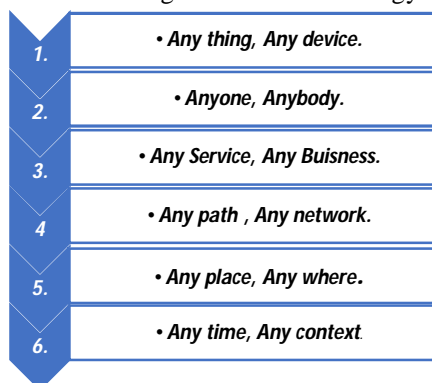
Multi-featured Smart Home is a collaboration of technology through a network for better quality living. A smart home allows the entire home to be automated and provide convenience to everyday activities in the home. This technology is used to make the electronic appliances 'smart'. In the near future almost all the electronic devices will take advantage of this technology through home networks and the internet. Many people think this technology as pure networking. Basically, smart home facilitates users with security, comfortable living and energy management features as well as added benefits for disabled individuals humans have a very busy daily schedule in today's scenario. we all face a very common problem of forgetting to switch off the home appliances when we leave home. this project gives solution to this problem as the user can control the home appliances from any part of the world through the android based web application. The application also shows the status of the appliances. So, if some of the appliances are left ON after user leaves home, the user can switch them OFF by a single tap on the mobile phones. This system also has an automatic gardening module for automatically watering the garden by sensing the moisture level in the soil by using a soil moisture sensor. This reduces human interference and labour in watering the garden. The sprinklers get automated by this system. So, the user does not need to always remember to water the plants. The system also sends an alert to the user's phone in case of fire by detecting the smoke. It makes your HOME a SMART HOME.

II. TECHNOLOGY USED

A. Internet Of Things (Iot)

The Internet of things (IOT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to connect and exchange data.

Advantages Of This Technology



B. Functional Overview

1) *Remote access to home appliances:* It enables the user to control (ON/OFF) the home appliances from anywhere. The user taps on the mobile application, which sends the signal to the microcontroller through wifi and the appliance is turned ON

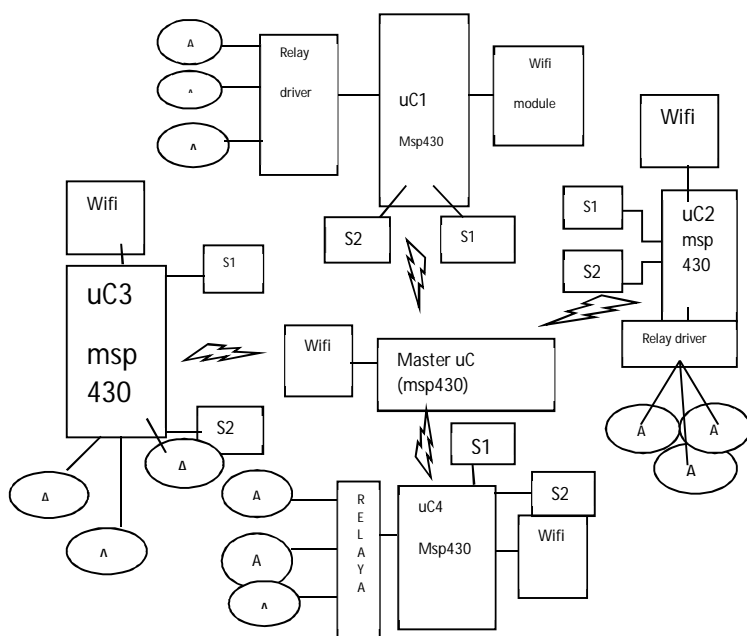
- 2) *Shows the status of the appliances:* shows the status (whether the appliance is ON/OFF) of the appliances on the mobile application. So, if the user has left the appliance turned ON, he can get to know and turn it OFF through the mobile application from any part of the world. This will also reduce power wastage due the carelessness of humans and hence saves money.
- 3) *Automatic water sprinkling mechanism:* This mechanism will automatically detect the moisture level in the soil by using a moisture sensor. When the moisture level in the soil goes low below a threshold value, it automatically turns the sprinkler's ON. So, it completely eliminates human interference and labour involved in watering the garden.
- 4) *Fire sensing and alert module:* This module sends an alert to the user's mobile phone in case of fire. It uses a MQ-135 smoke sensor to detect the presence of smoke.

C. Technology Solution Overview

This section describes the primary design considerations for the proposed solution and gives an overview for the architecture of the system.

D. Proposed design Architecture

- 1) There would be a main micro-controller to which a wifi module with internet connectivity is connected.
- 2) Then there would be several micro-controllers that would also be connected to separate wifi modules.
- 3) Each sub micro-controller would be connected to several appliances in the house and also to the sensors (smoke sensor, moisture sensor).
- 4) the appliances would be connected to the sub microcontrollers through the relay switches.



E. Master Microcontroller

- 1) It will act as the main controlling unit of the system. Every signal from the user's phone application would be received by this microcontroller.
- 2) Then this microcontroller will send this signal forward accordingly to the sub microcontroller(s) to complete the task.
- 3) This microcontroller is required to be connected to internet connectivity through a wifi module in order to fetch command through the server.

F. Wifi Module(Esp8266)

- 1) Here, the communication between the microcontrollers is taking place mainly through wifi.
- 2) The wifi module connected to the main microcontroller should be connected to the internet in order to fetch command from the server.

3) Rest of the four wifi modules connected to the sub microcontrollers do not require internet connectivity .

G. *uC1,uC2,uC3,uC4(sub microcontrollers):*

These are the sub micro controllers that receive the signal from the main micro controllers .Each of these sub micro-controllers should be connected to a wifi module to communicate (send/receive data) to the main micro controller.

These are the appliances that are connected to the sub micro controllers through a relay driver.

III. WORKING OF EACH MODULE/FEATURE

A. *Controlling appliance remotely*

- 1) When the user taps on the mobile phone in the application, the signal is sent to the main micro controller through internet as the main microcontroller is connected to the wifi module which provides it the internet connectivity.
- 2) From there , according to the programming saved in the main microcontroller , a signal will be sent to the sub micro controller to switch ON/Off the appliance that is connected to the sub microcontroller.
- 3) The signal is then sent to the relay through the sub microcontroller and the relay switch turns the appliance ON/OFF.

B. *Displaying the Status of the Appliance*

- 1) Not only the main microcontroller would be able to send the data to the sub microcontrollers but the sub microcontrollers would also be able to send data to the main micro controllers.
- 2) So, programming would be done in the sub micro controllers so that if the device is ON/OFF, the sub microcontroller will send a signal to the main micro controller which will further send it to the server .
- 3) So, the status of the appliance would be displayed on the application.

C. *Automatic water sprinkling Mechanism*

LM 35 soil moisture sensors would be connected to a sub microcontroller that is placed near the garden . The input of the soil moisture sensors is fed to the sub microcontroller . The sub microcontroller is programmed such that whenever the moisture level in the soil goes below a threshold value(set by the programmer) , it sends a signal to the relay connected to the sprinklers ON and turns ON the sprinklers and turns them OFF after fixed time interval. The user can also turn the Sprinkler ON/OFF through the mobile application if required.

D. *Fire Alert Module*

The Mq135 smoke sensors would be connected to each sub microcontroller placed in different regions of the house. The input of these smoke sensors is fed to the sub microcontrollers which are programmed such that if the sensors detect the presence of smoke , the submicrocontroller sends the signal to the main micro controller . The main microcontroller further sends the signal to the server and the user receives an Fire Alert warning on the phone .

E. *Key Features*

- 1) Enables access to appliance from anywhere
- 2) Automates your appliances
- 3) Shows the status of appliances
- 4) Automatic water sprinkling mechanism
- 5) Fire alert module
- 6) Makes lifestyle comfortable and smart
- 7) Saves time and money
- 8) Reduces human labour
- 9) Power efficient
- 10) Easy to install
- 11) Low purchasing costs
- 12) Easy to use and handle



IV. CONCLUSION

Till now we have studied about an approach towards developing a system that introduces a whole new smarter way of controlling the home appliances and increasing comfort in the lifestyle. is designed in such a way that the purchasing costs are lower and affordable. This project can be implemented to hospitals, offices, shopping malls and stores by just little modification.

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