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SOPHISTICATED HOME AUTOMATION SYSTEM USING BLUETOOTH

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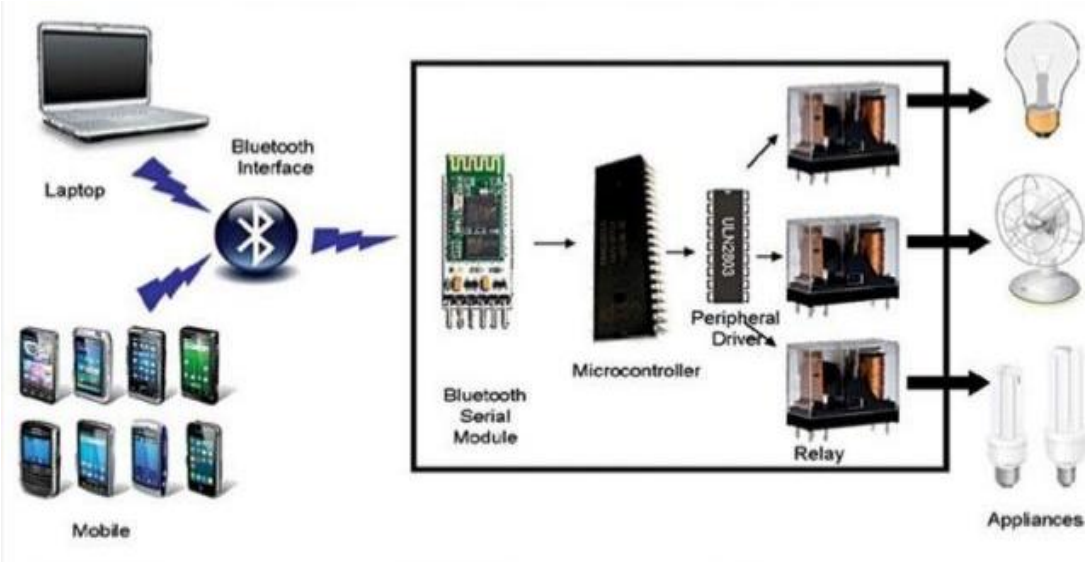
Abstract:

In this paper a low cost and user friendly remote-controlled home automation system is presented using Arduino board, Bluetooth module, smartphone, ultrasonic sensor and moisture sensor. A smartphone application is used in this system which allows the users to control up to 18 devices including home appliances and sensors using Bluetooth technology. Nowadays, most of the home automation systems are designed for special purposes while proposed system is a general-purpose home automation system. Which can easily be implement in existing home. This system has more features than a normal home automation system such as an ultrasonic sensor is used for water level detection and soil moisture sensor is use for automatic plant irrigation system. This paper also describes the hardware and software architecture of system. The proposed prototype of home automation system is implemented and was tested on hardware and it gave the expected results.

Introduction:

Home automation system is use of information technologies and control system to reduce the human labor. The rapid growth of technologies influences us to use smartphones to control the home appliances. An automated device has ability to work with versatility, diligence and with lowest error rate the idea of home automation system is a significant issue for researchers and home appliances companies. Automation system not only helps to decrease the human labor, but it also saves time and energy early home automation systems were used in labor saving machines but nowadays its main objective is to provide facilities to elderly and handicapped people to perform their daily routine tasks and control the home appliances remotely. The Allied Business Intelligence (ABI) research reports that almost 1.5 million automatic home appliances were installed in United States of America (USA) during 2012 and their increasing rate is 45.2%. A Bluetooth based wireless home automation system can be implement with a low cost and it is easy to install in an existing home . A research work proved that Bluetooth system are faster than wireless and GSM systems. Bluetooth technology has ability to transmit data serially up to 3 Mbps within a physical range of 10m to 100m depending on the type of Bluetooth device.

Block Diagram:



PIR Sensor:

The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.

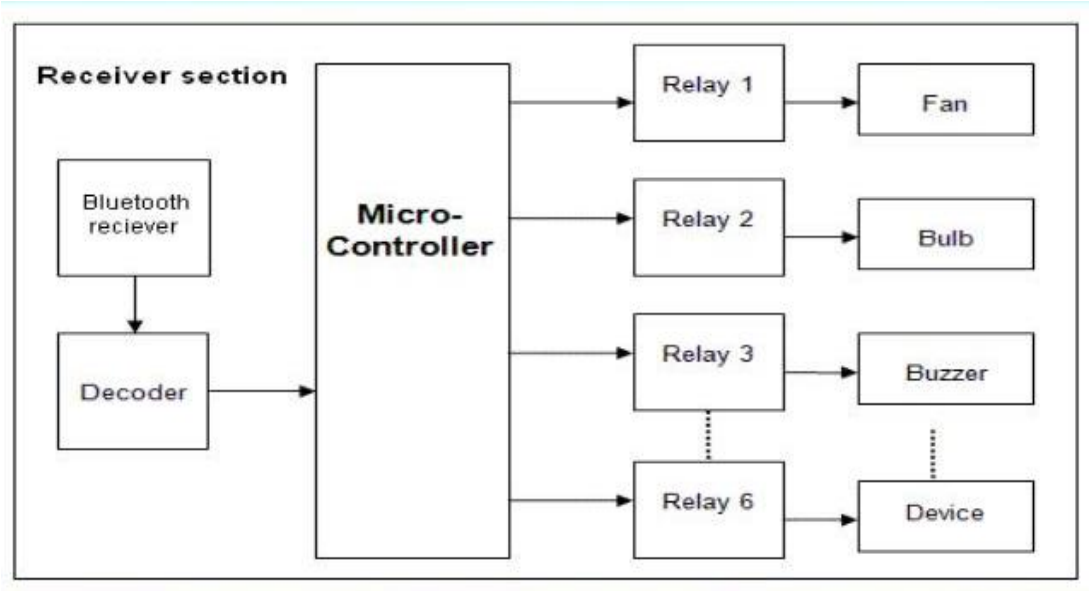
Ultrasonic sensor:

The ultrasonic sensor is a device that can measure the distance to an object by using sound waves it measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back.

Soil moisture sensor:

The soil moisture sensor detects the volumetric content of water in soil it uses the properties of soil such as electrical resistance, dielectric constant or interaction with neutrons to know the moisture content. Measured properties and soil moisture may vary depending upon environmental factors like soil type, temperature, electric conductivity. Moisture sensors mainly refer to sensors that estimate volumetric water content. There is another class of sensors that measure the water potential and are usually called as soil water potential sensors.

Block diagram:



Working:

Arduino based home automation using Bluetooth project helps the user to control any electronic device using Device Control app on their Android Smartphone. The android app sends commands to the controller – Arduino, through wireless communication, namely, Bluetooth. The Arduino is connected to the main PCB which has three relays as shown in the block diagram. These relays can be connected to different electronic devices. As per the block diagram, Device 1 – fan, Device 2- Bulb, Device 3 – Buzzer.

When the user presses on the 'On' button displayed on the app for the device 1, the Buzzer is switched on. This Buzzer can be switched off, by pressing the same button again.

Similarly, when the user presses on the 'On' button displayed on the app for the device 2, the fan is switched on. The fan can be switched off, by pressing the same button again.

Reference:

- http://arduino.cc/en/guide/Environment
- http://atmel.com/Images/doc8161.pdf
- Referred IEEE books.