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Home Robotization System using ATmega16 Microcontroller

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ABSTRACT: The home robotization system achieved a great popularity in the last decades and it increases the comfort and quality of life. Nowadays, most automation system consists of a smart phone and a Microcontroller. In this project a smart phone application is used to control and monitor the home appliances such as bulb and fan. Various Sensors are used for water level detection and filling water in a tank when it is empty, fire alarm, hazardous gas leakage detection and on/off status of light and fan. All the notifications are sent to the mobile through an Android mobile application. This system consists of closely-networked ATmega16, which is an AVR based microcontroller. Bluetooth technology is used in this project to overcome the disadvantages like an inconvenience, inefficiency, etc. Thus, efficiency and user friendly can be achieved by signaling, monitoring and customizing.

I. INTRODUCTION

The home robotization system is the technological solutions that control the system to reduce the human labor. The rapid growth of technologies influences us to use smart phones to remotely control the home appliances. An automated device has the ability to work with versatility, diligence and with the lowest error rate. The idea of home automation system is a significant issue for researchers and home appliance companies. Automation system not only 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. A Bluetooth based wireless home automation system can be implemented with a low cost, and it is easy to install in a living home. A research work proved that Bluetooth system is faster than wireless systems. Bluetooth has ability to transmit data serially up to 3 Mbps within a physical range of 10m to 100m.

The proposed method presents the design and implementation of a robust, low cost, secure and user-friendly home automation system using Bluetooth technology. The design of proposed method is based on ATmega16 microcontroller, Bluetooth module, sensors and smart phone application. Bluetooth module HC-05 is interfaced with ATmega16 controller board via relay. Smart phone application is used for serial communication between smart phone and Bluetooth which is further connected with ATmega16 controller. Nowadays most of conventional home automation systems are designed for elderly, handicapped people or for any special purpose.

II. SYSTEM DESIGN AND ARCHITECTURE

EMBEDDED SYSTEM:

An embedded system is a combination of computer hardware and software, designed for a specific function or functions within a larger system.

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II. SYSTEM ARCHITECTURE

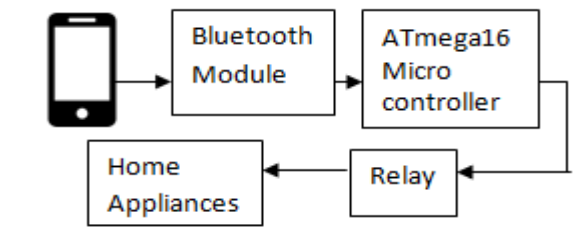


Figure1.System architecture

III. HARDWAREIMPLEMENTATION

The entire system consists of two parts, one is android application and the other one is electronic controlling circuitry. The android device is used for communicating with the circuit through Bluetooth channel. The android application can be easily installed from Google Play or Play Store. The electronic circuitry consists of a microcontroller, a Bluetooth module, relay driver connected with appliances. The android device sends command which is received by the Bluetooth module and forwards it to the microcontroller through an interface. After receiving command, the necessary actions are performed by the micro controller. The ATMEL’s ATmega 16, a high performance; low power RISC architecture based 8-bit micro controller. The Bluetooth module (HC-05) isa wireless technology designed for connection setup. Various sensors like moisture sensor, flame sensor and gas sensor are used.

IV. SOFTWARE ENVIRONMENT

Android Application:

Android application is software application which will run on the android platform. Serial Bluetooth Terminal application is used.

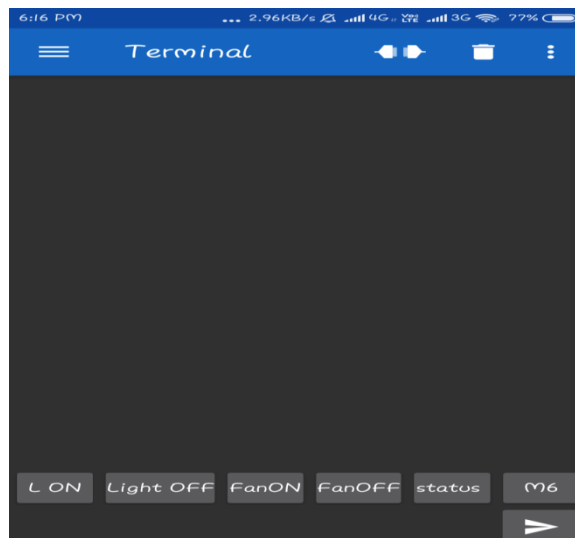


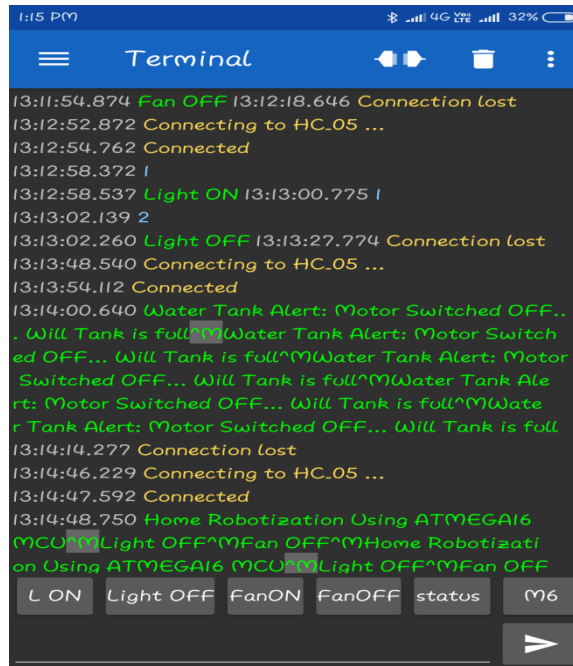
Figure5.1 Snapshot of android app

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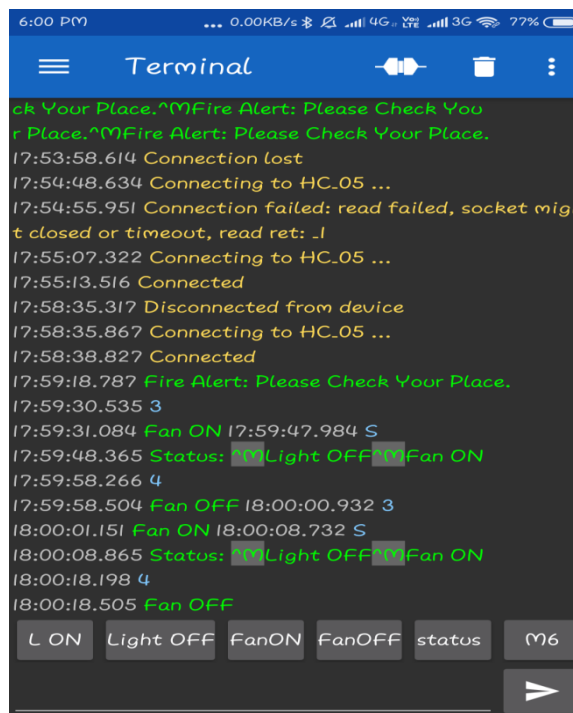
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1:15 PM
Terminal
13:11:54.874 Fan OFF 13:12:18.646 Connection lost
13:12:52.872 Connecting to HC_05 ...
13:12:54.762 Connected
13:12:58.372 I
13:12:58.537 Light ON 13:13:00.775 I
13:13:02.139 2
13:13:02.260 Light OFF 13:13:27.774 Connection lost
13:13:48.540 Connecting to HC_05 ...
13:13:54.112 Connected
13:14:00.640 Water Tank Alert: Motor Switched OFF..
. Will Tank is full Water Tank Alert: Motor Switch
ed OFF... Will Tank is full Water Tank Alert: Motor
Switched OFF... Will Tank is full Water Tank Ale
rt: Motor Switched OFF... Will Tank is full Water
Tank Alert: Motor Switched OFF... Will Tank is full
13:14:14.277 Connection lost
13:14:46.229 Connecting to HC_05 ...
13:14:47.592 Connected
13:14:48.750 Home Robotization Using ATMEGA16
MCU Light OFF Fan OFF Home Robotizati
on Using ATMEGA16 MCU Light OFF Fan OFF
L ON Light OFF FanON FanOFF status M6
  
```

Figure5.2 Snapshot of android app



```

6:00 PM
Terminal
ck Your Place. Fire Alert: Please Check Your
r Place. Fire Alert: Please Check Your Place.
17:53:58.614 Connection lost
17:54:48.634 Connecting to HC_05 ...
17:54:55.951 Connection failed: read failed, socket might
closed or timeout, read ret: -1
17:55:07.322 Connecting to HC_05 ...
17:55:13.516 Connected
17:58:35.317 Disconnected from device
17:58:35.867 Connecting to HC_05 ...
17:58:38.827 Connected
17:59:18.787 Fire Alert: Please Check Your Place.
17:59:30.535 3
17:59:31.084 Fan ON 17:59:47.984 S
17:59:48.365 Status: Light OFF Fan ON
17:59:58.266 4
17:59:58.504 Fan OFF 18:00:00.932 3
18:00:01.151 Fan ON 18:00:08.732 S
18:00:08.865 Status: Light OFF Fan ON
18:00:18.198 4
18:00:18.505 Fan OFF
L ON Light OFF FanON FanOFF status M6
  
```

Figure5.3 Snapshot of android app

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IV. WORKING METHODOLOGY

Wireless Bluetooth technology is used for the communication between HC-05 Bluetooth Module and Android Mobile. HC-05 is connected to ATmega16 microcontroller. User enters the control signal from Android Mobile through Serial Bluetooth Terminal App. The Bluetooth Module(HC-05) receives the control signal and transmits it to the ATmega16 microcontroller. The ATmega16 microcontroller receives the control signal and processes it and sends the required control to the relay driver. Relay driver will turn on/off the home appliances according to the control signal received from the ATmega16 microcontroller. The microcontroller also sends the appliance status to the Android mobile through Bluetooth. 2 keys from the Android Mobile is used to control one appliance. One key will be used to turn On and another key will be used to turn Off the appliance. So, totally 5 keys from android mobile is used. Various sensors are also used here and notification will be received in mobile.

V. CONCLUSION

Nowadays most automation system consists of a smart phone and microcontroller. It is easier to automate and control appliances and we can detect dangerous threats to our life using this project. It is suitable for elderly and handicapped people. It also provides a general-purpose home automation system, which can be easily implemented in an existing home.

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