SMS Based Home Automation System using Arduino ATMEG328 with GSM

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Abstract: *This paper discusses automation techniques that can be applied at home to control home appliances remotely. Through engineering techniques easy drive and friendly environment can be ensured. Controllers and sensors are used for automation. Our main idea is to develop a system to provide people a living environment with security, convenience, comfort, environmental protection and intelligence. It will also be locally maintainable. We are willing to design smart home services will bring people a new living experience, and creates a smart way of living, as it can provide intelligent, individual services according to the changing of environment, emergencies, status of user's, user's preferences and user's wishes. We introduce a technology which will not only save money and time but also will prove to be beneficial and effective for the economy.*

Keywords: *Automation, Controllers, Modules, Sensors*

I.   Introduction

Our project is aimed at developing system based on sensors & GSM for the capture the many things. Our aim is to develop a system to provide people a living environment with security, convenience, comfort, environmental protection and intelligence. The main idea is to develop a system for fair dealing and better management. It will also be remotely maintainable. This is the spirit and main driving force behind this proposed system.

II. Problems

The root problem of all our homes is safety and security and   is the major concern in today's world, and hence an improvement in many sectors is of growing importance. Safety is a huge issue in densely populated urban areas And also power saving and improving overall power efficiency is key aspect.
The convenience of physical handicapped people for living in home is another issue.

III.   Existing Solutions

MITSIMLab stands for simulation-based laboratory. It is developed for evaluating the impacts of alternative home management system designs at the operational level and assisting in subsequent design refinement.

1. Implementation of interactive home automation system based on Bluetooth and email technology[2]:

A hardware implementation with MATLAB-GUI platform for the proposed system is carried out to support the usefulness of the proposed technique and the reliability of the system is introduced. The proposed system is a cost effective, flexible and simple model.

2.Microcontroller Based Home Automation System Using Bluetooth, GSM, Wi-Fi and DTMF[1]:

Using this system, physically weak people can control home appliances from anywhere. This system can be implemented in houses, offices, hospitals, industries, or even in universities. The user interface is kept simple, so users from beginner to advanced level internet users can use the system without problem.

IV. Practical Solution

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In proposed system overcome the all the unsupported things in existing system[3]. This system is designed for secured wireless communication, our system is based on the WSN system user can access the system from android mobile using GSM module .Project contain the two section one is transmitter section and another section is receiver. Transmitter section is contain the android mobile and Receiver section is the actual controlling electronic system for home automation which is designed using the Arduino circuit containing the GSM module for wireless communication. Sensors are used to sense the current environmental status of the home. Actuators are used to perform the appropriate physical operations. Also provide the indication to indicate the abnormal situation acting in home. GSM module is used to wireless communication between android mobile as well as the Arduino circuit.
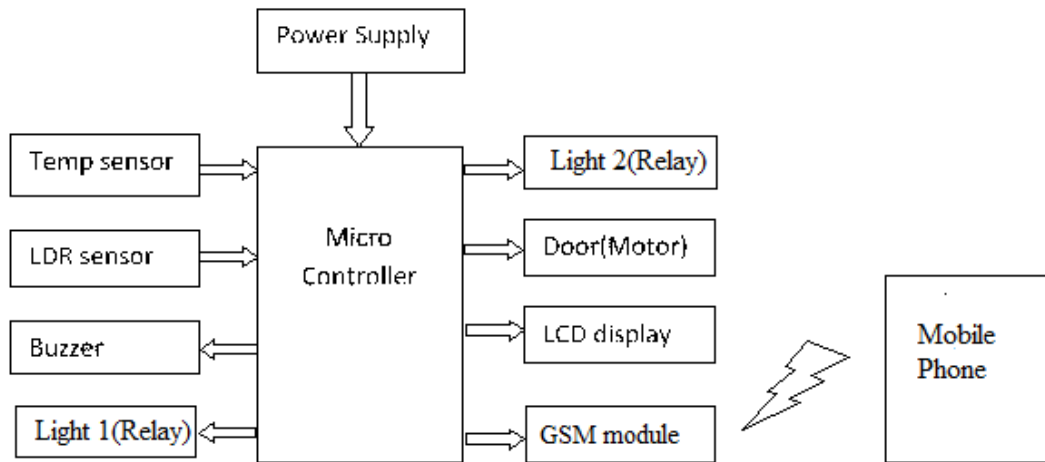
System architecture:

Figure 1.Architecture of home automation system

Above architecture represent the working of the proposed system. Proposed system is implemented using the Arduino uno development board. System is divided into two section First section is the control system which is actual hardware and another section is remote section which is software. Control system is used to monitor the environmental fault parameter of the home. Software section monitor that parameter remotely or control the system remotely. Control system is collection of modules and sensor mounted on single circuit board. Power supply give the sufficient power to the microcontroller & related modules to operate the properly. temperature sensor sense the room temperature and temperature sensor with the ldr monitor the fire detect in home . Door is indicated by using the motor user can open or close the door remotely. Relays are the switching device for the home appliances by using this we can remotely ON/OFF the home appliances. Buzzer is used to indicate the improper situation is done in home like fire detection. LCD is used to indicate or display the status of the home appliances or status of the home. Microcontroller get the data from the sensor according to this data the status is send to the remote system by using the gsm which is wireless communication module. The gsm module gets the sensor date & the status information from the microcontroller to the android mobile through the wireless media. This data is display on the android mobile to monitor the system.
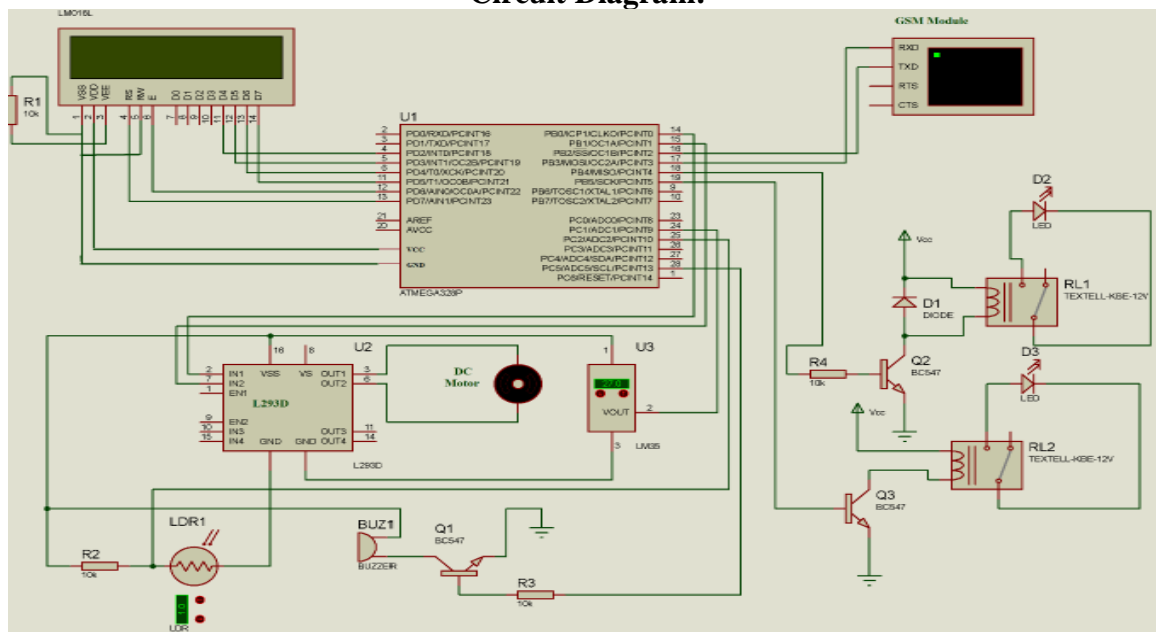
Circuit Diagram:

Figure 2. Circuit diagram of home automation system

Circuit Description:

Connections of this GSM based home automation circuit are quite simple, here a liquid crystal display is used for displaying status of home appliances which is directly connected to arduino in 4-bit mode. Data pins of LCD namely RS, EN, D4, D5, D6, D7 are connected to arduino digital pin number 6, 7, 8, 9, 10, 11. And Rx and Tx pin of GSM module is directly connected at Tx and Rx pin of Arduino respectively. And GSM module is powered by using a 12 volt adaptor. 5 volt SPDT 2 relays are used for controlling LIGHT 1 and LIGHT2. And relays are connected to arduino pin number 3 and 4 through relay driver for controlling LIGHT1 and LIGHT2 respectively.

Modules used in System :

1.Arduino uno development board :

Figure 3. Arduino UNO Board

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.
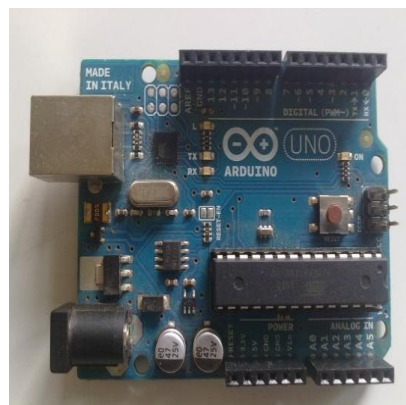
2. GSM Module :

Figure 4. GSM board of SIM 800

GSM MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification. A GSM/GPRS MODEM can perform the following operations:

1.   Receive, send or delete SMS messages in a SIM.
2.   Read, add, search phonebook entries of the SIM.
3.   Make, Receive, or reject a voice call.

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A photoresistor (or light-dependent resistor, LDR, or photocell) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits, and light- and dark-activated switching circuits. A photoresistor is made of a high resistance semiconductor. In the dark, a photoresistor can have a resistance as high as several megohms (MΩ), while in the light, a photoresistor can have a resistance as low as a few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and their hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a photoresistor can substantially differ among dissimilar devices. Moreover, unique photoresistors may react substantially differently to photons within certain wavelength bands.

3. Ligh Dependent Resistor
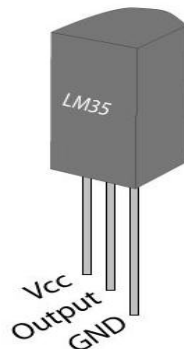
4. Temperature sensor:


Fig 3.3.7 Temperature sensor LM35

The LM35 series are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. Thus the LM35 has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm\frac{1}{4}°C$ at room temperature and $\pm\frac{3}{4}°C$ over a full $-55°C$ to$+150°C$ temperature range. Low cost is assured by trimming and calibration at the wafer level. The low output impedance, linear output, and precise inherent calibration of the LM35 make interfacing to readout or control circuitry especially easy. The device is usedwith single power supplies, or with plus and minus supplies. As the LM35 draws only 60 µA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 is rated to operate over a $-55°C$to $+150°C$ temperature range, while the LM35C israted for a $-40°C$ to $+110°C$ range ($-10°$ with improved accuracy). The LM35 series is availablepackaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface-mount smalloutline package and a plastic TO-220 package.

Hardware & Software Significant

- H/W Requirements:
  Microcontroller   -   Arduino development board
  Internet Module   -   GSM SIM800A module
  Sensors/Actuator   -   LM35(temperature sensor), DC motor, buzzer,
  Relay 5volt, LDR, LCD 2*16 display, Android mobile with GSM activation.

- S/W System Configuration:-
  Burning tool   : Arduino 1.6.1

- Contribution :
  1. GSM can be used to long distance communication.
  2. Improve the real time security level to access the things

Flowchart
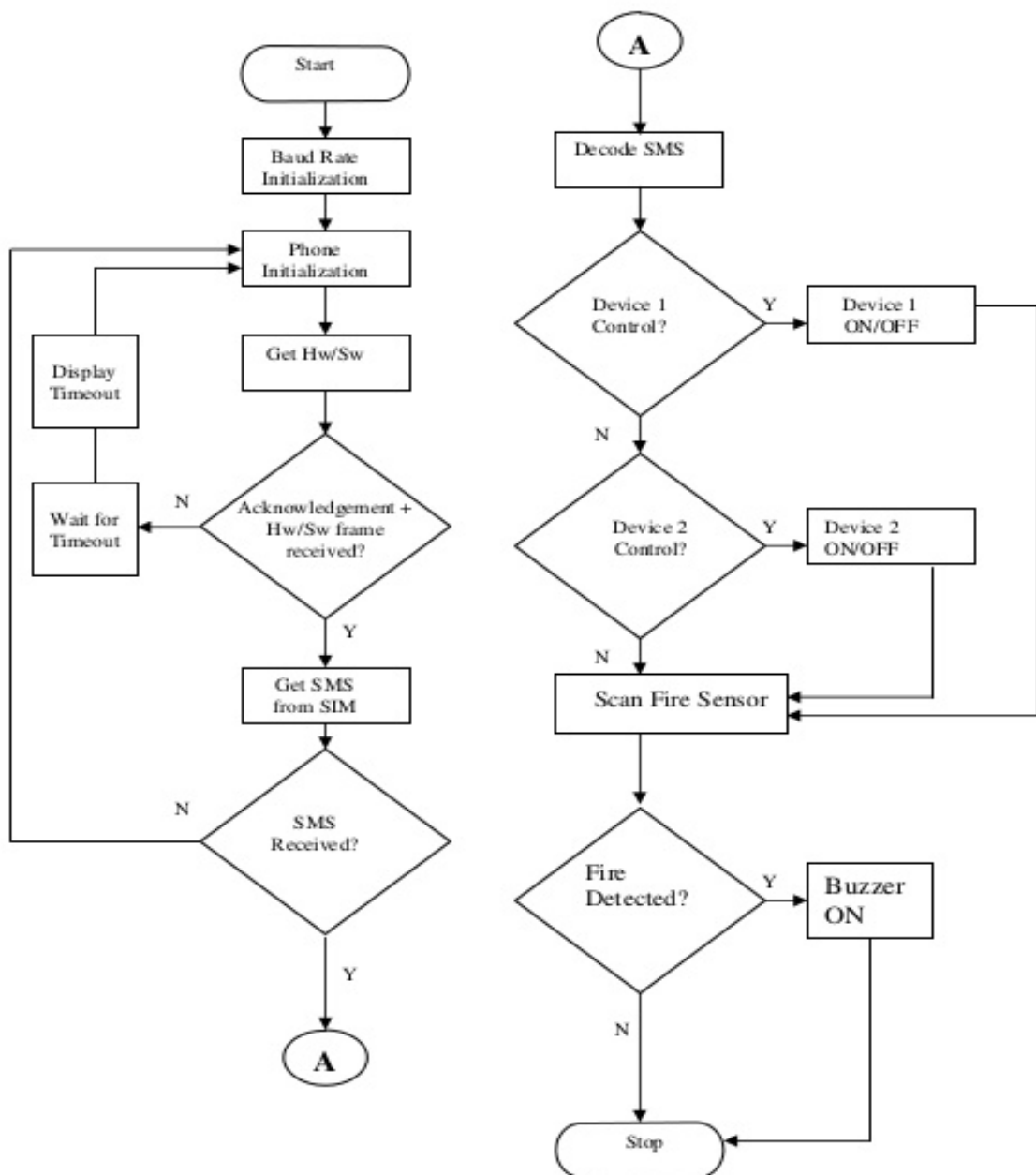
Application of system:

1. Lightning control : Smart lightning allows you to control wall switches , blinds and lamp . Also you are able to schedules the time light should turn on and off and decides level of light should be emmited .

2. HVAC regulation : Heating and cooling our homes consumes an average of 50% of energy costs yearly ,making daily HVAC regulation progressively. With automated HVAC you are able to reduce heat when room is unoccupied , and increases or decreases it at specific time based on your schedule .

3. Lawn Irrigation System : The grass is always greener

4. Security system : There is great deal of scrutiny regarding the level of trust in controlling your home security system via a mobile device , but it begs earnest exploration when weighing the potential benefits .

Advantages of system :

1 .Managing all of our home devices from one place .The convenience factor here is anormous .Being able to keep all of the technology in our home connected through one interface is a massive step forward for technology and home management .Flexibility for new devices and appliances.

2. Being able to integrate the new comers seamlessly will make our job as home owner much easier and allow us to keep upgrading the latest life style technology.

3. Safety :Automation system are installed carefully and are integrated under one centralized control unit which ultimately secures the people.

4. Energy saving :By controlling temperature and lighting based on the programmed schedules ,automation system reduces the energy bills considereably.

5. Improves the security features: The system has an ability to enhance the security features of the home without demanding a huge home renovation.

6.Enhanced performance : Proper wiring and computer control are the important factors that determine the effective performance of the automation technology.

7.Easy to use : We can operate and access the automation technology with ease due to its simple procedure that are easy to learn and implement

8. Affordable : home automation process doesn't require a huge sum of money to modity oue home.

Conclusion

It can be concluded that HOME AUTOMATION SYSTEM USING ARDUINO was a success. This system consists of an Arduino-Uno board, a GSM Module, an Android phone, power sockets, home appliances. It is user friendly and it is cost effective. Also it can be concluded that the objectives of this project has been successfully met and they are as Constructed a wireless home automation system controlled by a smartphone specifically an android device. Designed and implement cost effective home automation system yet an efficient one. Designed a user friendly and a safe system to control home appliances especially aimed to aid the elders and handicapped.

Acknowledgment

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