Volume 3, Issue 4, April-2016, pp. 173-178 ISSN (O): 2349-7084

International Journal of Computer Engineering In Research Trends

Available online at: www.ijcert.org

GSM Based Device Controlling and Fault Detection

Dr. P.V. Rama Raju[1], K.S.S. Phani Kumar[2], Y. Guna Teja[3], K. Bhargav[4], T.V.K. Prasanna[5]

[1] Prof., Dept. of ECE, SRKR Engineering College, Bhimavaram, Andhra Pradesh, India. pvrraju50@gmail.com
[2] B.E Student, Dept. of ECE, SRKR Engineering College, Bhimavaram, Andhra Pradesh, India. kadaliphani192@gmail.com
[3] B.E Student, Dept. of ECE, SRKR Engineering College, Bhimavaram, Andhra Pradesh, India. gunateja100@gmail.com
[4] B.E Student, Dept. of ECE, SRKR Engineering College, Bhimavaram, Andhra Pradesh, India. bhargavkumbha200@gmail.com
[5] B.E Student, Dept. of ECE, SRKR Engineering College, Bhimavaram, Andhra Pradesh, India. prasannatangirala3@gmail.com

Abstract:-The mobile communication has expanded to a great extent such that it can be applied for controlling of electrical devices. These projects make use of this capability of mobile phone to control three electrical devices with some use of embedded technology which can be extended up to eight devices. Apart from controlling it also does the sensing of the devices. Thus a user can be able to know of the status of the devices and in addition to that the user get notified if any fault is detected. Here in the project controlling and sensing is done for three electrical devices only. According to the user need both of this can be expanded.

Keywords - Device Control, GSM, Mobile Phone, Short Messaging Service (SMS), Fault Detection, Device Status Monitor, Microcontroller, AT89C52

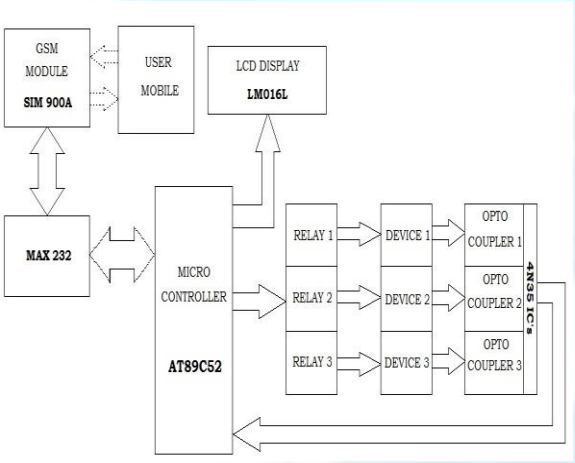
1. INTRODUCTION

In this paper embedded systems and its operations are controlled by intelligent software inside the Microcontroller. The aim of the paper is to control i.e. ON/OFF the electrical or electronic appliances connected to this system from anywhere in the world. Any Mobile can be used for this purpose. This way it overcomes the limited range of IR and radio remote controls. By the use of SMS, this project lets you remotely control equipment by sending simple text messages, such as ST100,ST111,ST 1 all of the commands which can be already programmed into the microcontroller and easily remembered by the user. It can control up to eight external electrical devices. Short Message Service (SMS) is defined as a text-based service that accepts up to 160 characters to be sent from one mobile phone to another mobile phone. In a similar vein to email, messages are stored and forwarded to an SMS center, allowing messages to be read later if you are not immediately available to receive them. SMS messages travel through the low-speed control channel of the mobile network. "Texting", as its also known, is a convenient and fast way of communicating. SMS has taken on a life of its own, spawning a complete new shorthand language that is being adopted as the norm rapidly.

Technology Used

As microcontrollers, the center of today's advanced circuit plan in the industry, this framework utilizes it for the computerized preparing and brought together operation. Cellular telephones and the

system they work under differ essentially from supplier to supplier and from country to country. Every one of them conveys through electromagnetic radio waves with a cell site base station through the reception apparatuses which are normally mounted on a tower, shaft, or building. The phones have a low-control handset that transmits data and voice to the nearest cell sited, more often 0.5 to 10 miles away. At the point when the information gadget or PDA is turned on, it registers with the cell phone trade, or switch, with its special identifiers, and after that will be modified by the versatile switch when there is an approaching phone call. The handset consistently hunts down the most grounded sign being gotten from the encompassing base stations. As the user moves around the network, the mobile will "handoff" to new cell sites. Cell destinations have moderately low-control radio transmitters which show their area and hand-off interchanges between the versatile handsets and the



switch. The switch, thus, interfaces the call to another supporter or client of the same remote administration supplier or to the general population phone system, which incorporates the systems of different remote transporters. The dialog between the cell site and the handset is a flood of computerized information that incorporates digitized sound. The innovation relies on upon the framework which the cell telephone administrator has embraced. A few innovations incorporate AMPS for simple, TDMA, GPS, EV-DO, CDMA, GSM and UMTS for computerized correspondences. Every system administrator has a one of a kind radio recurrence. The innovation utilized here is installed innovation which is the fate of today's cutting edge gadgets. Here a rapid Microcontroller i.e. AT89C52is utilized which is a low-control, superior CMOS 8-bit microcontroller with Flash programmable memory of 8K bytes and erasable read just memory (EPROM).

2. SYSTEM MODEL

Fig.1 Block diagram that shows the components used and process of interchanging of commands among them

3. COMPONENTS USED

3.1. MICROCONTROLLER AT89C52

The Microcontroller AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with erasable read only memory (EPROM) and 8K bytes of flash programmable. The device is manufactured using Atmel's high-density nonvolatile memory technology and it is compatible with the industry-standard 8052 and 8051 instruction set and pinout. The on-chip Flash allows the program memory that can be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile eight bit CPU with Flash on a monolithic chip, the AT89C52 is a powerful microcomputer which provides a highly flexible and economical solution to many embedded control applications.

3.2. GSM SIM900A

GSM modem is a breakout board and minimum system of SIM900 Quad-band/SIM900A Dual-band GSM/GPRS module. SIM 900A modem can accept any SIM card of a GSM network operator and act just like a mobile phone with its own unique phone number. With this module one can send/receive SMS, connect to the internet via GPRS and receive calls. The modem can either be connected to any

microcontroller or to PC serial port directly. It can communicate with controllers via AT commands (GSM 07.05 ,07.07 and SIMCOM enhanced AT Commands). This module supports software power on and reset.

3.3. MAX232 IC

The MAX232 is an integrated that converts signals from a TIA-232 (RS-232) serial port to signals in TTL compatible digital logic circuits. The MAX232 IC is a dual driver/receiver and typically converts the RX, TX, RTS and CTS signals. The drivers give TIA-232 voltage level outputs (approx. ± 7.5 volts) from a single five volt supply through external capacitors and on-chip charge pumps. This makes it useful for implementing TIA-232 in devices that do not need any other voltage input. The receivers reduce TIA-232 inputs, which may be as high as ± 25 volts, to standard 5 volt TTL levels. These receivers have a typical hysteresis of 0.5 volts and a typical threshold of 1.3 volts.

3.4. 16x2 LCD LM016L

A 16x2 LCD (Liquid Crystal Display) is very basic electronics display module and is very commonly used in various devices and circuits. These modules are mostly preferred over seven segments and other multi-segment LEDs. The reasons being LCDs are easily programmable, economical, have no limitation of displaying animations, special & even custom characters (unlike in seven segments) and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD, every character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Data and Command. The data to be displayed on the LCD is stored in the data register. The data is the ASCII value of the character to be displayed on the LCD. The command instructions given to the LCD are stored in the command register. A command is an instruction given to the LCD to do a predefined task like initializing it, setting the cursor position, clearing its screen, controlling display etc.

3.5. OPTO COUPLER 4N35

An Optocoupler, also known as a Photo-coupler or Opto-isolator, is an electronic component that interconnects two separate electrical circuits by use of a light sensitive optical interface. The basic design of an Optocoupler consists of an LED that produces IR light and a semiconductor photosensitive device that is used to detect the emitted IR beam. Both the photo-sensitive device and LED are enclosed in a light-tight body or package with metal legs for the electrical connections. An Opto-isolator or Optocoupler consists of a light emitter, the LED and a light sensitive receiver which can be a single phototransistor, photodiode, photoresistor, photo-SCR, or a photo-TRIAC. Opto-isolators prevent large voltages from affecting the signal receiving system. Commercially available Opto-isolators have voltage transients with speeds up to 10 kV/μs and withstand input-to-output voltages up to 10 kV.

3.6. CENTRAL TAPPED TRANSFORMER 12-0-12V 750mA

A Centre Tapped transformer works in same way as a usual transformer. The difference lies in just the fact that the secondary winding consists of two parts, so two individual voltages can be acquired across the two line ends but the internal working is the same, which is when an alternating current is supplied to the primary winding of the transformer it generates a magnetic flux in the core, and when the secondary winding is brought near, an alternating magnetic flux is also generated in the secondary winding as the flux flows through the ferromagnetic iron core and changes its direction for every cycle of the alternating current. In this way, an alternating current flow through the two halves of the secondary winding of the center tapped transformer and flows to the external circuit.

4. CIRCUIT DIAGRAM

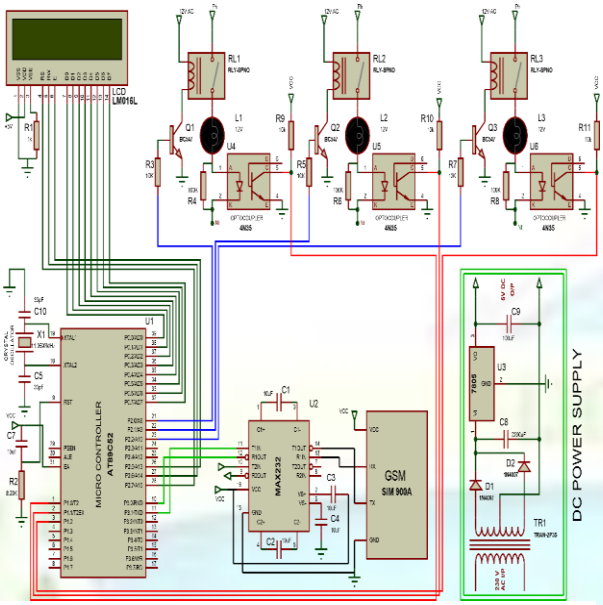


Fig.2 Circuit Diagram

5. CIRCUIT WORKING

Commands send by the user from his mobile is first received by the GSM. Since GSM has the RS232 interface for serial communication, in between the microcontroller and GSM module MAX232 IC is connected.MAX232 IC is used for converting the logic levels. The RS232 logic levels of GSM are converted to the TTL logic levels of the microcontroller using this MAX232 IC and send to microcontrollerAT89C52. According to the commands send pins P2.0, P2.1, P2.2 of the microcontroller are either enabled or disabled. For example, if the command send is ST110 then P2.0, P2.1 are enabled and P2.2 is disabled. These three ports are given to three relays used to switch the devices respectively as shown in circuit design. Thus according to the command send the devices are switched. The port 5 of Optocoupler 1 of the device 1 gives logic 0 if the corresponding device 1 is ON and similarly the port 5 of Optocoupler 1 of the device 1 gives logic 1 if the corresponding device 1 is OFF. Similarly, all three Optocouplers responds according to the state of the corresponding device. The outputs of these three Optocouplers are given to ports P1.0, P1.1, P1.2 of the microcontroller as shown in the circuit design. As these are the feedbacks from the devices these TTL logic levels are converted to RS232 logic levels of GSM through MAX232 and send to the user as feedback message from GSM.

6. RESULTS

6.1. Requested Device 1, Device 2 – ON & Device 3 – OFF (Command Sent – ST110)

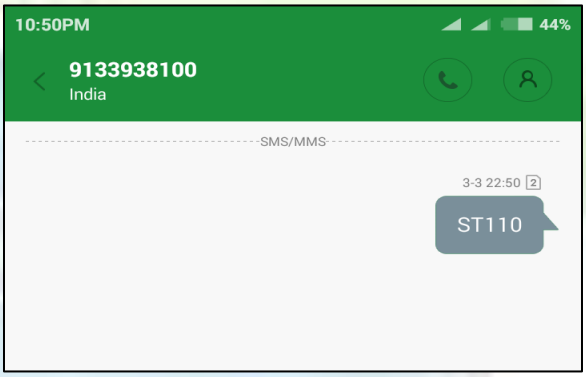


Fig.3 Command Sent

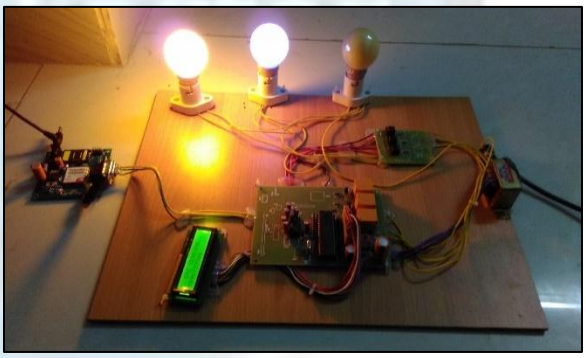


Fig.4 Output Obtained

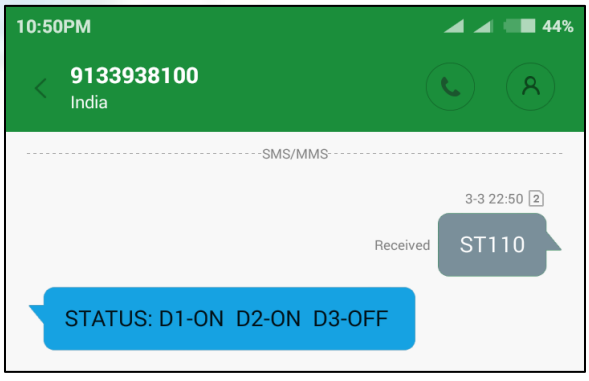


Fig.5 Feedback Received

In this case, all devices are working properly and so the output is obtained correctly as per our request.

6.2. Requested Device 1, Device 2, Device 3 – ON but Device 2 is fault before the command (ST111) is sent

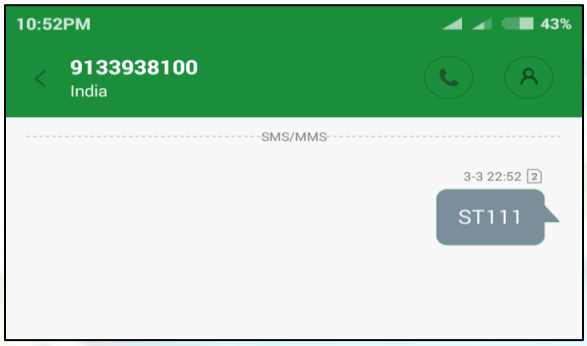


Fig.6 Command Sent

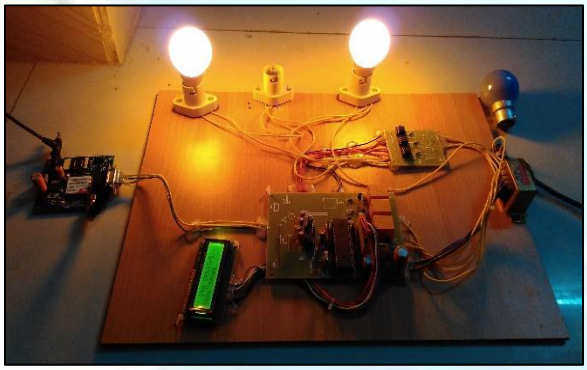


Fig.7 Obtained output

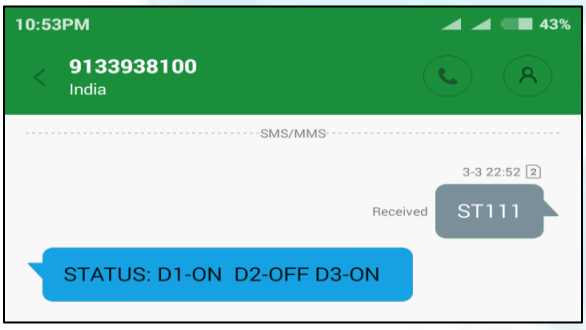


Fig.8 Feedback received

In this case, the device 2 is damaged/fault before the command sent. So even though the device 2 is requested to turn ON (according to the command sent) but the device 2 is not turned ON. So the user got a feedback message that the device 2 is OFF which means device 2 is not working and is to be fixed.

6.3. Requested Device 1, Device 2, Device 3 – ON but Device 2 got fault after the command (ST111) is sent

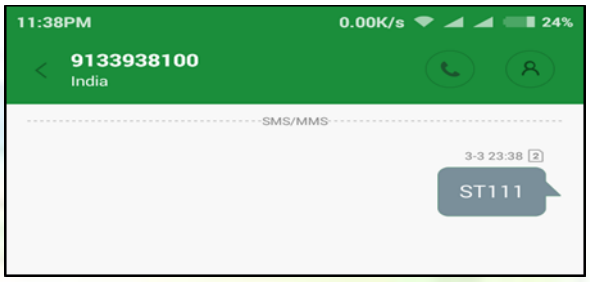


Fig.9 Command Sent

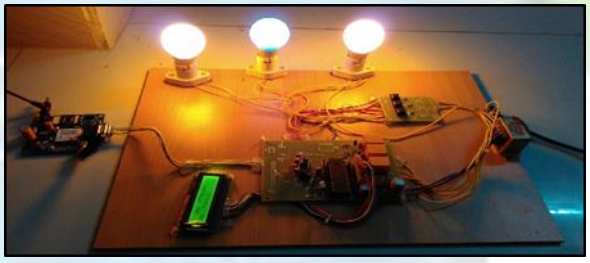


Fig.10 Output obtained at the instant message received

Fig.11 Device 2 is damaged/stopped working after some time

Fig.12 Feedback received

In this case, the device 2 is damaged after some time. Which means when the command received, at that instant the device 2 is working well? But after some time it stopped working. So even though all the devices responded correctly according to the command for starting few seconds, the user got the feedback once the device is damaged.

7. CONCLUSION

Here in the project bulbs are used as the devices. But in real time any Electrical devices like Home Appliances, Reservoir Dam Motors etc. can be used which can be controlled from anywhere in the world. This way it overcomes the limited range of infrared and radio remote controls.

REFERENCES

1. The 8051 Microcontroller Architecture, Programming and Applications by Kenneth J Ayala.
2. Basic electronic components by Millman.
3. MCS51 series authorized manual.
4. http://www.atmel.com
5. http://www.aplus.com
6. http://www.I2C.info
7. http://www.alldatasheets.com
8. An YouTube video with name "GSM Based street light with fault detection .wmv"

ABOUT THE AUTHORS

Dr. P.V. Rama Raju is a Professor at the Department Electronics and Communication Engineering, S.R.K.R. Engineering College, AP, India. His research interests include Biomedical-Signal Processing, Signal Processing, VLSI Design, Antennas and Microwave Anechoic Chambers Design. He is author of several research studies published in national and international journals and conference proceedings.

K.S.S. Phani Kumar is a B.E. Student at the Department Electronics and Communication Engineering, S.R.K.R. Engineering College, AP, India.

Y. Guna Teja is a B.E. Student at the Department Electronics and Communication Engineering, S.R.K.R. Engineering College, AP, India.

K. Bhargav is a B.E. Student at the Department Electronics and Communication Engineering, S.R.K.R. Engineering College, AP, India.

T.V.K. Prasanna is a B.E. Student at the Department Electronics and Communication Engineering, S.R.K.R. Engineering College, AP, India.