

Home Automation System Using Android and Arduino Board

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ABSTRACT: Home automation trade has drawn goodish attention of researchers for quite a decade. The main plan is to mechanically management and monitor electrical and electronic home appliances. Consistent with the marketing research firm ABI regarding 4 million home automation systems were subscribed globally in 2013. An equivalent firm additionally calculable that regarding 90 million homes would use home automation system by top of 2017, Many industrial and analysis versions of home automation system are introduced and designed. Good home system has captured many technologies.

The proposed system makes use of existing GSM architecture to control the home appliance. Four different devices are controlled via Android APK. Initially designed APK is installed on Smartphone and messaging is done through sms service which uses GSM architecture. The sms is received by GSM modem which is interfaced to Arduino board. In accordance with sms specific device will be turned ON or OFF through relay board.

I. INTRODUCTION

Today we are living in 21st century where automation is playing important role in human life. Home automation allows us to control household appliances like Light, door, fan, AC etc. It also provides home security and emergency system to be activated. Home automation not only refers to reduce human efforts but also energy efficiency and time saving. The main objective of home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situations.

The system proposed provides to control the home appliances using GSM network, androids APK and Arduino board. The preface of the Global System for Mobile Communication (GSM) and mainly the use of cellular phones got the novelty of distance communication at remote location. Paper makes use of this ability for remote control of instruments and appliances; take a look at this example, a person on a drive within his car all of a sudden memorizes that he left the Cooler, ON actually it should be OFF. The usual circumstance is to drive back and switch OFF. But with the Android mobile phone in the hand equipped with GHAS (GSM Home Automation System) Application, one looks on how the same could be used to result control at any point, anywhere and time without worrying geographical locations.

II. LITERATURE SURVEY

Deepali Javale *et.al* [1] presented the design of home automation and security system using Android ADK which is based on a standalone embedded system board Android ADK (Accessory Development Kit) at home. Akanksha Singh *et.al* [2] presented the paper on how to control home appliances, safety & security system using GSM technology by using android application through android mobile phone. It can control the appliances even in the absence of android phone by sending a normal sms. Prof. R.S. Suryavanshi *et.al* [3] discussed a approach in which a model of Home Automation System Using Android and wifi technology, which really offers easy and really much awaited Home Automation Systems (HAS). Sadeque Reza Khan *et.al* [4] explained the paper where the proposed system can maintain the security of home main entrance and also the car door lock. It can control the overall appliances in a room. The

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mobile to security system or home automation system interface is established through Bluetooth. Prof. R.A. Kadu *et.al*[5] discussed the paper which allows multiple users to control and monitor home appliances simply by an Android application installed on mobile phone. It is irrespective of their locations with relatively low cost design, user-friendly interface. Gowthami.T *et.al*[6] explained the paper which introduces a smart home system which could supervise household appliances remotely and realize real-time monitoring of home security status through mobile phone. This project describes the Zigbee module and Android-based home monitoring system for security, safety and healthcare for human. Niraj R Chauhan *et.al*[7] proposed a system in which if the interrupt is occurred put in the system sends SMS to user however user is enabled to reply the SMS in such a condition associated in nursing intelligent software package can reply SMS. Satish Palaniappan *et.al*[8] explained this paper survey of all existing systems such as Wi-Fi, GSM, Bluetooth, Zigbee and compare the available features. Based on all the systems surveyed, it is identified as an ideal system for home automation with remote access. Rajeev Piyare *et.al*[9] proposed a low cost and flexible home control and monitoring system using an Embedded micro-web server, with IP connectivity for accessing and controlling devices and Appliances remotely using Android-based Smart phone app.

III. SYSTEM IMPLEMENTATION

The block representation of proposed system is as shown in figure 3.1.

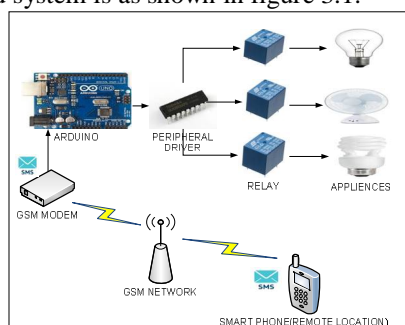


Fig.3.1 Block representation of proposed system

The objectives of proposed system are as below:

- To implement home automation and monitoring using advanced technology.
- Use of smart phone to control home appliances from remote location.
- Real time monitoring and controlling of home appliances from remote location.
- Power saving and improving overall power efficiency.

3.1 Hardware Implementation:

3.1.1 ARDUINO UNO Board:

The Uno is a microcontroller board based on the ATmega328P. 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 worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

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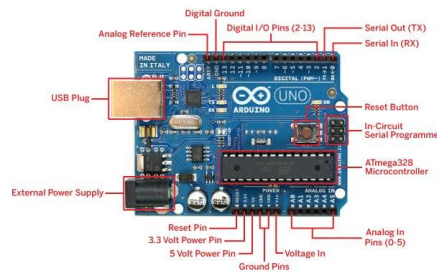


Fig.3.2 ARDUINO UNO Board

"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.

3.1.2 GSM MODEM [SIM900A]:

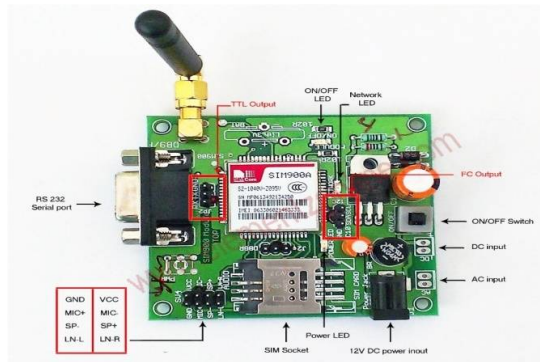


Fig 3.3 SIM 900A GSM MODEL

This is an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications allowing you to benefit from small dimensions and cost-effective solutions. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x24mm x 3 mm, SIM900A can fit in almost all the space requirements in your applications, especially for slim and compact demand of design

3.1.3 Relay:

A relay is usually an electromechanical device that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit. Relays are like remote control switches and are used in many applications because of their relative simplicity, long life, and proven high reliability. Relays are used in a wide variety of applications throughout industry, such as in telephone exchanges, digital computers and automation systems. Highly sophisticated relays are utilized to protect electric power systems against trouble and power blackouts as well as to regulate and control the generation and distribution of power. In the home, relays are used in refrigerators, washing machines and dishwashers, and heating and air-conditioning controls.

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Fig 3.4 Relay

Although relays are generally associated with electrical circuitry, there are many other types, such as pneumatic and hydraulic. Input may be electrical and output directly mechanical, or vice versa.

3.2 Software Implementation:

The proposed system makes use of existing GSM architecture to control the home appliance. Four different devices are controlled via Android APK. Initially designed APK is installed on smartphone and messaging is done through sms service which uses GSM architecture. The sms is received by GSM modem which is interfaced to Arduino board. In accordance with sms specific device will be turned ON or OFF through relay board.

3.2.1 Interfacing between Android and GSM modem

The flow chart to support interfacing between Android and GSM modem is as shown in figure 3.4

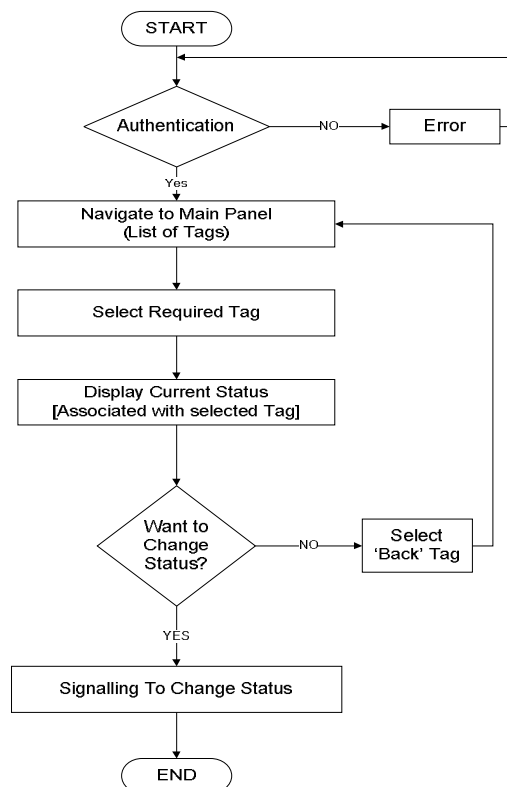


Fig 3.4 Flowchart of communication between Android and GSM modem

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3.2.2 Interfacing between GSM and Controlling devices

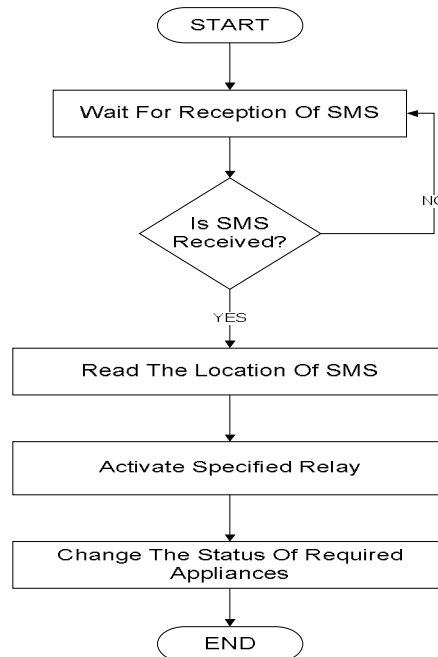


Fig 3.4 Flowchart of Interfacing between GSM and Controlling devices

IV. RESULT

Experimental results of system which is proposed in this paper are as below, Figure 4.1 (a)(b)(c) shows hardware implementation, android app to support home automation and actual appliances respectively. In designed android app, System 1 tag used to turn ON or OFF the Light 1[230v 50Hz electric bulb], System 2 tag used to turn ON or OFF the Light 2[230v 50Hz electric bulb], System 3 tag used to turn ON or OFF the DC motor Light 1[12 v] and System 4 tag used to turn ON or OFF the FM receiver.

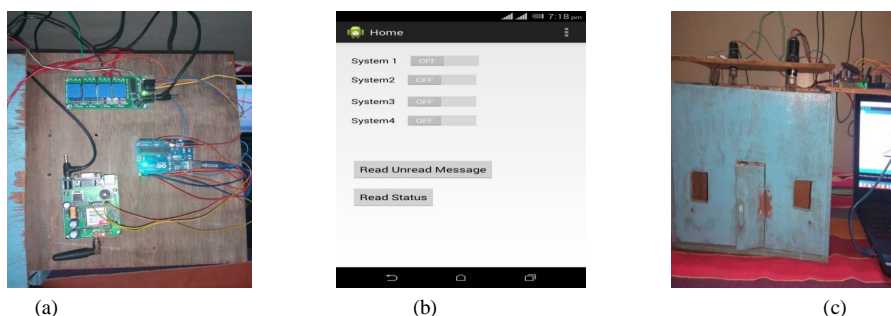


Fig 4.1 (a) hardware implementation (b) Android app (c) System setup

When tag 1 corresponding to system 1 is configured as ON, relay 1 will be turned ON which leads to turning ON of Light 1 as shown in figure 4.2 (a)(b)(c).

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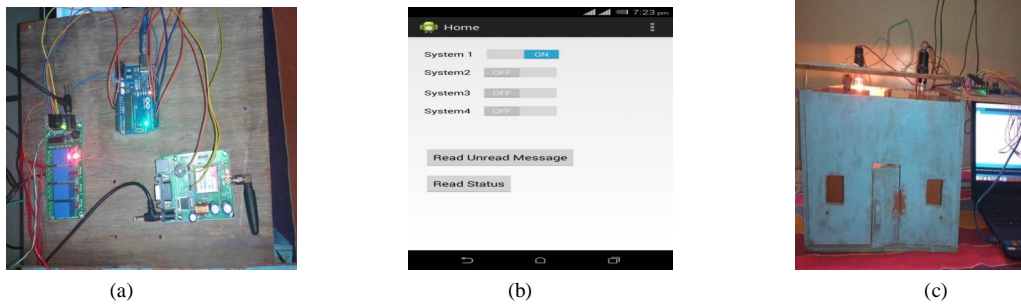


Fig 4.2 (a) hardware implementation with relay 1 ON (b) Turning ON the Light 1 through android app (c) System setup with Light 1 ON
When tag 2 corresponding to system 1 is configured as ON, relay 2 will be turned ON which leads to turning ON of Light 2 as shown in figure 4.3 (a)(b)(c).

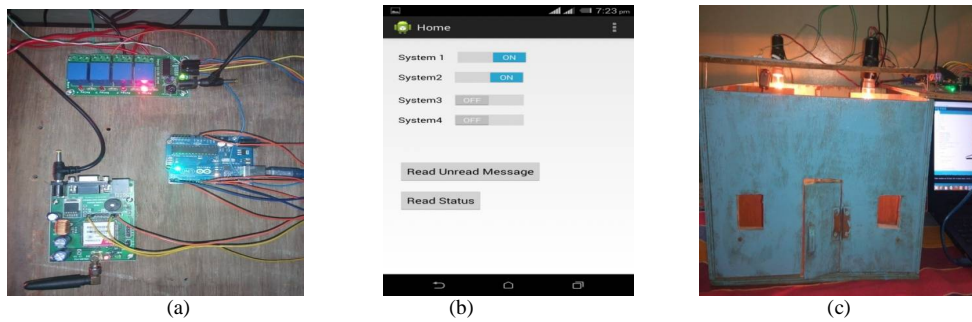


Fig 4.3 (a) hardware implementation with relay 1, relay 2, relay 3 ON (b) Turning ON the Light 1, Light 2r through android app (c) System setup with Light 1, Light 2 ON

Figure 4.4(a)(b)(c) shows system 1, system 2, system 3, system 4 status which is in ON position with corresponding tag positions in android app.

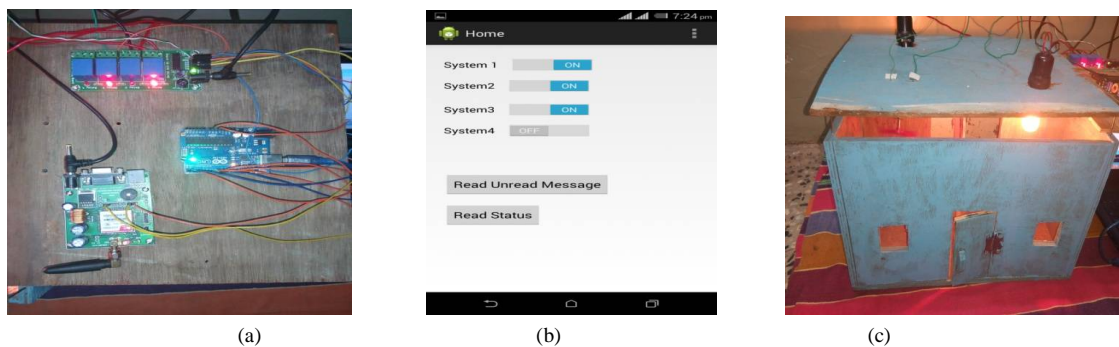


Fig 4.4 (a) hardware implementation with relay 1, relay 2, relay 3 ON (b) Turning ON the Light 1, Light 2, Motor through android app (c) System setup with Light 1, Light 2, Motor ON

Figure 4.5(a) and (b) shows the home appliances status message send by the designed system.

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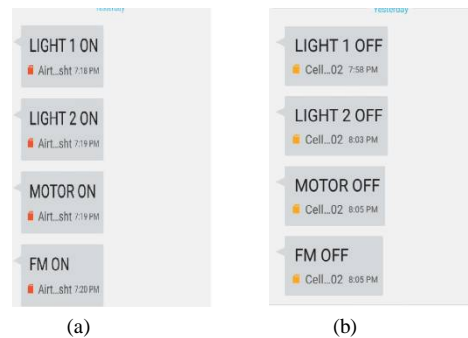


Fig 4.5 (a), (b) SMS received which indicates current status of home appliances

V. CONCLUSION

In proposed system, home automation system is presented using an Android mobile device. It uses GSM sms messaging technique which is simple to use and easy to interface. Our prime objective is to assist handicapped/old aged people. This paper gives basic idea of how to control various home appliances and provide a security using Android phone. This project is based on Android and Arduino platform both of which are FOSS (Free Open Source Software). So the overall implementation cost is very cheap and it is affordable by a common person. Looking at the current scenario we have chosen Android platform so that most of the people can get benefit.

REFERENCES

- [1] Deepali Javale, Mohd Mohsin, Shreerang Nandanvar, Mayur Shingate, "Home automation & security using Android ADK", International Journal of Electronics Communication and Computer Technology (IJECCCT) Volume 3 Issue 2, March 2013.
- [2] Akanksha Singh, Arijit Pal, Bijay Rai "GSM Based Home Automation, Safety and Security System Using Android Mobile Phone", International Journal of Engineering Research & Technology (IJERT) Vol. 4 Issue 05, May-2015.
- [3] Prof. R.S. Suryavanshi, Kunal Khivensara, and Gulam Hussain, Nitish Bansal, Vikash Kumar "Home Automation System Using Android and WiFi", International Journal of Engineering and Computer Science ISSN: 2319-7242 Volume 3 Issue 10 October, 2014.
- [4] Sadeque Reza Khan and Farzana Sultana Dristy "ANDROID BASED SECURITY AND HOME AUTOMATION SYSTEM", International Journal of Ambient Systems and Applications (IJASA) Vol.3, No.1, March 2015".
- [5] Prof. R.A. Kadu, P.P. Dekhane, S.J. Dhamanwala, A.S. Awate "Real Time Monitoring and Controlling System", The International Journal of Engineering and Science (IJES).
- [6] Gowthami, T., Dr. Adiline macruga. G "Smart Home Monitoring and Controlling System Using Android Phone", International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal) Volume 3, Issue 11, November 2013.
- [7] Niraj R. Chauhan, Prof. Pranjali P. Deshmukh "Android based intelligent mobile home automation security system", International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal) Volume 3, Issue 11, November 2013.
- [8] Satish Palaniappan, Naveen Hariharan, Naren T Kesh, Vidhyalakshimi S, Angel Deborah S "Home Automation Systems - A Study", International Journal of Computer Applications (0975 – 8887) Volume 116 – No. 11, April 2015.
- [9] Rajeev Piyare and Seong Ro Lee "Smart Home-Control and Monitoring System Using Smart Phone".