



# Home Security and Control System using ARM7 and GPS

Gajula Pavani , Fiza Khatoon, C Preethi Esther, Kavya H

Students, Department of ECE, Sai Vidya Institute of Technology, VTU University, Bengaluru, India

**ABSTRACT:** The proposed project is focused on functionality of the GPS protocol, which allows the user to control the target system away from residential using the frequency bandwidths. The concept of serial communication has been applied towards development of the smart GPS-based home automation system. Home owners will be able to receive alert messages of any home security issue in the home remotely from their mobile phones. Arm 7 LPC2148 micro controller with the integration of GPS provides the smart automated house. The system automatically sends SMS or Voice call alert information to concerned person's cell phone if any one of the sensors is enabled. Household security is one of the major concern topics.

**KEYWORDS:** Home Automation, GPS, ARM7 LPC2148 micro controller.

## I. INTRODUCTION

Security is one thing that is very influential in today's life everyone needs security guarantees when they work. Like health, security is an important aspect in life. Hence, various kinds of development in the technology field is designed to provide security at all times to protect their assets and privacy.

In addition to the course with the application of security systems, it can reduce the crime rate in the society especially the crime of theft at home. Due to the increasingly rapid movement of people, making them requires a security technology that has the characteristics of mobile technology in terms of getting information easily and quickly.

The wireless communication techniques have given better results as compared to the wired systems. The home security & safety are two main major concerns. There are many applications & embedded devices to monitor the security and safety of the home. This proposed system is developed on ARM-7 TDMI core processor which has the GPS connectivity. Varieties of sensors have been used as far as home safety & security is concerned like LPG gas leakage which is one of the dangerous safety parameters which also causes heavy damages to the house if not monitored. Fire/Smoke sensor which is used to sense the fire or smoke arises due to electrical or burning of any other inflammable material which is also to be monitored. The third one is intruder sensor or entry of unauthorized person's entry in the house has to be sensed. The system senses any abnormalities in these sensor values by enabling a particular sensor and sends appropriate SMS or Voice call alerts to the owner of the house by using the wireless GPS connectivity.

Mobile phones with SMS facility will be very useful when applied to integrated security systems, where the information sent by a security system and the information received by the user mobile phone in the form of SMS. SMS (Short Message Service) is a GSM mobile technology that can perform remote communication wherever they are.

## II. LITERATURE SURVEY

The Home automation system that uses Wi-Fi technology [1]. System consists of three main components; web server, which presents system core that controls, and monitors users' home and hardware interface module (Arduino PCB (ready-made), Wi-Fi shield PCB, 3 input alarms PCB, and 3 output actuators PCB.), which provides appropriate interface to sensors and actuator of home automation system. The System is better from the scalability and flexibility point of view than the commercially available home automation systems. Android application on a Smartphone issue command to raspberry pi card. An interface card has been realized to update signals between the actuator sensors and the raspberry pi card.

The application has been installed on an android Smartphone, a web server, and a raspberry pi card to control the shutter of windows. The User may use the same technology to login to the server web based application. If the server is connected to the internet, so remote users can access server web based applications through the internet using a compatible web browser..

1. **Bluetooth based home automation system using mobile:** In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The password protection is provided so only authorized users are allowed to access the appliances. The program of the Arduino BT board is based



on the high level interactive C language of microcontrollers; the connection is made via Bluetooth. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. One circuit is designed and implemented for receiving the feedback from the phone, which indicates the status of the device.

2. **Zigbee based home automation system using mobile:** To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is recorded and stored by network coordinators. The network SSID and security Wi-Fi parameters are preconfigured. The message for security purposes is first processed by the virtual home algorithm and when it is declared safe it is re-encrypted and forward to the real network device of the home. Over the Zigbee network, the Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce the expense of the system and the intrusiveness of respective installation of the system.

The figure below shows the basic block diagram of home automation:

**BLOCK DIAGRAM OF PROPOSED SYSTEM**

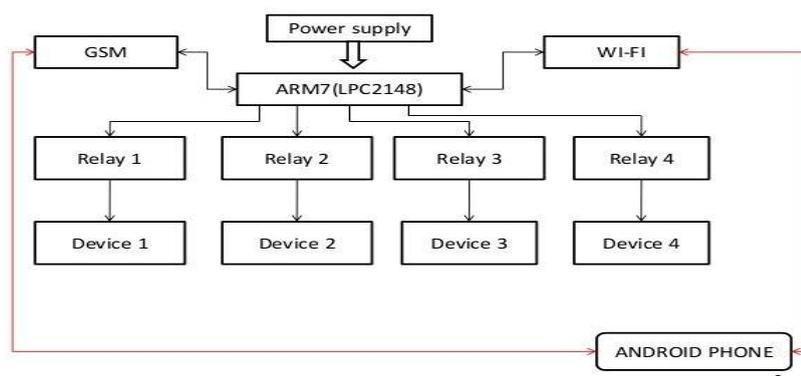


Fig1: Basic block diagram of home automation

**III.METHODOLOGY**

The arm7 controls the working of the whole project. It senses the information from the sensor and controls the appliances. It has the 5 sensors, and this sensor has five relays to control the different appliances.

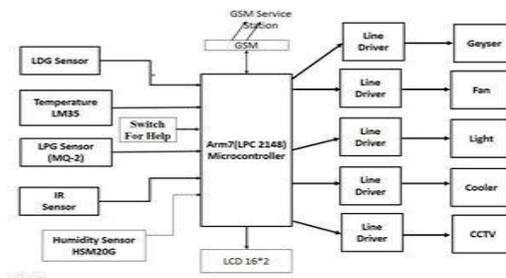
Project objectives to provide the automation system which abels to control the home appliances wirelessly with effectiveness and efficiency.

1. Controlling home appliances via switch
2. Control through wifi and GSM
3. Extensible platform for future enhancements

Our home devices are connected by the ARM7 and the connection is between the ARM7 and to the Bluetooth device. Appliances in the house are connected to the input and the output ports of the embedded system and the status of information is send to the ARM7. The GSM based Device Control System and the mobile application developed using the App Inventor for Android phones.

The GSM network is present almost everywhere. The use of the GSM and mainly the use of cellular phones got the new scope in the Fig2: Block diagram of smart home distance communication at remote location.

.Consider this example of the person on a drive within his car all of a sudden remembering that he left the Refrigerator, ON actually it should be OFF. The usual condition is to drive back and switch OFF the Refrigerator. But with the Android mobile phone in the hand equipped with GHAS (GSM Home Automation System) Application, he is able to OFF his Refrigerator from his Car.



We can control the CCTV camera by SMS through GSM modem . If we send a SMS to a SIM installed inside the GSM modem of the project and then the SMS is received by the GSM modem and then it transfers it to the microcontroller. The microcontroller decodes the SMS and switches on the camera through relay connected to pin 0.31 of the microcontroller.

The microcontroller keeps checking the analog input pins data from temperature sensor, humidity sensor, and LDR Sensor. The microcontroller checks the digital input IR sensor and LPG sensor through the Pins P0.17 and P0.18 respectively.

The IR sensor is placed near the door if someone opens the door or enters in the IR sensor send digital one output to the microcontroller through pin no. 0.17 once this pin is detected, then microcontroller switches on the CCTV camera through pin no. 0.31 and there is a SMS send to the mobile no. which is stored in the microcontroller through the GSM modem intimating that someone is detected.

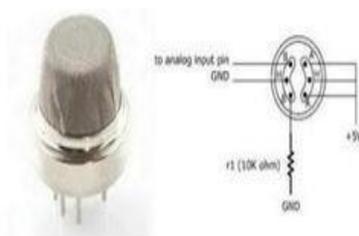
#### IV. SOFTWARE IMPLEMENTATION

The system software is written by using C and embedded C in micro vision Keil-4 software. Then the hex is downloaded in the ARM core by using flashmagic software. The system software doesn't use any generalised operating system program, as the developed system is a dedicated embedded system. As soon as the system is powered ON, the process automatically executes the system programs stored in EPROM. The LCD displays the welcome message, initializes the GSM, indicates the signal strength and scans the output of the sensors.

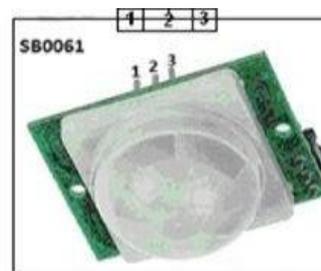
The three sensors 1.SMOKE sensor 2.LPG GAS sensor 3.PIR(Passive infrared) sensor



Smoke sensor



LPG GAS sensor



PIR sensor

Fig.3: Smoke sensor

Fig.4: LPS GAS Sensor

Fig.5: PIR sensor

#### V. EXPERIMENTAL RESULT

The developed system was very rigorously tested in the laboratory by enabling various sensors. Firstly, a smoke is created near the smoke sensor MOC7811. The system immediately gave buzzer alarm and sent SMS message to a test SIM card of a cell phone . Similarly we have tested the LPG gas leakage sensor MQ-6 for this, we have used electronics lighter to sense the leakage of LPG. Lastly infrared intruder sensor,for this, if you create an obstacle in between transmitter and receiver ,it will sensed. The large sized embedded systems certainly create the space problem and is tried to solve in the proposed system by implementing very compact, low power consumption ARM-7 processor.



It was proposed to reduce the size of the embedded system by implementing compact high performance ARM7 and to reduce the power consumption and also allow the system to automatically take the status of sensor output & inform the concern person without distance limitation between transmitter & receiver with the use of GSM mobile technology for wireless communication. From the above discussions it is clear that the system is automatic, wireless, portable and communicates the status of sensors to the authorized person's cell phone thus provides security & safety of the home.

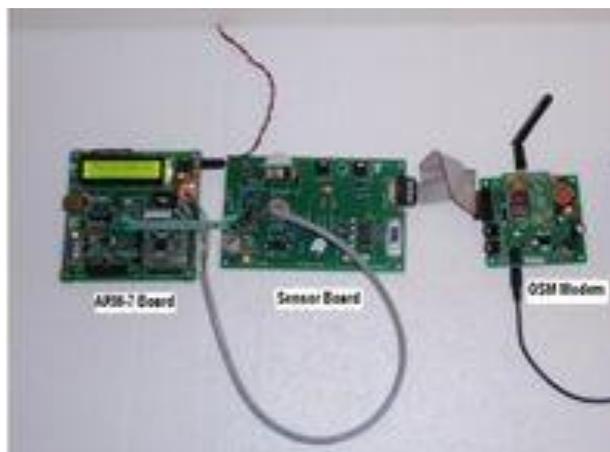


Fig.6: Photograph of Experiment

## VI. CONCLUSIONS

The GSM based home security system has been designed and tested with the mobile network. The user can get alerts anywhere through the GSM technology thus making the system location independent. A flexible way to control and explore the services of the mobile, AT commands is used in the system. The communication of home is only through the SMS which has been tested with the mobile networks and is working on any mobile network.

The web camera based security system is very easy, user friendly and software has many features. It will be easier to use an IP camera instead of a web camera. However, the cost of an IP camera is more. Similar softwares is available on the internet which will perform the same task. This type of system is useful when the owner is out of station and the home is locked. By installing the web camera at the door site, intruders can be detected and the owner can receive a mail telling the intruder entry in a home. If the nearby police station email id is also configured in the system, then the intrusion mail can be received by police also and necessary action can be taken.

The system has tested on the model of smart home and further it will be tested in actual home. The complexity of the algorithm of the system can be increased by introducing number of sensors to make the energy efficient home

## REFERENCES

1. R.G. Jamkar and R.H. Chile "Microcontroller based Temperature Indicator and Controller", *J. Instrum. Soc. India* **34**(3) 180-186, Sept-2004.
2. A.Rajendran and P. Neelamegam "Design of AT89C52 Microcontroller based system for the measurement of Temperature and control", *J. Instrum. So, India* **35**(1)99105, March-2005.
3. J. Jayapandian and Usha Rani Ravi "An Embedded Single Chip Temperature Controller Design" *J. Instrum, Soc. India* **38**(2) 132-136, June-2008.
4. B.Santhikiran., E. Vargil Vijay and M.V.H.Bhaskara Murthy "Design of Multi-Point Short Range Wireless Data Communication Systems" *Proceeding of International Conference on Communication, Computation, Control and Nanotechnology -ICN-2010*, REC, Bhalki, PP 266-270, Oct2010.
5. Shih-Pang Tseng, Bo-Rong Li, Jun-Long Pan, and Chia-JuLin,"An Application of Internet of Things with Motion Sensing on Smart House", 978-1-4799-6284-6/14 © 2014IEEE.
6. Kim Baraka, Marc Ghobril, Sami Malek, RouwaidaKanj, Ayman Kayssi "Low cost Arduino/Android-based Energy-Efficient Home Automation System with Smart Task Scheduling" , 2013 Fifth International Conference on Computational Intelligence, Communication Systems and Networks.