International Journal of Science Engineering and Advance Technology

Design and Implementation of home security system with feedback and control of electric gadgetry

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***Abstract*:**

An embedded system is designed for providing security to home, as the home security is the more prior among all other aspects which are among to home. The system has two sections, one is main station and other is feedback and control section. The main station consists LPC 2148, HLK-RM04, and feedback and control system consists HLK-RM04, GSM-SIM300, and data processing module.

Keywords: LPC 2148, HLK-RM04, GSM-SIM300, home security, feedback and control.

I. Introduction

As the probability of danger is increasing day by day from evildoer, so certain precautions needed to be taken to provide security to pronominal articles. With the progress of science and technology, unprecedented advances taking place in the field of communication technologies such as GSM, Wi-Fi, and Bluetooth and so on. The application of the wireless communication technologies are very extensive and the smart home is one of those important application area.

The aim to this paper is to research a valuable wireless system that will providing controlling of home appliances remotely and able home security against intrusion when the home host absence of home. In the single stared buildings providing security is better than multi starred buildings and apartments. In modern day life style there is not much attachment between people who are living in the apartments or multi stared buildings. So, we need to monitor the state of home and as well as the state of gadgets when we are away from the home.

This system provides security to pronominal articles from evildoer at the same time it also provides smart controlling of gadgets by means of machine drives self activating mechanism. The system sends a text message to the home host about state of home security and state of gadgets.

II. The overall plan of system

The system sends text message to the home host about the state of home security and state of home gadgets whether they are on or off. The control center can detect an external interrupt, when an external interrupt occurs, the buzzer will automatically alarm.

The main principal involved in the system is wireless data transfer between two station i.e. one is main station and other is feedback control section. The system of main system is shown in the figure below.

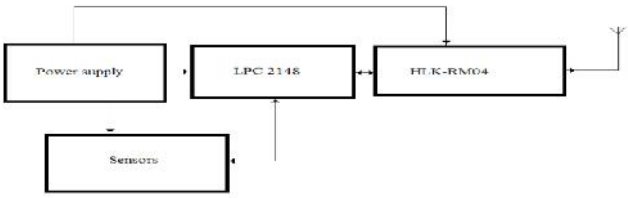

Fig 1: main section

(a) In the main system it includes ARM7TDMI i.e. LPC 2148, wi-fi module i.e. HLK-RM04 and sensor networks. The most important sensor used for providing security is PIR sensor, It works based on the black body radiation, whenever an IR signal is passed through a human body it radiation different frequencies based on temperature. By this way the presence of evildoer at the remaining walls other than main door can be easily

found. In case of main door, authentication password is required and a special key is provided at this place.

Whenever there is a danger at main door the person who is entering the password has to press this special key. Whenever the key is pressed then the system will automatically sends a text message to local police station may be to local police officer. Two different sensors are used to monitor the state of gadgets, they are LDR and pressure sensor.

ARM7TDMILPC2148 has 512KB flash program and 32+8 K SRAM. It takes 12 MHZ crystal for maximum execution speed. It supports mini-B USB connector to UART #0 UART-to-serial Bridge. It is connected to FT232 RL from FTDI. In LPC 2148 only channel#1 has control signals needed for full modem communication. There are two LEDs connected to USB-to-serial bridge chip. LPC 2148 has 14 analog inputs connected to two different 10 bit ADC.

The PIR is pyroelectric device that detects motion by measuring changes in the infrared levels emitted by surrounding objects. The PIR sensor has sensitivity of 20 feet. This can vary with environmental conditions. PIR sensor requires "warm-up" time; this is of 20-60 seconds. It has two modes one if retrigger and the other is normal.

(b) The structure of feedback and control

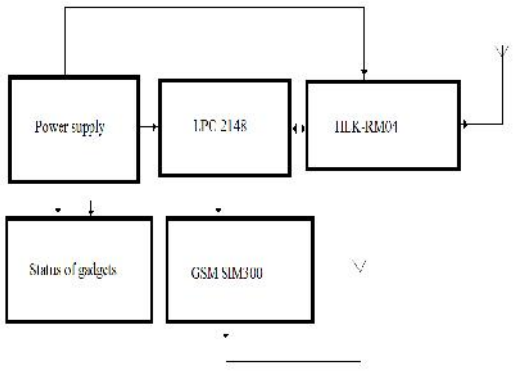

Fig 2: Feedback and control section

The feedback and control section includes Wi-Fi HLK-RM& GSM-SIM300.

The feedback and control section receives signal from main station about the state of electric gadgets and the state of home security. It any interrupted signal is generated from PIR sensor then automatically a text message about state of home security. ARM7TDMILPC2148 has 512KB flash program and 32+8 K SRAM. It takes 12 MHZ crystal for maximum execution speed. It supports mini-B USB connector to UART #0 UART-to-serial Bridge. It is connected to FT232 RL from FTDI.

If any electronic gadgets are in on state then a text message will be send to home host at the same time an LED is used to indicate the state of gadgets. The home host can control the gadgets wherever and whenever required.

III.The hardware design of system

(a) *HLK-RM04 module*

This module is an embedded module based on the universal serial interface network standard, built in TCP/IP protocol stack. It is an Ethernet wireless network. It works with the frequency of 2.4 GHZ. It has flash 4 MB memory and RAM is of 16 MB. It uses a 32 bit ARM7TDMI processor i.e. LPC2148.

After power-on normally, the module will check whether the current network serial port configuration is normal, if the network connection is normal, the module automatically enters transparent transmission mode, and otherwise the module will enter AT command mode. The frame time interval is about 500ms. The module will record only the last information on the remote connection.

This can be configured as

"At+wifi_conf=<ssid>, <encrypt type>, <password>/r"

Ssid: network ssid

Encrypt type: encrypt mode

Table 1: encrypt mode

Value	Meaning
Name	Open network
Wep_open	Wep encryption, open authentication method
Wep	Wep encryption, encryption authentication
Wpa_tkip	Wpa tkip
Wpa_aes	Wpa aes
Wpa2_tkip	Wpa2 tkip
Wpa2_aes	Wpa2 aes
Wpawpa2_tkip	Wpa/wpa2 tkip
Wpawpa2_aes	wpa/wpa2 aes

Net mode can be set as

"At+net mode=<net mode>/r"

Table 2: network mode

Value	Meaning
0	Default setup
1	Ethernet
2	Wifi client
3	Wifi ap

(b) *GSM SIM 300 module*

SIM 300 uses GSM/GPRS which is produced by simcom to provide information as a service to its customers. There are several versions in SIM300. In this system SIM300_V01_06 is used. It works on the frequency of EGSM 900 MHZ. the antenna connector used is MURATA MM 9329-2700 with impedance of 50Ω.

The system includes GSM baseband processor, power supply ASIC, RF, and flash memory and other parts. With this module we can implement SMS and GPRS services, to complete long-distance communication system needs. AT command are major mobile phone manufacturers who work together for GPRS to develop a set of instructions, including the control of SMS.

To turn ON alarm mode following command is used

"At+calarm=1"

To turn off following command is used

"At+cpowd=1"

To minimize current consumption following command is used

" At+cfun"

And functionality levels are

<Fun>=0, 1, 4

Table 3: functional value

Value	Meaning
0	Minimum functionality
1	Full functionality (default)
4	Disable phone both transmit and receive RF circuits.

(c) *Architecture of main system*

ARM7TDMILPC2148 has 512KB flash program and 32+8 K SRAM. It takes 12 MHZ crystal for maximum execution speed. It supports mini-B USB connector to UART #0 UART-to-serial Bridge. It is connected to FT232 RL from FTDI.

It consists of LPC 2148 and HLK-RM04. HLK-RM04 provides transmission rates up to 564Mbps. Its power emission is of 15dbm. It operates from 2.7V to 3.6V. If any interrupt is detected at the sensors then the wifi will communicate to remote section. LPC2148 has a flash memory of 512KB and 32KB SRAM. It takes 12MHZ clock frequency to operate.

The hardware of total system is shown below

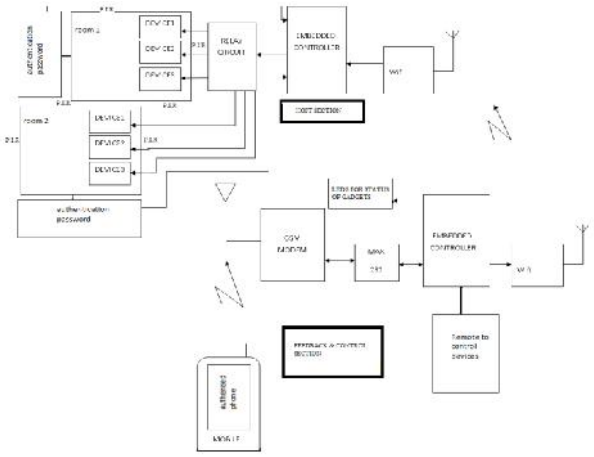

Fig 3: system

IV. Flow design of the system

It provides the graphical representation of working of system. It also reflects the simulation mechanism of system. The flow chart of system is shown below.

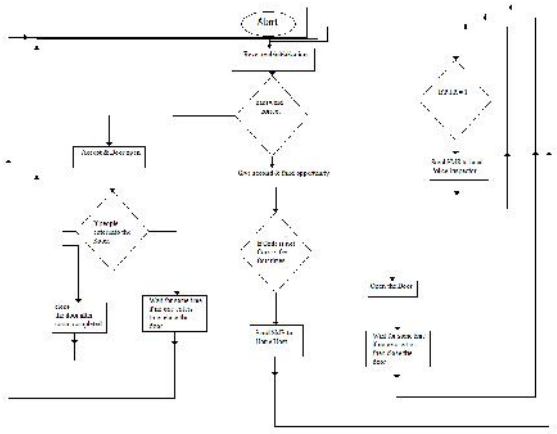

Fig4: flow chart

Experimental study

Fig- Experiment kit

V. conclusion

By using wifi technology the range and data transfer rates are improved. By combining GSM with wifi, the effect give implementation of user friendly home control system was implemented and users can get the current status of appliances. By this way we can get better security to home. This paper discussed and shown a clear experiment for providing security to home, using wifi technology and message passing . The system has two sections, one is main station and other is feedback and control section. With this experiment we concluded that embedded system like this can be helpful to keep us safe.

V.References:

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