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Android Mobile Based Home Security and Device Control using GSM Technology

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Abstract: The main aim of the project is to mechanically management and the monitor electrical and electronic appliances. In domestic environments, based on android mobile and GSM the popularity of home automation has been increasing greatly in recent years due to much higher affordability and simplicity through smart phone and tablet connectivity. There have been many attempts to standardize the forms of hardware, electronic and communication interfaces needed to construct a home automation system. Today - there are also dedicated gateways that connect advanced VRV/VRF and Split HVAC Systems with Home Automation and BMS (Building Management Systems) controllers for centralized control and monitoring. In addition, such gateway solution is capable of providing remote control operation of all HVAC indoor units over the internet incorporating a simple and friendly user interface. All these systems use dedicated hardware or software to function, as the number of devices increased the hardware increases so will be the power consumption. Hence there is a need of single standard systems to control multiple devices. The proposed system uses an IR sensor to detect the person. The system also integrates short range Radio Networks This paper provides a concise overview of mobile network security attack vectors using the back end system and the web browser, also the hardware layer and the user as attack enable mode. It has been shown different and similarities between normal security work and the mobile security.

Keywords: Android, GSM, Stepper Motor, Memory and Sensor.

I. INTRODUCTION

With the development of technology and the continuous improvement of people's living standard, people are in pursuit of automated, intelligent and convenient home control systems. At present, the PC is used as the remote control terminal for most home control systems; however, there are some problems in the PC monitor terminal, such as its great bulk, inconvenience to carry, high cost, limited monitoring range and so on. Therefore, it's a good choice to design a terminal based on phone. With the popularity of smart phones, particularly, the phone based on Android system is rapidly developed. At its I/O developer conference, Google showed a sneak preview of its Android Home project, which will extend the Android platform into household objects. It means that the remote control based on Android phone will become a mainstream way. After logging into the control interface, users can easily control the lights, TVs and air conditionings anytime, anywhere, which brings great convenience to people and improves the quality of life. For this proposed Seminar, following IEEE papers were studied as part of literature survey. Smart Home System for Disabled People Via Wireless Bluetooth gives moneywise concept by using GPRS as the medium to control and monitor home appliances.

Design and Realization of Home Appliances Control System Based on The Android Smartphone present the information about the remote appliances control system based on the Android smart phone is designed and realized. A user logs into the smart phone interface, and clicks the buttons gently to send message commands which will be transmitted to home information Centre through the GSM network. Then the PIC processor recognizes the specified command, and controls the home appliance switches in the wireless radio frequency manner to achieve remote control of appliances ultimately. Exploiting Bluetooth on android mobile devices for home security application present the information about mobile devoice has been integrated into our everyday life. Home automation and security are becoming increasingly prominent features on mobile devoices the mobile devoice and security system communicates via Bluetooth because a short-range-only communication system was desired. With the help of android mobile we can control task such as locking the doors, turning on/off lights remotely. According to kaue, home automation can be useful to those who need to access home appliances while away from their home and can improve the lives of the disabled.

Disabled people are more likely to be exposed to daily life problems than other healthy people. While deaf people cannot hear the door bell, Alzheimer diseased people can forget the gas open in the kitchen. These are some encountered examples when they 4 are alone at home. With

the help of technology, assistant projects can be developed to overcome their difficulties. Smart homes can also be used to support disabled people, providing safe, secure and empowering environments. The system can allow the user to control many features or automate them. The environment can also be monitored by the smart home system to ensure safety and alert people when there is some dangerous situation. The users can manipulate appliances anytime, anywhere, letting our houses become more and more automated and intelligent. At present, the PC is used as the remote control terminal for most home control systems [however, there are some problems in the PC monitor terminal, such as its great bulk, inconvenience to carry, high cost, and limited monitoring range and so on. Therefore, it's a good choice to design a terminal based on phone.

II. BLOCK DIAGRAM

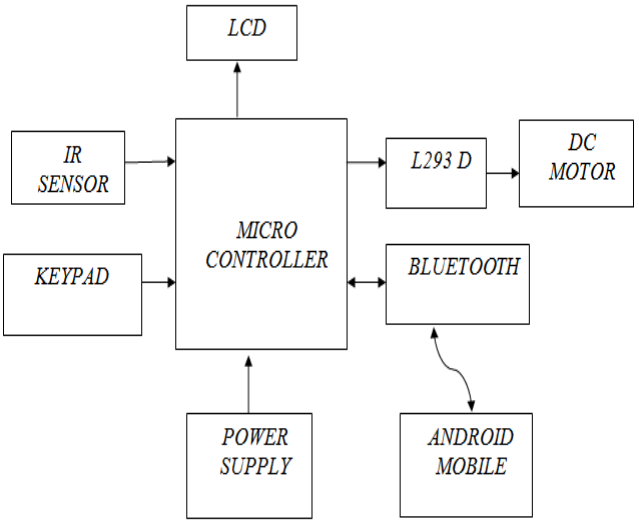

Fig.1. Block Diagram.

A. Hardware Requirements

- Micro Controller (LPC 2148)
- LCD
- IR Sensor
- Keypad
- Bluetooth Module
- L293 D
- DC Motor
- Power Supply

1. LPC2148 Microcontroller: LPC2148 microcontroller board is based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontrollers with embedded high-speed flash memory ranging from 32 KB to 512 KB as shown in Fig.2. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30% with minimal performance penalty. The meaning of LPC is Low Power Low Cost microcontroller. This is 32 bit microcontroller manufactured by Philips semiconductors (NXP). Due to their tiny size and low power consumption, LPC2148 is ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale.

Features of LPC2148 Microcontroller:

- 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 KB to 40 KB of on-chip static RAM and 32 KB to 512 KB of on-chip flash memory; 128-bit wide interface/accelerator enables high-speed 60 MHz operation.
- USB 2.0 Full-speed compliant device controller with 2 KB of endpoint RAM. In addition, the LPC2148 provides 8 KB of on-chip RAM accessible to USB by DMA.
- One or two (LPC2141/42 Vs, LPC2144/46/48) 10-bit ADCs provide a total of 6/14 analog inputs, with conversion times as low as 2.44 ms per channel.
- Single 10-bit DAC provides variable analog output (LPC2148 only)
- Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.
- Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input

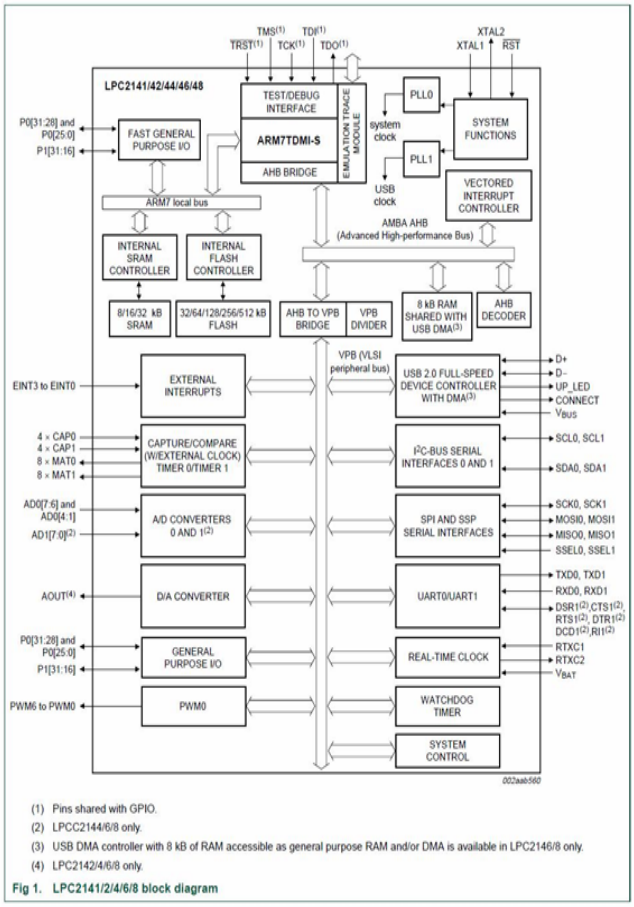

Fig.2. Block Diagram.

2. Liquid Crystal Display (LCD): LCD is a display module finding its application in many electronic devices and circuits. LCDs are preferred to LEDs since they are easily programmable and can display various special characters as shown in Fig.3. We use JHD 162A LCD. A 16x2 LCD displays 16 characters per line with 2 lines in total. It has two registers Command and Data.

Key Features:

- High contrast display
- 16 Characters x 2 Lines
- Built-in HD44780 Equivalent LCD Controller with extension driver
- Works directly with ATMEGA, ARDUINO, PIC and many other microcontroller/kits.
- 4 or 8 bit data I/O interface (in our project 4 bits used)
- Low power consumption.
- Power supply of +5v or 3.3v or 2.7v
- Operating temperature of -20 to +70°C
- EA DIP 162-DNLED: Green color display with LED backlight
- EA B200-9 a 9-PIN socket is used to detach LCD from kit.

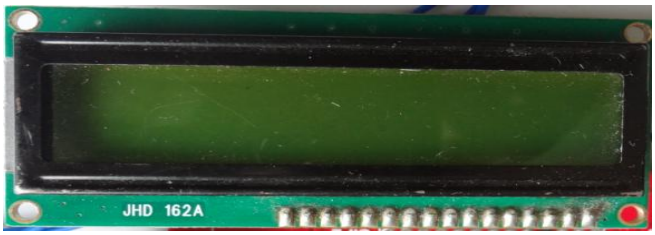

Fig.3. LCD.

3. IR Sensor:

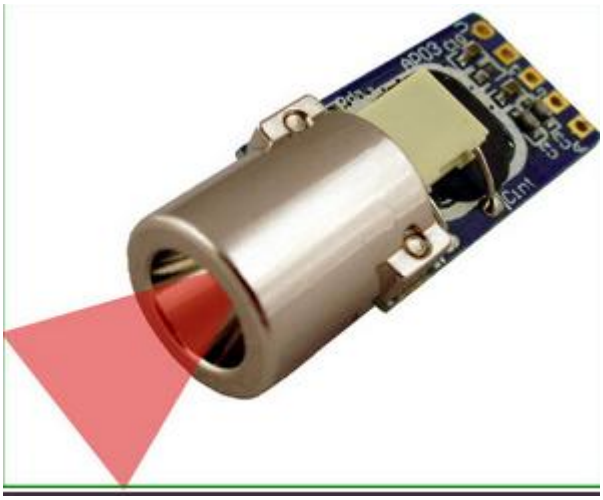

Fig.4.IR Sensor.

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED as shown in Fig.4. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

Applications:

- IR sensors are classified into different types depending on the applications. Some of the typical applications of different types of sensors are
- The speed sensor is used for synchronizing the speed of multiple motors. The temperature sensor is used for industrial temperature control. PIR sensor is used for automatic door opening system and Ultrasonic sensor are used for distance measurement.

4. Key Pad:

Fig.5. Key pad.

This 16-button keypad provides a useful human interface component for microcontroller projects as shown in Fig.5. Convenient adhesive backing provides a simple way to mount the keypad in a variety of applications.

Key Features:

- Ultra-thin design & adhesive backing provides easy integration to any project
- Excellent price-performance ratio
- Easy communication with any microcontroller

Application Ideas:

- Security systems
- Menu selection
- Data entry for embedded systems

5. Bluetooth Module: Bluetooth File Transfer for the PC is a file transfer utility and client which makes it extremely easy to share files between devices with a better laid out user interface than Windows' built-in file transfer program. The included file and folder manager gives you the ability to browse your computer or remote device. It comes with full support for Android and Apple devices and basically

any type of device with Bluetooth capabilities. From within the Bluetooth File Transfer explorer itself, you're able to upload and download files, perform file management operations such as deleting, renaming, copy paste files and more. Bluetooth File Transfer cans also playback multimedia files, open text files and browse images as shown in Fig.6. Although the program might be a little bit slow finding devices, that isn't really a fault of the program but more of Bluetooth protocols. This software certainly makes it a less daunting task of dealing with Bluetooth devices and file management.

Fig.6.

Bluetooth File Transfer (PC) Features And Highlights:

- Easy to use and simple user-interface
- View your files using Large Icons, Small Icons, Tiles, List or Details mode
- High-speed transfer rate achievable
- Adaptive Medieval Cache System for a folder navigation in turbo mode
- Fully supported Drag & Drop to and from the Windows operating system
- Cool background transfers for very large files, a tray icon will be displayed on bottom-right
- Intuitive options system using a drop-down button and quick item explanation
- Information about connected device are stored in a quick "Device History" menu system
- Very useful folder navigation system using a cool drop-down button
- Unique licensing system using ultra-secure online SSL transactions
- Detailed raw log generation system of any device connection
- Built-in error report system for quick bug reporting
- Automatic online version check and update

6. L293D- Current Driver: The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications as shown in Fig.7.

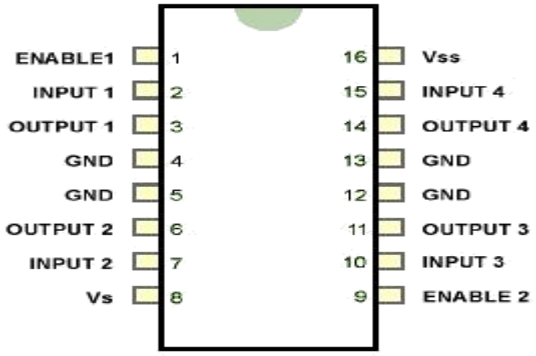

Fig.7. Pin Diagram of L293D Motor Driver.

L293D IC: The driver IC L293D is quad push-pull drivers capable of delivering output currents to 1A per channel respectively as shown in Fig.8. Each channel is controlled by a TTL-compatible logic input and each pair of drivers (a full bridge) is equipped with an inhibit input available at pin 1 and pin 9. The motor will run only when chip inhibit is at high logic i.e. chip inhibit is enabled.

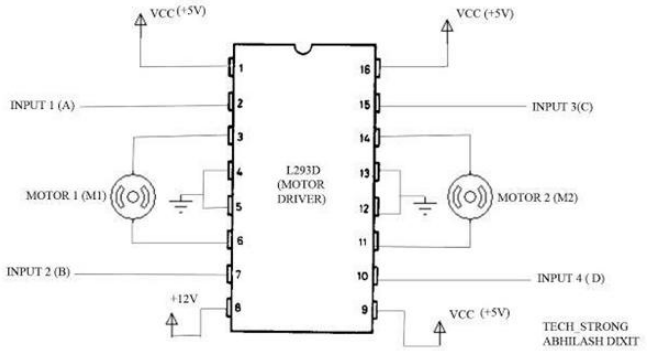

Fig.8. Pin connections of L293D IC.

7. DC Motor: Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits, motors etc. While these circuits require around 10milli amps to be operated, the microcontroller's pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the motor as shown in Fig.9.

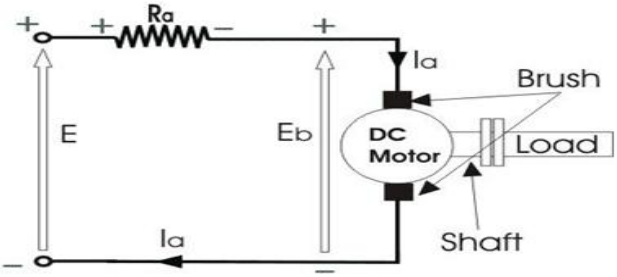

Fig.9. Circuit diagram for DC Motor.

8. Power Supply: All electronic circuits works only in low DC voltage, so we need a power supply unit to provide the appropriate voltage supply for their proper functioning .This unit consists of transformer, rectifier,

filter & regulator. AC voltage of typically 230volts rms is connected to a transformer voltage down to the level to the desired ac voltage. A diode rectifier that provides the full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage as shown in Fig.10. This resulting dc voltage usually has some ripple or ac voltage variation . A regulator circuit can use this dc input to provide dc voltage that not only has much less ripple voltage but also remains the same dc value even the dc voltage varies somewhat, or the load connected to the output dc voltages changes.

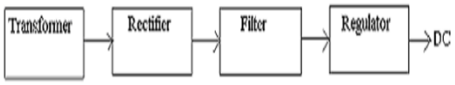

Fig.10. General Block of Power Supply Unit.

Transformer: A transformer is a static piece of which electric power in one circuit is transformed into electric power of same frequency in another circuit. It can raise or lower the voltage in the circuit, but with a corresponding decrease or increase in current. It works with the principle of mutual induction. In our project we are using a step down transformer to providing a necessary supply for the electronic circuits. Here we step down a 230volts ac into 12volts ac.

Rectifier: A dc level obtained from a sinusoidal input can be improved 100% using a process called full wave rectification. Here in our project for full wave rectification we use bridge rectifier. From the basic bridge configuration we see that two diodes(say D2 & D3) are conducting while the other two diodes (D1 & D4) are in off state during the period t = 0 to T/2.Accordingly for the negative cycle of the input the conducting diodes are D1 & D4 .Thus the polarity across the load is the same. In the bridge rectifier the diodes may be of variable types like 1N4001, 1N4003, 1N4004, 1N4005, IN4007 etc… can be used. But here we use 1N4007, because it can withstand up to 1000v.

Filters: In order to obtain a dc voltage of 0 Hz, we have to use a low pass filter. So that a capacitive filter circuit is used where a capacitor is connected at the rectifier output& a dc is obtained across it. The filtered waveform is essentially a dc voltage with negligible ripples & it is ultimately fed to the load.

Regulators: The output voltage from the capacitor is more filtered & finally regulated. The voltage regulator is a device, which maintains the output voltage constant irrespective of the change in supply variations, load variations & temperature changes. Here we use fixed voltage regulator namely LM7805.The IC LM7805 is a +5v regulator which is used for microcontroller.

III. APPLICATIONS AND FUTURE CHALLENGES

A. Applications

Followings are the applications of home appliances control system based on the android Smartphone.

Lighting Appliance Control Subsystem: Household appliances also don't need to transmit large amounts of data, and its real-time requirement is not high, so take a combination of wired and wireless ways to make wiring easy. Alarm subsystem with landline phone alarm and GSM alarm has multiple protections. It can still alarm normally when the line of the landline phone is cut off. The entire system takes modular design thinking which contributes to the design clear and facilitates the user to select a different combination of modules to meet the needs of individual users. Humanized operation interface allows users to use them more conveniently. Dimming control, a more comfortable environment and a certain scene was creating. Appliance control function is not only our commonly household appliances such as microwave ovens, water dispensers, rice cookers, television sets, but also includes garden automatic irrigation systems, fountains and other equipment. Lighting appliance control subsystem can be achieved not only a variety of romantic scenes, but also for the whole family safe. When you go out, just one lobby button, you can complete power outage, which significantly reduces the risk of fire and saves energy

Curtain Control Subsystem: Curtain control subsystem control all electric curtains including blinds, sunshades and skylights. It can automatically open and close in a particular time or at the intensity of light. You can control it by panel, remote control, and even the Internet and smart phones.

Future Challenges: This project can be further developed by integrating it with the internet to monitor your home while sitting in a remote area. By doing this, one can keep an eye on his or her home through an internet connected to the user‟s mobile phone or PC or laptop. This will not only improve the security of your home in this modern day world but will also assist in conservation of energy like if you left any home appliance switched on by mistake, then you can check the status of the appliance on the graphical interface made on your mobile and can switch it off using the internet connectivity.

IV. RESULTS

The hardware model has been developed. The mobile device i s able to communicate approximately ten feet away from the microcontroller through concrete walls the total time from initiation of a lock/unlock to action was approximately one second. This could be shortened through use of lesser delays in the program and the delays are left long in this developed model to ensure that data was sent successfully. The hardware was modified to draw power from a 120V to 12V transformer that i s obtainable, Thus it could be added to any existing structure. To keep all the electronics relatively stable, the normal convention of the locking pin in the door was ignored. Instead, the linear actuator was placed in the door jamb, along with the microcontroller and key switch. For demonstration purposes, and to avoid major construction work on the building, a mock door approximately half the size of a standard door was constructed. It consisted of several feet of a false wall, the door jamb, and the door itself. The false

wall housed the linear actuator, microcontroller and other necessary circuitry. Since no door this size is available, it had to be constructed. Building both the door and the jamb led to the issue of having them both squares, which was a major consideration throughout the construction process. The frame was made as square as possible, but was not entirely sturdy because it was not part of a larger structure. There was some resistance when the door was opened or closed, but this did not seem to detract from the true purpose of the project. This was thought to be the best solution for demonstration because it was very easy to install and repair the electronics and was portable, so that the project could be demonstrated anywhere with ease.

Two major problems arose in the development of this project. The original program prototype for both the mobile device and the microcontroller only communicated a single character to toggle a LED on the microcontroller proto board. The mobile device user interface consisted on a single button to transmit the character because the MAC address of the microcontroller was hard coded in. Some problems arose when the second version of the mobile device program was developed. The mobile device was reading and writing to its buffers to quickly and losing data. An addition of a delay to the source code of the application fixed this problem. This problem did not occur in the microcontroller because delays had already been added to that code. Another problem arose in the choice of a suitable resistor value for the transistor array. It had to be a relatively small value, approximately 30 Ω, to supply enough current. While that value was on hand, it would quickly burn up because it drew too much power. This problem was overcome by the use of six 180Ω resistors that were placed in parallel.

V. CONCLUSION

By designing the Android user interface and Home information centre, home appliance control system based on the Android phone can be designed. It has combined android client, network transmission, and wireless switch, home information center to form a complete system, and the whole system works normally. Identifying message commands and wireless encoding are the two major tasks for home information center. Android phone have advantages such as humane interface, customizable and extendible applications and android phone is easy to carry so on. By constantly improving the control function, android phone allows us anytime, anywhere to control any device, and finally realizes the highly intelligent home.

VI. REFERENCES

[1] S. Rajadurai, P. P. Nehru, R. Selvarasu, "Android Mobile Based Home Security and Device Control Using GSM", IEEE Sponsored 2nd International Conference on Innovations in Information, Embedded and Communication systems (ICIIECS) 2015.

[2] Kaur, I., "Microcontroller based Home Automation System with Security," International Journal of Advanced Computer Science and Applications, vol. 1, no. 6, pp. 60-65, 2010.

[3] Periyar Dasan, Agan Prabhu,Shanmuga Sundaram, Senthil Rajan, Kesavan, "A Ubiquitous Home Control and Monitoring System using Android Based Smart Phone", International Journal Of Computer Science And Mobile Computing.vol.2,no.12,pp.188-197,December 2013.

[4] Micheal J. pont, "Embedded C", Pearson education, New York, 2002.

[5] Gerard Rushingabigwi, Liguo Sun, Godfrey Lugoloobi and Frank Mwezi," An Electric Circuits Remote Switching System based on GSM Radio Network", International Journal of Research in Engineering and Technology, vol.3,no.11,2014,pp. 2321- 4708.

[6] Niraj R Chauhan and Pranjali P Deshmukh, "Android Based Intelligent Mobile Home Automation Security System", International Journal of Research in Computer Science , vol.1.no.2,2014,pp.5-8.

[7] Micheal Becher ,Felix C. Freiling, Johannes Hoffmann, Thorsten holz, sebestian Uellenbeck, Christopher wolf, "Mobile Security Catching up Revealing the nuts and bolts of the Security of Mobile Devices", IEEE symposium on security and privacy, 2011.

[8] Rupam K.S.,Ayub M.,Himaraka K. and Dhiraj K, "Android Interface based GSM Home Security System", proc. of IEEE International conference on Issues and Challenges in Intelligent Computing Techniques, 2014.pp.196-201.

[9] Hapsari,A.T.,E.Y.Syamsudin and I,Pramana, "Design of Vehicle Position Tracking System using Short Message Services and its Implantation on FPGA", Proceedings of the conference on Asia South Pacific Design Automation, Shanghai, China.

[10] Alfredo de Santis, Aniello Castiglione and Umberto Ferraro Petrillo, "An Extensible Framework for Efficient Secure SMS", International Conference on Complex, Intelligent and Software Intensive Systems, May 2010, pp:843-850.

[11] Das, S.R., et al., "Home Automation a n d Security for Mobile Devices", IEEE PerCom Workshops, pp. 141-146, 2011.

[12] Piyare, R., Tazil, M., "Bluetooth based Home Automation System using Cell Phone," IEEE ISCE, pp. 192-195, 2011.

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