SENSOR-BASED SECURITY AND ALERT SYSTEM FOR SMART HOME DOORS

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Abstract

Thanks to IOT, technology nowadays has become an integral part of our lives. Automated smart home might seem a self-sufficient idea but is it? Keeping 24*7 securities of smart homes in mind is also important. Most common security based items like CCTV and other modern techs, face issues like lags in data transfer or other internet related attenuations even at crucial times. Thus, depending only on them is no more advisable i.e. reporting home security breach needs real-time alerts via SMS, CALLS or instant Captured Images of the movement. But here, as said, relying on data or network signals reception for security is again an obstacle which we'll conquer in this project. Keeping the same in mind, In this paper, we have explained that we are creating a sensor based security alert system for smart homes so that we can easily find out if any unusual activity is going on. This sensor based system is going to be affordable for everyone and will utilize a pyro-electric infrared (PIR) along with other devices to minimize the delay of sending alert and if wanted images as well. Hence, it is going to be a "one of a kind" security tech, very cheap yet a brilliant knight for our homes.

1. Introduction

[1] Reducing human efforts has always been the key idea behind any invention, keeping that a priority, smart home automation acts as an ignition spark to your wagon to automation. But in terms of security we are still lagging a bit.

As when it is about providing security to homes, offices, banks or other

human inhabited structures it becomes a big issue for us even in today's world. The need of the hour is to keep our homes, offices, shops safe when we are not around and hence we need to evolve more in terms of security. As now a days it has become very easy for the intruders to break the camera or vandalize them in various ways like breaking them for ex. by spraying something on it. Also, the high cost of these systems makes it less feasible for the common man to afford them. [2] Earlier a system was also developed but as it included camera, the possibility of damaging the camera could become a major problem, thus, to improve the security of home the new method that we are developing can be used by the property owner. Now, suppose that you are outside the home and within that time leap, a dacoit wants to enter the house, at these situations this device as an oriented setup will inform the owner about the burglary in addition, will also send images if wanted by the owner. The PIR sensor holds a strong grip on detection of changes in IR level, and hence detects the motion inside the house, so if there is any unusual movement detected, being connected to framework it passes flag to arduino. Arduino which is a calculative circuit forms the data inside it. In this way, with assistance of it can send a phone call and a text message to the person whose number is already provided in the application. Along these lines, the gadget consequently sends the message while hoodlum is caught up with taking the resources.

2. Related work

Web Of Things and Mobile figuring are the slanting innovations in its field. With the developing utilization of cell phones it requests the engineers for all the more better and easy to use application. Here we summarize the most important and relevant work in the field of security and data protection using the internet of things. Below are materials from various researchers who have worked in this field:

K. Balasubramanian et al. [5] in his paper explained the home security and automation system as the one which holds the capability to remotely access the appliances at home and even have the capability to alert the owner if there is any presence of an intruder or if the fire is detected at home. This paper proposed that it includes a motion detector which will

detect motion and a intruder detector which will detect the intruder within sensor circuit and the RF and LDR were exchanged.

S. Dey et.al. N. S. Sirsath, P. S. Dhole, Naik S. C. Mohire and N .S. Ratnaparkh [1] put forward a automation system explaining it as Automation system as one using mobile device, networking, wireless connection so that it can provide user a remote control varied lights and appliances in the home. The system integrates cellular applications and wireless handheld remote control with computer programs to provide the customer with interface capabilities. Anwar S. et. al. [6] has introduced an IoT based security system with access control using a smart phone. IR motion sensors and camera modules are used to capture motion and photograph respectively. Several other functions have been added to the system (for example, displaying mobile video streams). In addition, when an intruder is detected, a sound signal or siren is activated which notify the neighbours. You can also use the LCD monitor to protect your Raspbery web server [12-14]. From all of these paper it was explained that home automation system always faces difficulty in gaining security. So the prime objective of the paper was to create a system with IoT which holds the capability to control as well as automate many appliances using a simple and manageable web interface as well. Basil Hamed [2] the paper given by Basil Hamed clarifies that the principle objective is to plan and execute a control and screen framework for savvy house. Brilliant house framework comprises of the numerous frameworks that constrained by Lab VIEW programming in light of the fact that the principle controlling framework during this paper. Additionally, the brilliant home framework was bolstered by a remote framework as the sub controlling framework. The framework is likewise associated with the web so it can watch and can control the house hardware's also from anyplace inside the world utilizing Lab VIEW. Denning et al. [7] this paper explains that it explores the privacy and security environment in IoT based homes and in this document it, and offers a framework for reasoning on security needs. In this esearch they have used a script-based a technique which comprises of three parts, they are the achievability of leading an assault, the appeal of the framework as an undermined stage, and the harm which is brought about by executing an assault also. Depali Javle, Mod. Mohsin, Shrirang Nandawar [3] The

principle goal of this paper was to help the disabled and old matured individuals. It gives essential thought of the best approach to control different home apparatuses and supply a security utilizing Android telephone/tablet. This plan comprises of an android telephone along with the home mechanization application that is Arduino Mega ADK. Client can collaborate with the android telephone and impart control sign to the Arduino ADK which progressively will control other inserted gadgets/sensors. Gaan et al [8]. It center around the utilization of advances in IoT conditions and target security-improving answers for arrange purposes of passage. They state that significant dangers comprise of launches of malevolent programming and hacking strategies, and that they are especially significant dangers to alleviate by, e.g., verification methods in the associated gadgets and cryptography between the imparting objects. Kozlov [9] it talks about danger to protection and security at various compositional degrees of the keen home. In this paper they have particularly promoted for the protection control strategies to break down hazard levels, and the parts of security, protection, and trust, as they are especially identified with the vitality utilization of the whole shrewd home [17] [18]. In this paper, it is portrayed that the utilization of insightful home with remote correspondence innovations fundamentally incorporates: The IRDA infrared innovation, the Bluetooth and Zig Bee innovation with numerous others. In the work of Baabar et al. [10], an installed security structure for IoT situations is proposed. In view of a survey of system put together assaults with respect to IoT frameworks, they examine the need to give worked in security in the associated gadgets to give an adaptable foundation to, recognition, finding, dynamic anticipation, segregation, and different countermeasures against effective security strategies. In light of this investigation, they characterize security needs while considering utilizes the biometric inside the verification for home passageway which strengthens home security likewise as ease of home entering process. The structure of the framework is depicted and in this way the joined interchanges are dissected, likewise an estimation for the entire framework cost is given which is something ailing in a ton of other shrewd home plans offers. WB-SH is planned in such a way, that it is equipped for assuming a significant job in a structure computerization framework and subsequently can be applied to

workplaces, centers, and different places too. The paper closes with a creative mind for the more drawn out term of the brilliant home when utilizes the biometric innovation during a bigger and progressively exhaustive structure.

3. Objective

The aim of the project is to develop a certain system which is efficient enough to solve all existing problem related to home security. This security system is going to be economically cheaper and hence can be easily accessible by everyone.

4. Proposed System

4.1. System Overview

We have introduced an engineering that give security to home and a couple of confined spots like armed force zone, government additionally as private spots and so forth. Also, the proprietor can get a caution through telephone call or instant message or even images if wanted, should there arise an occurrence of any abnormal action recognized. From the proposed equipment module, any quick choice are frequently taken as on when required. From the proposed hardware module, immediate decisions are often taken as on when required. The idea is to develop a device which is going to sense the human motion firstly and as soon as it detects it an automatic phone-call and an automatically generated message will be send to the person who's number is already fed in the application. This, as you can see, works on a thought of home security framework where a deficiency in any one part in the framework doesn't influence different segments of the framework. Using various gadgets which might possibly be legitimately good with one another yet can be made to work [3].
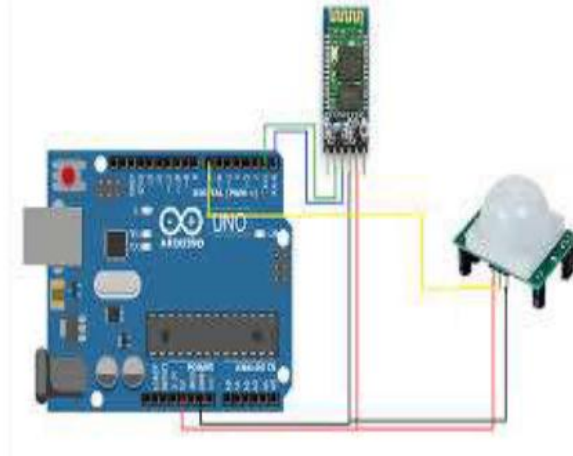
Figure 1. Connection diagram [19].

Keeping that in mind here for developing the device we are using Arduino, Bluetooth HC05, PIR motion sensor using them we are going to develop a device which will inform the user that an unusual activity is detected in their store or the place where the device is kept and hence by installation of this and they will have an option that whether they want to activate camera or not which will always an option to be installed by the user or not and using this now anyone can easily go for long vacations.

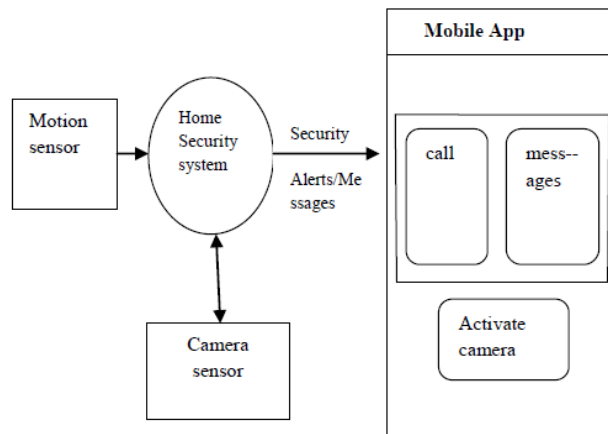### 4.1.1. Proposed system architecture

Figure 2. Proposed System Architecture.

This is the proposed architecture of our project which explains the architecture and shows that when motion is detected as an input, the security system sends alert through blue tooth and call and text message is send with an option to activate camera if IP camera is installed by the user.

4.2. Equipments Used

4.2.1. Arduino Kit. The Arduino Uno R3 might be a microcontroller board upheld a removable, double inline-bundle. AT mega 328 AVR microcontroller. Projects are frequently stacked on thereto from the simple to-utilize Arduino PC infection. It is a microcontroller board which was created by Arduino.cc and bolstered by Atmega328. It has an inside and out help network, which makes it an extremely simple gratitude to begin working with implanted gadgets.
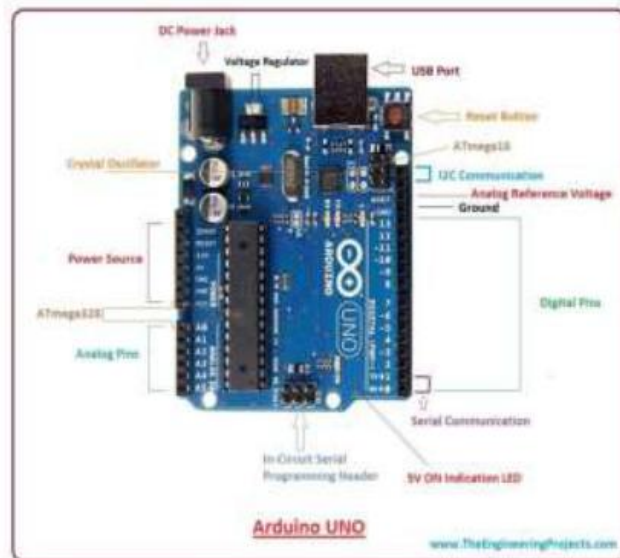

Figure 3. Arduino Uno Component Diagram [22].

4.2.2. PIR Motion Sensor. With a technology that includes pyro electric sensor, a PIR is used to detect the change in the toggling levels of infrared. With the idea of synonymous division of symmetric locaters, PIR makes it easy for the rectified illusion diagrams or real life movements to be simplified into highly detectable altered IR levels based on classified bodies that reflect the radiation. The same can be instantiated via the idea that

while using the sensor as a part of daily lifestyle, there will be loads of scenarios which will be making movements in the house, pushing/triggering alarms at the movement of any random obstacle in IRs also our agenda here is not related to distinguishing the average IR Levels. Keeping the idea of multiple sensors at the bay, PIR sensors outrun the primitive idea as unique as themselves. Thus the dual opening in PIR sensor makes its way into critical IR detection i.e. understands the difference in IR qualities received by the two nodes and compares the differences , and only hints the alarms when the obstacle is same.

Figure 4. PIR motion sensor [20].

4.2.3. Bluetooth HC 05. The Bluetooth HC05 module is a master slave module which males it exceptionally productive and thus it functions as an extraordinary answer for remote correspondence. As a matter of course the production line setting is SLAVE. The Role of the module are regularly arranged uniquely by AT COMMANDS. This is a sequential port blue tooth module which is totally qualified BluetoothV2.0+EDR (Enhanced Data Rate) 3Mbps with adjustment with complete 2.4GHz radio handset and baseband. It utilizes CSR Blue core 04- External single chip and blue tooth framework with CMOS innovation and with AFH (Adaptive Frequency Hopping Feature).
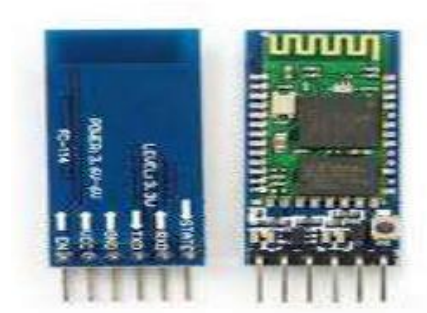
Figure 5. Bluetooth hc-05 [21].

4.3. Methodology:

4.3.1. The Proposed Framework:

Based on the earlier works done for providing security system it was evaluated that many works were done by the researchers in the field of IoT. [11] There is a paper proposed in which a framework is created which utilizes a handholding remote, PC based program and a cosolidation of a portable application which gives a UI to the purchaser. So, many works were done but most of them were either not successful due to any reason or were very expensive and hence not easily accessible. So, here we are proposing the framework which includes some simple steps.
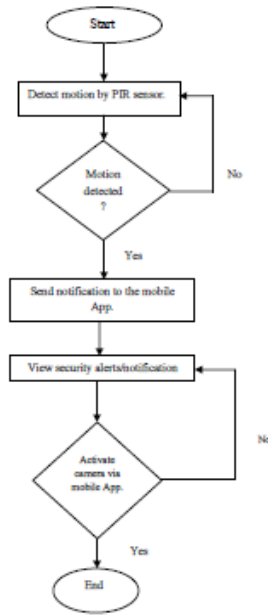
Figure 6. working methodology of proposed system.

In this module we are developing a device which will sense the motion first after which it will firstly evaluate whether we need to perform further action or not on the basis of frequency of motion detected. If the value is larger then the one fitted in motion sensor then further actions will be performed. Now as the motion is detected as an unusual one it will send this t0 arduino which will make blue tooth device perform its action by sending message and phone call using the mobile application developed by us and hence in this manner it will inform the owner. So by installing it now you can easily go for long vacations and enjoy without any stress and in your absence if something unusual occurs you will get notified.

4.3.2. Working:

Initially it will take a variable for movement sensor pin. Here Arduino advanced pin 7 is utilized and after that we are making a set-up capacity and the Bluetooth baud rate is also setted (here utilized baud rate 9600) and then we will set the pin mode for PIR sensor as info. At that point inside the following piece of the code, we will make a loop work and under that it will make an 'if condition' that checks the status of movement recognized by the

sensor. At that point when the PIR movement sensor recognizes any human movement, at that point the Arduino sends a number over Bluetooth which will educate the Android application after which a telephone call and an instant message will be send to the proprietor and they will have another choice that whether they need to actuate camera or not which will constantly an alternative to be introduced.

Presently, we will cross check every one of the associations and afterward furnish capacity to the Arduino with battery and afterward we will fix the gadget in a room. After that we will interface the application that we have made. Presently, at whatever point any individual who is a gate crasher will enter in your room it will right off the bat identify it and afterward send a number to the application and the application will naturally approach the telephone number and text message also on the number that we have provided in the application with an option to activate camera if IP camera is installed by the user.

Now, we can easily fix this device in our home and can go anywhere we want to without worrying about security.

5. Conclusion and Future Work

We proposed and tested a general device for real-time problem. Our proposed architecture have been systematically built in order to reduce the number of burglary, break-ins. We have developed a system that protects the homes 24*7. [15] There was a paper proposed which holds the capability to detect that the person who is entering to the home is a guest or intruder based on judgments using camera but it was having a drawback as sometime it use to detect unknown guests as intruders. Keeping that in mind we have developed an architecture reduces the stress of security of their homes while obtaining favourable results and the user will always have an option to activate camera if he or she have installed it. Finally we presented a system or device that automatically sends the message while thief is busy in stealing the valuables. As IoT is going to be a new era of technology in future, so home security is also a part of automation which include security control. It will be one of the cheapest and most affordable device which will be easily accessible for everyone. And it will prove very useful and success well in future.

In short, home automation has a huge scope in future. Everyone will opt for this technology happily because of the energy saving behaviour and more smart security accessibility features of smart homes.

It augments the home security, build effectiveness, control and personalization. It is set to make you lethargic in coming future. AI would upset home via programmed danger discovery and proactive readiness. Future homes will have the option to offer practically all required services. As innovations keep on advance, you can anticipate that the place of tomorrow should be considerably more computerized than that of today.

References

[1]   N. S. Sirsath, P. S. Dhole, N. P. Mohire, S. C. Naik and Ratnaparkhi, Home Automation using Cloud Network and Mobile Devices, International Journal Of Engineering And Computer Science 5(2) (2016), 15852-15855.

[2]   Deepali Javale, Mohd. Mohsin and Shreerang Nandanwar, Home Automation and Security System Using Android ADK, International Journal of Electronics Communication and Computer Technology 3(2) (2013).

[3]   Charith Perera, Arkady Zaslavsky, Peter Christen and Dimitrios Georgakopoulos, Context Aware Computing for The Internet of Things: A Survey, IJEDR, 5(2) (2017).

[4]   Y. Charith Perera, Arkady Zaslavskyy, Peter Christen and Dimitrios Georgakopoulosy, Ca4iot: Context Awareness For Internet Of Things, Proceedings of the IEEE International Conference on Green Computing and Communications, France, 2012.

[5]   K. Balasubramanian and A. Cellatoglu, Analysis of Remote Control Techniques Employed in Home Automation and Security Systems, IEEE Transactions on Consumer Electronics 55(3) (2009), 1401-1407.

[6]   Shaik Anwar and D. Kishore, IOT based Smart Home Security System with Alert and Door Access Control using Smart Phone, International Journal of Engineering Research and Technology 5(12) (2016), 1-5.

[7]   T. Denning, T. Kohno and H. M. Levy, Computer Security and the Modern Home, Comm. of the ACM 56(1) (2013), 94-103.

[8]   G. Gan, Z. Lu and J. Jiang, Internet of Things Security Analysis, IEEE International Conference on Internet Technology and Applications, Chengdu, 16-18 August-2011,

[9]   D. Kozlov, J. Veijalainen and Y. Ali, Security and Privacy Threats in IoT Architectures, Proc. of the 7th Int. Conf. on Body Area Networks, 2012.

[10] S. Babar, A. Stango, N. Prasad, J. Sen and R. Prasad, Proposed Embedded Security Framework for Internet of Things (IoT), Conference: 2nd IEEE International Conference on Wireless Communication, Vehicular Technology, Information Theory and Aerospace and Electronics Systems Technology (Wireless VITAE), 2011, At Chennai, India.

[11] M. Chan, E. Campo, D. Esteve, J. Y. Fourniols, Smart Homes-Current Features And Future Perspectives, Maturitas 64(2) (2009), 90-97.

[12] Basma M. Mohammad El-Basioni, Sherine M. Abd Elkader and Mahmoud Abdelmonim Fakhreldin, Smart Home Design Using Wireless Sensornetwork And Biometric Technologies, At 2(3) (2013).

[13] Inderpreet Kaur, Microcontroller Based Home Automation System With Security, International Journal of advanced Computer science And Applications 1(6) (2010).

[14] Rosslin John Robles and Tai-Hoon Kim, Review: Context Aware Tools For Smart Home Development, International Journal Of Smart home 4(1) (2010).

[15] A Review of Smart Homes-Past, Present, and Future, IEEE transactions on Systems Man and Cybernetics, November 2012.

[16] R. Rudolf, Smart Home concept and the integration of energy meters into a home-based system, in Proc. 7th Int. Conf. Metering Apparatus and Tariffs for Electricity Supply, (1992), 277-278.

[17] Wen-Yang Wang, Chih-Chieh Chuang, Yu-Sheng Lai, etal., A Context-Aware System for Smart Home Applications, Lecture Notes in Computer Science 38(23) (2005), 298-305.

[18] D. Egan, The Emergence of ZigBee in Building Automation and Industrial Control, Computing and Control Engineering Journal 16(2) (2005), 14-19.

19] https://www.google.com/imgres?imgurl=https%3A%2F%2Fel ectronicsforu.com%2Fwpcontents%2Fuploads%2F2019%2F06% 2Fconnection696x385.png&imgrefurl=https%3A%2F%2Felectro nicsforu.com%2Ftag%2Farduino%2Fpage%2F3&docid=iHELO ELjH9HfeM&tbnid=sb6XLtfTcE2ADM%3A&vet=10ahUKEwj 2_basvTmAhXyX3wKHbWhASAQMwgtKAIwAg..i&w=696& h=385&bih=755&biw=1536&q=ir%20tx%20rx%20arduino&ved =0ahUKEwj2_basvTmAhXyX3wKHbWhASAQMwgtKAIwAg &iact=mrc&uact=8

[20] https://www.google.com/search?q=pir+sensor+pictures&sourc e=lnms&tbm=isch&sa=X&ved=2ahUKEwjNi6r9wOTmAhUEU 30KHSWGD54Q_AUoAXoECA8QAw&biw=1536&bih=755#i mgrc=4ZpkQp8jw8bYPM:

[21] https://www.google.com/search?q=Arduino+pics&source=ln ms&tbm=isch&sa=X&ved=2ahUKEwjRrO7D7tfmAhXdzTgGH QALDhwQ_AUoAXoECA0QAw&biw=1536&bih=706#imgrc= U33b1RxArcw4JM:

[22] https://www.google.com/search?q=bluetooth+hc- 05+module&source=lnms&tbm=isch&sa=X&ved=2ahUKEwicg PmV79fmAhX9yjgGHa5nCfkQ_AUoAXoECBEQAw&biw=15 36&bih=706#imgrc=lMzqllVo5z3NDM:

[23] Subhajit Dey, Tamaghna Kundu, Sourav Mukherjee and Mili Sarkar, Web based Real-Time Home Automation and Security System, Int. J. Elec. Electr. Eng. Telecoms 4 (2015), 126-132.