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Security system using PIR sensor, Arduino along with android application

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***Abstract*- Safety deserves an important position in everyone's life. Wireless Security Systems ensure the real time detection and signaling of the threat to the industry. In the present scenario, only the sophisticated technologies can detect the theft in time. So we made a simple project to detect the theft in time. Our project comprises of two modules. One module deals with hardware components of security system such as PIR (Passive Infrared) sensor. For detection of changes in the surrounding we made use of Web camera, Alarm etc. The other module deals with an Android app through which the user can interact with the security system even from a remote location. To announce intrusion to us, we use alarms, sms and an android application. The movement can be viewed through a web camera. The movement is first detected by PIR sensor which is connected to Arduino microcontroller and that gives the serial monitor output as "movement detected". The Arduino is then connected to GSM. GSM gives the call alert to the user's smartphone. When the call is viewed by the user, user will open our own Android Application and view the happenings in our industry. In case of theft, the user can able to trigger the alarm button in our application which switch on the alarm in our industry. The special thing in our project is we made our own application for monitoring inside the industry when theft is recognized. In future, if theft is recognized the captured images in our phone will be sent to police station in time.**

***Keywords*— PIR Sensor, Webcam, GSM, Android Application, Arduino.**

I. INTRODUCTION

The main and most essential reason to think about a security system is to safeguard our property from burglaries. Continuous thefts and burglaries are being reported, which is getting increased day by day. Thus the whole responsibility falls at the hand of every individual to ensure their own safety.

One potential deterrent to these burglary issues is to install a security system at our provinces. Security systems and alarm monitoring systems can affect these crime rates and burglaries. These security systems offer a critical challenge to stealers, which makes easy for police men to catch them.

Many statistics says, an environment protected with any kind of security system are less prone to robberies. Thus, in addition to the precautions like window locks and deadbolts on doors, a security system is a prime candidate for security options.

Often the main deterrent for people thinking about getting a security system is the cost, which usually includes a monthly bill and any initial installation products and fees. But the cost is worth covering the potential risks – a decision that only can made by ourselves.

Security systems involve the use of various devices (like camera, alarm) and sometimes a human force in order to protect the individuals or a property from various hazards such as crime and loss.

Instead of just protecting our provinces, these security systems can alert a company monitoring of our target, send us the status of intrusions, alerts the surrounding in case of a break-in etc... Various technologies are being adopted for developing a user friendly effective security systems.

A detailed survey about security systems, their prevailing technologies, their pros and cons are considered and dictated here.

II.RELATED WORKS

2.1 Alper Sismen, Coskun Tekes,Haluk Gokce,Recep Uzelli , Sinan Eksi (23 Jun 2005), "Gsm-based security system WO 2005057516 A2"

A security system positioned in places where security is to be provided and producing predetermined warnings by switching into alarm mode upon detecting an extraordinary motion in a certain area by means of its sensors, said system characterized by comprising a central unit, which has an microprocessor-equipped electronic card having a GSM modem and at least one SIM card. It is controlled by at least one GSM-based mobile unit with at least one SIM card and communicates with said mobile unit via a GSM network.A further drawback that the device calls first the center and then the householder is informed by this center on the relevant matter is that it leads to time loss and one falls behind in taking the necessary measures. Another disadvantage appears in the controls of the present systems. This case restricts the users to control their alarm devices within a limited space only. Similarly, the security systems employed against car-thefts or for vehicle pursuits have also many disadvantages.

2.2 Saravana kumar. M, M.Mounika, L.Ramya pavani, E.Ranadeep, B.Siddharyha(B.E Students), K.B.V.S.Subramanyam(Associate professor) ,(2015) "GSM Based Industrial Security system"

In this paper, we have tried to increase these standards by combining new design techniques and developed a low cost home and industrial automated security systems. The design of simple hardware circuit enables every user to use this wireless home security system with PIR sensor, Gas sensor, Smoke sensor and Main fuse Failure Detector at Home & Industries. When the user is away from home or industry, all the sensors are activated by switching on the Security system. The architecture of the system mainly consists of three components the GSM MODEM and the interface circuit that include the different sensors used. The microcontroller is connected to different devices like smoke detector, motion detector through relays.

2.3Raqibull Hasan, Mohammad Monirujjaman Khan, Asaduzzaman Ashek, JahanRumpa (June 2015), "Microcontroller Based Home Security System With GSM Technology"

In this paper, design and implement of a microcontroller based home security system with GSM technology have been presented and analyzed**.** Two microcontrollers with other peripheral devices which include Light Emitting Diode (LED), Liquid Crystal Display (LCD), Buzzer and Global System for Mobile Communication (GSM) Module are responsible for reliable operation of the proposed security system. A mobile phone is interfaced with microcontroller through a Bluetooth device in order to control the system. Moreover, a manual keypad is another way to lock or unlock the system. A Compiler Code Vision AVR is used to design a program that controls the system along with maintaining all security functions. The designed program is applied in Proteus Software for simulation.

2.4 Pinhas Shpater, Laurent(CA), Shmuel Hershkovitz, Haifa(IL) (10 April 2001), "Passive Infrared motion detector and method"

Passive Infrared (PIR)Motion detector lens are staggerd at close range to provide for per immunity. In a dual Sensor, dual lens configuration, the sensor signal is acted on to generate an alarm only when the sensor signal is simultaneous, indicating that an infrared emitting object big enough to cross both staggered zones of a zone pair has been detected. The invention also provides a method and apparatus of detecting an intruder in a PIR sensor motion detector having a single sensor and lens in Which the Zones are staggered in height to prevent alarm signal generation When pets cross only alternate Zones at close range. Conventional PIR motion detectors have difficulty with "false" alarms resulting from pets moving through detection Zones at close range to the detectors. The level of IR radiation emitted by pets is sufficient at such close range to cause an alarm. Another approach to dealing with pet immunity in motion detectors has been special processing of detector signals, particularly in the case of dual technology detectors, which may be used to distinguish between pets and human intruders.

2.5 Zhimin Xiao, Zhongwei Ding Shanghai(CN) (19 March 2015), "Method of Installing PIR Sensor with Camera"

A method and apparatus that includes the steps of receiving a PIR signal and video signal from a passive infrared sensor having a pir detector and camera,

displaying a video image from the camera on a display. PIR detectors typically include one or more radiation detectors intended to detect infrared energy from human intruders. Since PIR detectors are activated by infrared energy, they also have the ability to detect fire. During the walk test, the installer may walk through the area in front of the PIR sensor. The installer may stop in any one or more locations where he/ she wants to make sure that the PIR sensor is able to detect an intruder. This is often necessary to avoid the possibility of activation by small animals such as pets. Once activated, the PIR detector may continuously monitor for intruders. In this regard, a signal processor may compare a signal level from the PIR detector with the one or more threshold values.

2.6 Viraj Mali, Ankit Gorasia, Meghana patil (19 March 2016), "Home automation and security using Arduino microcontroller"

As per our survey currently there exists system neither at cheaper rates nor easy to handle. Various systems are hard to install, difficult to use and maintain. Current systems are generally proprietary, closed and not very user friendly. Based on Arduino or GSM or low cost home security system and home automation system. In this importance of home security measures are elaborated using easily available programmable sensors like PIR sensors. This also helps in the variation and also maintains low cost. This paper aims to develop a low-cost means of home security system using sensors like motion sensor, PIR sensor etc. This system also deals with the OTP (One Time Password) generation which will be used as entry password for user. This paper is based on an embedded system where micro-controller is used for home security and automation system. This system can operate using cellular phone with the help of GSM technology. The Bluetooth client was successfully tested on different mobile phones from different manufactures, thus proving its portability and wide compatibility.

III.PROPOSED SYSTEM

From the above observations, we have come to know about various advantages and disadvantages of prevailing technologies used for security options. Motion sensors are the most widely used component for security system. But the sensitivity of these sensors lies within a short range. Also existence of remote monitoring system is also lagging. Hence, here we have developed a security system which overcomes both of these drawbacks. Our security system may ultimately be less of an expense when you include all of the potential savings, which you could lose in one burglary.

It comes under commercial security system. Commercial security system uses more sophisticated technologies and equipment. Security systems which are intended for small business cannot afford the highly sophisticated technology. So we made this project for small businesses in a simple affordable price. Our project triggers the user in case of movement detection. User can investigate the target condition by using android app installed in his phone, which is solely developed for this security system. In case threat, user can trigger an alarm signal from his remote location using internet connection over the target area. Thus, with this application installed user can monitor the status of target at anytime from anywhere. Target images could also be stored at our mobile phone without any delay.Installing, arming, disarming, paying monthly fees, and dealing with false alarms are all things that are tied to monitored security systems which may cause the user to wonder if security system is worth the inherent hassle. This system best protects our valuables. The following section gives detailed description about this security system.

3.1 Block Diagram and working

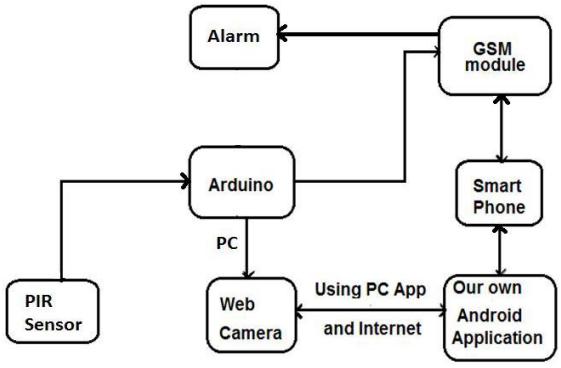

Figure 3.1 Security system

The Figure 3.1 will shows system comprises of two modules. One is of the transmitter section, which detects for any movement at our target place. It triggers the benefiter through a phone call, when it senses a motion. This section is highly accurate in determining the movements, whose range under surveillance can be varied according to the requirement. Hardware modules that are used under this module includes a motion

sensor, module that notifies user about intrusion, module that triggers alarm by accepting an response from user.
The other module comprises of Android application. Receiver section involves an android application installed at the user's mobile phone. Once a trigger signal is arrived as phone call, user can investigate the target by using this application. From this app, using internet connection target area can be monitored

IV. RESULT

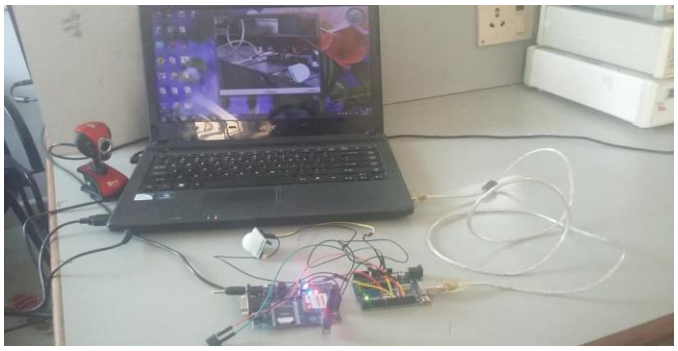

Figure 4.1 Final hardware setup of security system.

This figure 4.1 shows PIR Sensor and GSM module along with arduino and complete security system setup.

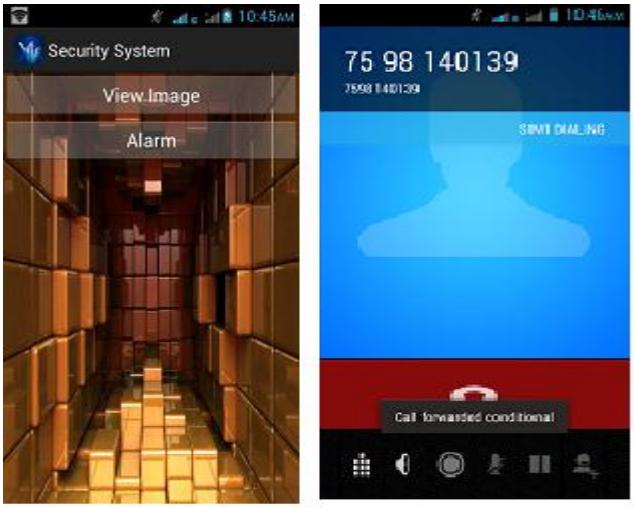

Figure 4.2 Front layout of android application and triggering alarm layout.

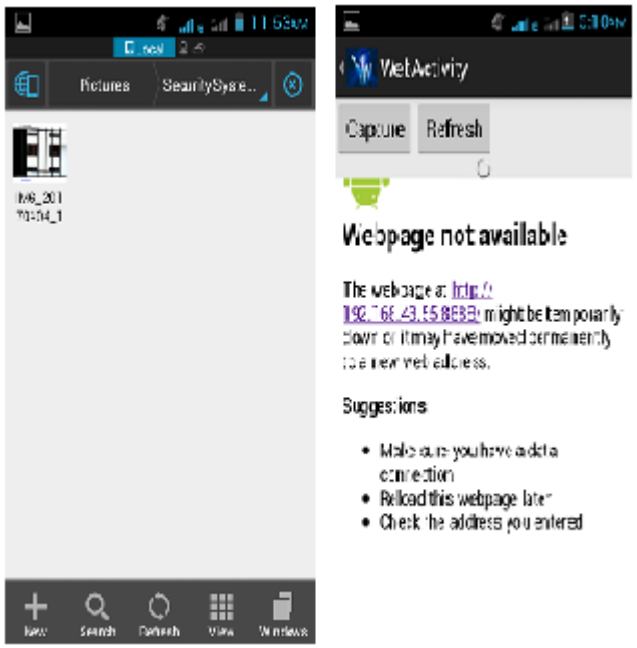

Figure 4.3 Storage location and webcam view layout of security system application.

Figure 4.2(a) shows the page comprising of the two main options. On clicking 'View image' button, it will navigate to show the webpage where our webcam uploaded picture will be available. This page is shown in the figure 4.3(b). Figure 4.2(b) shows sending of call alert in case of intrusion detected in the web layout. Figure 4.3(a), shows the storage location of images captured from web layout.

V. ADVANTAGES

4.1 Advantages

There are many advantages in this process that are given below,

1) The system monitors the target anytime and can be accessed from anywhere.
2) Through GSM call alert, emergency situations can be identified with 0% failure.
3) With low cost investment, target environment can be monitored and alerted easily.
4) Accuracy can be guaranteed with PIR Sensor.
5) Android Application gives user friendly environment.
6) Easy to be installed anywhere.

VI. CONCLUSION

When a person is entering unwantedly in our industry, the movement of the particular person was first detected by PIR sensor based on the temperature variations. The PIR sensor is connected to Arduino microcontroller and controller gives the serial monitor output as" Movement detected". The Arduino is then connected to GSM. GSM gives the call alert to the users smartphone after movement detection. When the call is viewed by the user, he/she will open our own Android Application and view the happenings in our industry. The captured images were successfully uploaded to the Webserver. In case of theft, the user can able to trigger the alarm button in our application which switch on the alarm in our industry. In case of unwanted intrusions (like pet animals moving) we won't trigger the alarm button instead we view it using web camera through our application. In future, if theft is recognized the captured images in our smartphone will be sent to police station in time. We got the expected output successfully.

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