

Advanced Intelligent Security and Self-Defence System for Human Beings

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Abstract: *This paper describes about a smart intelligent security system for every individual especially, Women all over the world are facing much unethical physical harassment, Men's are suffering from unethical attacks, school children are getting harassed. This acquires a fast pace due to lack of a suitable surveillance system. Our project is a venture to resolve this problem. The system resembles a band on the wrist incorporated with pressure switch and tilt sensor as an input which when activates shows the result Screaming alarm through buzzer and electric shock mechanism are imposed for self-defense purpose and send location and messages to the emergency contacts and figure out the attacker using the image captured from a webcam. The system can be activated in two ways either by a pressure switch or by the tilt/axis sensor which activates the system on a rotation over an angle. Electric shock mechanism and image capturing using webcam is incorporated in the wrist band that act as a weapon of the smart technology. We believe that this endeavor will make a difference in everyone's life who are influenced by harassments.*

Keywords: Tilt sensor, GPS, GSM, Webcam, LPC2148, Pressure switch

1. Introduction

In today's world, women safety has become a major issue as they can't step out of their house at any given time due to physical/sexual abuse and a fear of violence, even the unethical attacks over men for robbery or personal grudge and school children's kidnaps are rapidly growing. In today's world, physical violence, attacks and abuses over women and men are acquiring the pace even though technology is growing rapidly. The best way to curtail your probability of becoming a dupe of violent crime (robbery, sexual assault, rape, domestic violence) is to recognize, defense and look up resources to help you out of hazardous situation. If you're in dilemma or get split from friends during a night out and don't know how to find back residence, this device with you will guard you and can reduce your risk and bring assistance when you need it. There are several app reduce the risk of sexual assault on women by informing control center and their associates through SMS, but in lay of those this apparatus have much more efficient way to inform those this respected personal and has a defending system which cannot be provided by existing app. With the advancement of the crime rate security is having its alarming significance for school children. The safety mechanism to the children travelling from school to home and vice versa is very important. This project aims to provide total security for monitoring school children also. Thus, child arrival and departure details will be regularly sent to parents using GSM technology.

2. Literature Survey

Dongare Uma, Vyavahare Vishakha and Raut Ravina[1] proposed a voice keyword recognizing app to recognize the user and activate the app functionality even when the mobile keypad locked. The GPS module tracks the longitude and latitude to trace an exact location of a user and sends the pre-stored emergency message including location

to the registered contact numbers. The Audio Recording module starts the recording of the conversation for five minutes and stored as evidences. The message goes in queue if network problem and send when network gets available. A notification is generated for successful deliver message. Also user can select contact through voice based contact list and make a call. Note: The spoken keyword converted into a text to compare with the registered keyword.

Magesh Kumar.S and Raj Kumar.M[2] proposed an emergency response situation recognizing app called as IPROB to provide women safety even in the situation like terrorist attacks or natural disaster, by just shaking the mobile above the predefined threshold value automatically activate the system. It starts capturing the surrounding voice to test and confirm the unsafe IPROB situation where it raised the notification and user fail to respond in predefine time then the message alert sends to the register contacts. If the mobile profile at the receiver is in silent mode then convert it into the General profile to give the voice notification as —YOUR CHILD IS IN TROUBLE PLZ HELP...PLZ HELP ...I continuously like a ring tone, until they stop it. If a register contact confirms a PROB then appropriate emergency services like ambulance, fire brigade is alerted. If a register contact responds with an audible notification, then it automatically connects and enables the speakerphone at the victim side. An integrated tri-axial accelerometer used to evaluate the unique movements that a phone experiences as threshold.

Bhaskar Kamal Baishya [3] proposed an android app to provide security different situations as follows. The module provide security to Women at Emergency Situations propose a Save Our Souls (SOS) app to provides the security on a single click of SOS button for the women travelling at night or alone. No need to unlock the screen, instead by just pressing the power button it directly triggers the application to run at the background, to send the emergency message

including the location in the form of latitude and longitude to the registered contacts. Archana Naik et al. [4] proposed an app, in which a single click of SOS sends a message containing the location and/ or audio- video call to the guardian number. At receiver touch the location URL in the message to view it in the Google Map. It also provides different help tools like First- Aid help, Fake Call Help and video call. The First-Aid help tool provides the help on various health issue problems occurred at an accidental or emergency during the night time. First aid help for various problems are as: unconscious and not breathing, choking, bleeding heavily, burns, heart attack, diabetes etc. The Fake call help to escape from the meetings- parties at a time when women start feeling uncomfortable and think that, if someone calls me then I can leave this place. Fake call rings tone same as that of normal incoming call ring and once call accepted it stop ringing. It also supports Fake Hang Up option. The guardian contacts are by-default for this app, but it able to search the cops, firemen, hospitals contacts nearby to your location. It also sends the audio-video recording via Email-Gmail of emergency taken by the user where user unable to speak or tell the circumstances.

Systems designed as a device with the help of Microcontroller the IEEE real project by Thooyavan V [5] proposed an automated highly reliable women security device which consist of the advanced sensors embedded in some wearable dresses. It consists of advanced sensors, GSM and ATMEGA8 microcontroller with ARDUINO tool which keep user under observation at all the time. It monitors the heart beat-rate, temperature and vibration in body through sensors to check for uneasy situation. In such situation, it will activate the GPS module to track the location and wireless camera to capture the images that get send to the control room of the receiver through GSM modules to take necessary actions. At the same time processor activate the mic unit with amplifier which strengthens the voice of the women to screams or shout above the threshold limit. Archana Naik et al. [6] proposed a portable device as a belt which is automatically activated base on the pressure difference crosses over the threshold in unsafe situation. A GPS module track the location and sends the emergency messages to three emergency contacts every two minutes with updated location through GSM. The system also activates the screaming alarm that uses a siren, to call out for help and generates an electric shock to harm the attacker for self-defense which may help the victim to escape. The device mainly consists of micro controller on the MICRO CONTROLLER board which programmed using the programming language. Nishant Bhardwaj and Nitish Aggarwal [7] proposed the women security device called as-Surakshal which is an easy to operate device. This device can be activated through Press a switch key and shock (i.e. when the device is thrown with force, a force sensor used to activate the device). In emergency, it will send the message including instant location to the police, via the transmitter module and registered numbers via a GSM module. Currently the work is under process to embed it in jewelries, mobile or another carrier like belt etc. It can play a major role in the propose projects where all the police stations are connected and share the criminal records, crime investigating cases etc.

3. Methodology

The system comprises of sections which describes a quick responding, cost protection system for an individual using which an individual in distress can call for help just with the press of a button on this smart gadget. Self Defense System for safety is like a Smart gadget for individuals. It can help individuals with technologies that are embedded into a compact device. The individual wearing this device as a watch or band, in case of any harassment or when he/she finds that someone is going to harass, he/she presses a switch that is located on the watch or band or when the individual suffers unknowing attack and if the the attacker twist the hand of the individual the system gets activated with a buzzer and electric shock(vibrator) and location information is sent as SMS alert to a few predefined emergency numbers. And soon help is on its way! The system keeps on capturing the images of the attacker and stores in the memory of the device which can be ease the further investigations. The system will consist of embedded hardware and software co-designed for this dedicated application. The system allows for knowing exact location of the individual, as soon as the trigger key on the belt is pressed or hand is twisted. By providing the instant location of the distressed victim to the police so that the incident could be prevented and the culprit apprehended. This would help reduce crime against individuals.

4. Design Considerations

The module could be seen to be composed of sub- modules namely:

- 4.1 Sensing module: Emergency key, Tilt sensor, Buzzer, Vibrator
- 4.2 Control module: ARM-7 Microcontroller, Power Supply.
- 4.3 Transmission module: LCD Module, GSM Module, GPS Module.

These modules work together to determine the locations of the victim in danger situation and inform nearby police station and to the relative number stored in it a via an SMS.

5. Working of Proposed Model

Aim of the proposed model is to help an individual by the technologies that are embedded in it. This Smart gadget for is specially designed for safety women, men and school children. When the supply is given, the device will turn on Buzzer, Vibrator, GPS and GSM connected to ARM7 also start working and it displays the current position of device. Then with the help of GPS the location (latitude and longitude) of the victim is detected and is displayed on the LCD. When the victim feels danger, he/she presses the first emergency key, the kit displays emergency and buzzer is enabled. Now the webcam starts capturing images and gives the face detected image if the attacker and is stored in. The system can also be activated when the attackers twists the hand of the victim. Thus, the present location of the victim is sent to the stored contacts and police station. The vibrator connected generates an electric shock which can give severe shock to the person who is trying to mistreat.

Based on the critical analysis and the requirement of safety

functionality the modules are selected as shown in figure.1

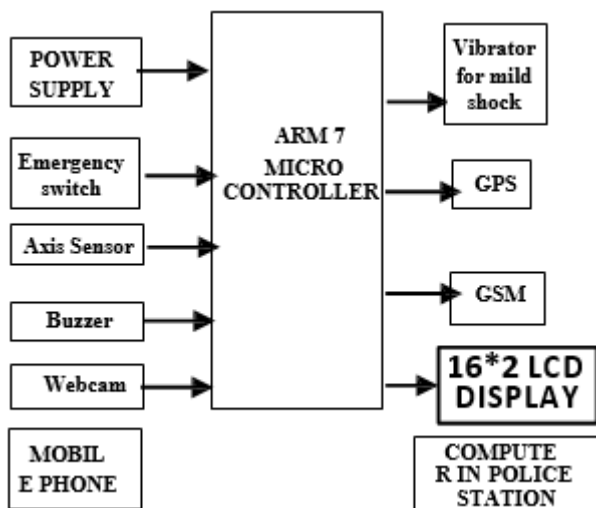


Figure 1: Block Diagram of Self Defense module.

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The working of selected modules is as follows:

5.1 Microcontroller

The LPC2148 microcontroller is 64-pin LQFP package is soldered on the microcontroller board for 64-pins. 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package. 40 kB of on-chip static RAM and 512 kB of on-chip flash memory. 128-bit wide interface/ accelerator enables high-speed 60 MHz operation. In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software. Single flash sector or full chip erase in 400 MS and programming of 256 B in 1 Ms. USB 2.0 full-speed compliant device controller with 2 kB of endpoint RAM. Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input. The LPC2148 is connected to on-board modules via pins which are also connected to the CN1 and CN2 connectors.



Figure 2: ARM7 LPC2148 Microcontroller

5.2 SOS Key Press Module and tilt sensor Module: -

Any tilt in this sensor can activates the system, which sends the message including the user location to the registered contacts. At the receiver, just by clicking on the location link provided in the message it can show the location on the Google map. And, activates buzzer and vibrator for self-defense.



Figure 3: Tilt sensor module

5.3 Global Positioning System(GPS) module: -



Figure 4: Global positioning system (GPS) module

It is a navigation and precise positioning tool, tracks the location in the form of longitude and latitude based. The GPS Coder Module used this information to search an exact address of that location as the street name, nearby junction etc. In case where GPS is disabled then the system will only send the longitude and latitude.

5.4 GSM System Module

Global System for Mobile communication (GSM) SIM card is inserted inside the mobile device to send and receive the messages using GPRS. The GSM SIM card number is registered with the system. With increasing usage of GSM, network services are expanded beyond speech communication to incorporate many other custom applications, machine automation and machine to machine communication



Figure 5: GSM system module

5.5 Buzzer or Alarm Siren module

It makes the alarm at —user end whenever user activates the system through the SOS button or through voice command. In case of the intrusion activity the alarm siren generated at the home side.

5.6 Vibrator

It contains a shock mechanism to produce non-lethal electric shock in emergency situations to deter the attacker.

5.7 Webcam: -

It can be incorporated onto the gadget depending upon user's pixel requirement. For experimental purpose the system or laptop or PC webcam can be used.

6. Expected results and future scope

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that use of its UART port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. This project is built on microcontroller which is interfaced with GSM module. An LCD is also interfaced in the project which displays the status of the system. Along with these feature project includes safety mechanism by providing mild shock through vibrator or tear gas dispatcher and a webcam to capture the images of the attacker.

As the technological changes or new requirement from user to enhance the functionality of product may require new version to introduce. Although the System is complete and working efficiently, new modules which enhance the system functionality can be added without any major changes to the entire system. By keeping this ability of the product in mind, an incremental process model has been used to design and develop the system. These are as follows.

6.1 Primary School Children Safety

As the school children safety are major concerns for parents as well as school management due to the recent incidents of child crimes like children missing, abuse etc. This module monitors the child safety when they are travelling in school buses. Once they reached the school the device gets deactivated by school authority and message send the parents that, —the child reaches the school safely. At return journey,

again the device is activated by school authority and when they reached the home, the acknowledge message is send to the school when parents deactivate the device. The device is capable of audio recording when activated that can be listening by the parents or authorize person.

6.2 Vehicle Safety System Module

The Safety of four-wheeler car is also a major concern in the society due to the increase in the crime rate of stolen car. The intrusion detection module can be modified per the requirement of vehicle safety system module.

6.3 Mobile and other valuables Safety System Module

The missing rate of mobiles is high while travelling from bus, train or crowded public area. The area zone module functionality further enhances to provide safety. A small device needed to keep either in same pocket or within the range of few centimeters. As you kept the mobile and forget to pick up or someone stolen it then due to small range the siren of mobile as well as device gets ON for user attention. Also, the same device can attach to our luggage, hence in case of forgetting to pick back or try to stole by someone can be easily noticed by the module and make the attention of user through the siren alarm.

Hence, the advance technology makes the system more robust and reliable. As the new modules provide the functionality which enhance the safety and security. Thus, it helps to fulfill the purpose of the project. Finally, the system will be implemented in a real scenario to test its actual performance.

7. Conclusion

It can be concluded that the system helps to supports the gender equality by providing safe environment to every individual in the society, and allows them to work till late nights. Anyone before doing any crime against any individual will be deterred and it help reducing the crime rate against the women.

The Guardian system pursuits a revolutionary concept: the total supervision of people under risk situations, augmenting their safety and autonomy in a completely ubiquitous way. It is important to mention that there is no similar solution in the market. This fact implies a high level of hardware development. The creation of a hardware and software prototype has achieved two objectives: validation of the proposed architecture and checking whether the utilized technology is appropriate for the system.

Women's security is a critical and social issue in today's world. The crime (molestations, robbery, sexual assault, rape, domestic violence) against the women can be now brought to an end and also unethical attacks over men and abuses over school children can also be brought to an end with the help of real system implementation of propose model.

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