

Wearable Device for Women Safety and Defence

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Abstract: Women are the most integral part of any economy primarily. Many crimes against them are not being reported because of society's hypocritic point of view. Various types of humiliations and mistreatment are being faced by the victims who try to report their assaults from society. Only one of four cases lead to conviction trials in India. In this project, a smart device for women's safety which automates the emergency alert system by using pressure sensor, pulse-rate sensor and Gyroscope sensor to detect a possible atrocity automatically. The system also have manual system with a push button which can be press by the women in critical situation, but during panic situation it is not possible to press the push button. The automatic system help in this situation. A GSM and GPS system is used in order to alert about the unusual situation and location to the relatives and police, image of attacker also sent to police by a camera system which helps to identify the criminal. Another module of shock system is implemented along with the system. A cancel button is also added to avoid false message to the authorities.

Keywords: Wearable Device

I. INTRODUCTION

In this current century where everyone is allowed to do whatever they want and to roam wherever they wish to go. There is a section or say half the section of the society who are still constrained to live their lives to the fullest. Women are still suffering from various inequalities. According to the National Crime Records Bureau, in 2020, there were over 300,000 reported incidents, a 44% increase from 2011 crimes against women. They are the foundation of any economy essentially forming the eventual fate of the nation. She who earlier stayed at home to attend her domestic duties is now maintaining work and home simultaneously, participating in the process of economic development on an equal footing with men. So, it is the time to think about their safety and it is possible through IoT (Internet of Things). The main answer for the issue can be taken so that the women ought to be allocated with a well-being device that is convenient and guarantees her security. Our task centers around giving a Smart contraption dependent on IoT arrangements that not just serve to female get away from the basic circumstances but also additionally guarantees to give equality to the women. IoT is the colossal number of interconnected gadgets overseeing computerized undertakings adroitly with no direct human inclusion. As time is passing, an ever-increasing number of gadgets are being interconnected and IoT is turning into an indispensable piece of our lives which permits us to play out the day by day undertakings quicker and proficiently, and in manners, we couldn't previously. Gender-based disparities are one of the major issues of the current century. Even though constitutional rights have vouched for gender equality, it is a reality that gender based disparity exists in several sections of societies across the world. The 21st-century women have to a certain extent succeeded in contributing to society and working shoulder to shoulder with men in several fields. However, violence against women is being increasingly reported in recent times across the world. According to António Guterres, the ninth Secretary-General of the United Nations, violence and abuse against women are among the world's most horrific human rights violations, affecting 1 in every 3 women in the world [1]. Gender equality is the prerequisite for a better world. Gender-based violence on females limits women's participation in decision making leading to a decline in life quality. Women's equal participation is vital to stability, to prevent conflict, and to promote inclusive and sustainable development. In Today's World the safety of women is in danger especially in India. The rate of crimes against women is not decreasing but in fact increasing at an alarming rate especially harassment, molestation, eve-teasing, rape, kidnapping and domestic violence. Many preventive measures have been taken by the government to stop these misbehaving activities but still has not affected the growing rate of these crimes and has remained unaffected. The problem of sexual harassment in work place is increasingly coming out day-by-day. Many methods were already proposed for the protection of women such as Security apps, gadgets etc were designed by many persons for the protection of women. In the existing system, there is no way to monitor the crimes occurring against women. However, there are some places



where CCTV cameras are fitted, and the recording is stored. They are used only one to act after everything has happened. Our proposed system is a wearable for women which contains pressure, gyroscope and pulse-rate sensors along. The system contain an automatic and manual system for the protection. A shock system also provided as a sub module for the sudden defense from the attacker.

II. LITERATURE SURVEY

The survey includes a broad, comprehensive, in-depth, systematic and critical review of the reference papers that are relevant and useful for the proposed system.

V. Hyndavi et al in "Efficient tracking for women safety and security using IoT ". Specifies a smart intelligent device which automatically senses information and helps women in "Every single step of life". The device is the integration of multiple devices comprises of a wearable smart-band and a secret webcam via Bluetooth which continuously tracks the information and communicates with smart phones that has access to the internet. The application is programmed and embedded in such a way that tracks information of the women such as call log, messages, movement, pulse measurement, blood oxygen levels, heart beat rating and records continuously in the internet. When SOS present in smart band is pressed continuously it automatically generates signals to the predefined smart phones and nearest police station along with location coordinates and the secret webcam in the locket captures the culprit photo which is directly uploaded to the server [2]

S. A. More et al in "Smart Band for Women Security Based on Internet of Things (IOT)" specifies a smart band and android application. This project work automatically based on pulse sensor and temperature sensor. This application uses pulse readings of that women and protect her. If she is in danger then emergency message is send to the 4 family member and nearby police station with the GPS location of victim. Also this emergency message is send on application so it is provide social platform. This paper include comparing of data from the sensors with the training dataset, if variation occurs then message will be send to nearby police, family, friend along with the GPS location to provide the security to the women in danger. The women will be held with wearable pulse rate sensor and temperature sensor. The values from the sensor per 10sec will be sent to the server. The server will consist of training data set with normal values of pulse rate and temperature according to the age group. If any abnormal value is encountered then an alert message will be sent to the women holding the wearable device, considering few situations like she might be in stress or jogging [3].

Naeemul Islam et al in "Design and Implementation of Women Auspice System by Utilizing GPS and GSM" specifies a device that sends SMS and area directions of the client to the relatives of the client or helpline number is proposed. In this system, we have used a GPS module to access location of user instantly. Three push buttons are implemented to define the types of an accident victim is facing. When the user faces any hassles in any place, it can push any of these three buttons. Then microcontroller will receive it and send an SMS to the specific phone number. The location of the user will be continuously traced until user switch off the system when rescued. In addition, to control the whole system we have used a PIC16F887A microcontroller powered by four AA batteries .The PIC16F876A microcontroller is the main driver of this system [4]

B. Vijaylashmi et al in" Self defence system for women safety with location Tracking and SMS alerting through GSM network" specifies a smart portable device which can track the current location of the victim. When they feel insecure, their heartbeat increases which can be measured by the pulse sensor and their stress level is monitored and women may be able to convey the misery message through our smart device to the trusted contacts and the cops. Such smart security devices can give quick responses for emergencies and prevent women from potentially shocking experiences. In addition to this, it can monitor certain parameters like hemoglobin level of blood, the oxygen level in the blood, pulse rate, stress. The main advantage of this device is small and easy to carry. The use of sophisticated components in this device gives more accuracy and it is more reliable [5].

R.A. Jain et al in "Smart Self-Defense Gad- get For Women's safety using IOT" specifies a portable / wearable device, used to secure women's in an emergency situation either the design have internet connection or without internet connection. Whenever the system receive emergency alert, it ready to send that received message using GSM to emergency contacts (neighbor's contact, friends, relatives, parents, cloud. Disadvantages of those gadgets used for safety are without internet connection they don't have a chance to send an emergency message to emergency contacts like Police Station, Ambulance, Fire Station, Relatives, Friends, Neighbors and Parent's. So in that case IOT is very useful, to connect a device and humans. But this proposed method and system overcome the need of internet connection [6]

Dr. Sridhar Mandapati et al in "A Mobile based Women Safety Application (I Safe App)" specifies a system with the push of one button, people can alert selected contacts that the person is in danger and share the location. With this personal safety app, women will never walk alone!! There might be a situation in which have you to travel alone a long distance at an odd hour and perhaps even by public transport and may face some danger. At such a time, a personal safety app might not only be wise to have easy access to, it might also give you a lot of much needed confidence. The personal safety application requires the name and number of the person who is to be contacted in times of emergency. Users can add multiple people in the emergency contacts list. These are the people who will receive notifications or SMS in case of an emergency. All it requires is the user's action to trigger an SOS button provided and it shoots messages as fast as the device can manage. Once the SOS button is hit, the people in the emergency contacts will get a message like: I am in an emergency; followed by another message, which has the exact or approximate GPS location of the cell phone. The user can also make audio or video call. This app also provides necessary first-aid measures that should be taken at the time of emergency situations. It let the family and friends know that you are in danger and where you are? Declare an emergency whenever you sense a danger, when you can disengage the emergency. Provides necessary first-aid measures that should be taken at the time of some dangerous situations. Creates emergency contacts that will be notified by default of all the actions you make in the application. Also display a list of detail contacts of cops, firemen, hospitals etc., nearby your location [7]

III. CRIME AGAINST WOMEN IN INDIA

Not a day goes by where don't hear of the news of a crime against women in India. In fact, there are at least five news articles that tell us about the horrific details of the various crimes. It is extremely painful to watch the status of women's safety in India, especially in a country where women are given the stature of goddesses. The list of crimes against women is quite long, to say the least. It is a shame that rapes take place every day. It is present in every nook and corner of the world. It doesn't differentiate between a 3-year-old kid and an 80-year-old lady. From parties to work- places to our homes, rape and harassment have become a norm. The survivors of these heinous crimes are then left to be humiliated throughout their life. Some of them even spend their whole "after rape life" on ventilators or they are burnt alive. Acid attack is becoming very normal in various parts of the country. The criminal throws acid on the face of the victim to destroy their lives completely. Nonetheless, India has a lot of strong acid attack survivors who are battling for their lives and trying to lead their lives independently. Furthermore, domestic violence and honor killings are very common. The wife stays in an abusive relationship because of the fear of society. The family kills their daughters in the name of honor to keep up with the reputation of their family. Similarly, female foeticide is yet another common crime. Due to the regressive thinking, people kill daughters before they are born. The list continues as crimes against women are on the rise. Other crimes also include child marriages, child abuse, rape, dowry deaths, trafficking and many more. A woman does not feel safe inside or outside the house. Woman is God's best creation, yet the worst sufferer. It is very sad to say that our country is not a better place for women. According to the National Crimes Records Bureau (NCRB), India recorded 88 rape cases every day in 2019. NCRB report highlights that rape vulnerability of a girl or woman has increased up to 44 percentages in the last 10 years. Every day there are cases of gang rape, brutal murder, protest, demonstrations, online petition. Reason behind the rape cases are,

A. Patriarchal Mindset

Human beings are social animals; it is society that shapes their attitudes, thinking and beliefs. Rape exists because of patriarchal misogynistic culture that overlooks it, whether implicitly or explicitly. Patriarchy has conditioned men to believe in their superiority. The males are always considered as more powerful than women, of which they take advantage.

B. Delayed Punishment

Awarding death penalty is subject to the rarest of rare cases. Death penalty will be pronounced if the crime has been committed in an extremely cruel and dreadful manner. The compulsory death penalty is against the constitutional rights of equality, right to live and personal liberty guaranteed under articles 14 and 21. In case death penalty is granted execution takes ages.

C. Forbidden Things are Fascinating

In our society people hesitate to discuss about sex or menstruation openly and hide such things from their grownup sons and daughters. The typical conservative mindset of parents and family members restrict their children to interact with the opposite sex.

D. Lack of Awareness

Our society, families, schools and institutions fail to bring awareness among children, youths regarding sex, sex related crimes. No proper counseling is provided to grownup boys and girls. The girls cannot share their problems with anyone even if they are bullied, harassed.

IV. WAYS TO ENSURE SAFETY

Although the list of crimes is very long, we can take measures to ensure women's safety in our country. Firstly, the government must make stringent laws that ensure the punishment of criminals immediately. Fast track courts must be set so the victim gets justice instantly. This will serve as a great example for other men to not commit crimes against women. Most importantly, men must be taught to respect women from an early age. They must consider women as equals so they don't even think of harming them. When you consider someone inferior, you tend to oppress them. If this thinking goes away, half of the crimes will automatically end.

1. Installation and maintenance of streetlights must be done. Building toilets can stop women going for open defecation and that will stop rape cases. One-stop destinations for providing legal, medical and police aid to victims will be very welcoming.
2. Night drop vans, cabs, auto rickshaws must be introduced and run having more women staff which can pick up and drop women in late hours even.
3. National level Network of volunteers.
4. Societal Change.
5. Self-defense training in school and colleges must be mandatory.
6. Amendment of act's the need of the hour to ensure that the rapists get the maximum to maximum punishment. Our law should be strict about sexual offences, about rape and it will definitely create havoc among the rapists. Swift and harsh, stringent punishment will reduce the number of rape cases in our country.

These ways are only achieving by social participation with government coordination. Many women safety gadgets and application are there. But we have to bring a holistic framework for women safety device. The project provides bring a small version of holistic framework, this project provides the crime spot by using mobile application so if there is any crime spot identified in user's travelling way, then she can wear the device with attacking facility.

V. MOBILE APPLICATIONS FOR WOMEN SAFETY

Some of the popular mobile applications available for women safety are Eye watch[9], iGosafely[9], Citizencop[9], Chilla[9], bSafe[9], My safetypin[10]. Most of these applications are re-active, i.e. can raise an alert when the user is in danger. These applications provide a means to contact the police, selected contact persons, or guardians when triggered. If the user goes to a distant location away from the contacts, only the police force will be available for help, and sending alerts to contacts at a distant place may be of limited use. Most of the applications do not offer assistance in warning women about a danger prone area. My SafetiPin app classifies a public area as 'unsafe' or 'safe' at night, based on parameters such as lighting conditions, openness, visibility, number of people in the vicinity, number of police stations, walking path, etc [9]. However, the reliability of the warnings generated by this application is mostly limited by the perceived data as entered by other users and not based on criminal history records from reliable sources. Also, higher number of people of the opposite sex in an area or poor visibility or lighting conditions may not necessarily indicate that the area is unsafe for women. It has to be noted that the safety of women is compromised even within house premises. These factors thus cause limited use of the available applications in ensuring women's safety.

VI. WEARABLE DEVICE FOR WOMEN SAFETY

Several mobile applications are available, which lets the user alert the contacts in case of perceived danger. However, during an emergency, it may not be always possible to access the phone, unlock it, open an app, and trigger the alert. Wearables are developed to address this scenario. Some of the popular commercially available wearable devices are (eg: Siren or Sound Grenade) are standalone, which does not pair with a Smartphone, and will generate high decibel sound on triggering thus alerting people in the near vicinity. However, this might also put the woman at risk as this might cause the pervert to attack the woman in an attempt to save himself. Other wearables are not standalone such as Safelet [11], spotnsave feel secure [12], Athena[14], Stiletto[15], Sonata ACT[16], Safer[17]. They pair with a mobile application on a smartphone using Bluetooth technology and then use the smartphone features to send alerts to pre-configured contacts, police, etc. ‘Safelet’, has two buttons on the side that can be pressed to send a distress message to selected contact numbers. The ‘Stiletto’ charm pairs with the mobile app and transmits a voice-assisted alert to selected contacts when triggered. The Sonata watch ACT paired with a smartphone can send out panic messages to a set of contact numbers. If the phone is lost, thrown away by the attacker, or if phone is out of charge then the wearable will not serve its purpose.

VII. PROPOSED SYSTEM

Many methods were already proposed for the protection of women. Security apps, gadgets etc were designed by many persons for the protection of women. In the existing system, there is no way to monitor the crimes occurring against women. However, there are some places where CCTV cameras are fitted, and the recording is stored. They are used only to act after everything has happened. Our proposed system is a wearable for women which contains pressure, temperature and pulse-rate sensors along .The system contain an automatic and manual system for the protection. When the person is in trouble, she can push the press button provided or otherwise a situation where sudden reflex does not activated the automatic system will help. A shock system also provided as a sub module for the sudden defence from attacker.

7.1 Automatic Mechanism

Most of the situations, the woman may not be able to react and use the manual mechanism. So, automate the mechanism using pressure, gyro- scope and pulse-rate sensor and use a conjunction of the readings of these sensors to avoid false positives. When any of the two sensors detect an abnormality, the alert mechanism is activated. The pressure sensor is a force sensing resistor sensor (FSR). With a small increase in force the resistance decreases exponentially. The resistance value is converted to analog voltage which ranges between 0-5V. A trial and error method to find the thresholds of the sensors after taking the normal and abnormal values for all the three sensors. Whenever the sensors readings cross the thresholds values then they become HIGH. The voltage output of pressure sensor for various types of activities such as a normal touch, pushing etc. were observed during this process. For a force which may be considered dangerous, about 4V analog output was shown which is around 5N force. The gyroscope is used to measure angular velocity and can be used for navigation purposes, as it detects orientation and rotation. The pulse-rate sensor goes high when the heart rate crosses 90bpm.

7.2 Manual Mechanism

Manual mechanism is the process flow which occurs when the women are in a situation to respond. It contains a button which can be pressed by the woman when she feels unsafe. When the button is pressed, the alert mechanism is triggered.

7.3 Alert Mechanism

Alert mechanism is the part which helps an- other person to knew the situation undergoing by the person. Alert mechanism consists of a GSM module, GPS module, Camera module. When any unusual situation is detected the message will be sent through GSM module. The message contained of the live location of the person obtained by a GPS module and also the IP address of the camera module which help the person who received the message to live streaming the intensity and depth of the situation .The message can be sent to the closed ones like family friends of that person and a message will also be sent to the nearby police station. So immediate help can be provided for the person under threat. The live streaming will help to identify the attacker and the video can also submit before court as an evidence so the attacker never get a chance to escape from punishing by law.

7.4 Shock System

As a second module a shock system is also provide for the self defence of the person from the attacker .This module will also activate at the same time when abnormality observed through the automatic or manual mechanism. It is activated by using an RF transmitter and receiver module. The module will be incorporated in the shoes or the footwear of that person. It is provided with separate power supply. If any attack happened she can use it for defence and can run away from that situation.

VIII. CONCLUSION

The main purpose of building a woman safety device to act as a rescue and prevent any harm at the time of hazard especially for women. Through the proposed system a smart device for women's safety which automates the emergency alert system is designed. This system detects and sends the alerts for the dear ones with the location coordinates of the women without the requirement of her interaction in critical times. It sends an emergency message automatically to the relatives and nearby police station along with the video of the current situation underwent by the women. Shock system also proposed to introduced into the system as an another module. It provides sudden defence from attacker. Through the process of customization, this prototype can be modified to wearable like smart watches, bracelets, necklace etc. The main advantage of our proposed system is that both automatic and manual mechanism is implemented. It is also cost-efficient and easy to use. The systems provide a rescue mechanism form an attacker if the person is supposed to be alone at any particular situation.

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