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A survey paper on NIRBHAYA - GPS Tracking and Image Capturing Smart Device for Women's Safety

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Abstract: "NIRBHAYA - GPS Tracking and Image Capturing Smart Device for Women's Safety" is designed to address the growing concern for women's safety by providing an effective, real time solution for emergencies. The device, which is compact and portable, can be worn discreetly by users and activated with minimal effort when they feel threatened. Once triggered, the device tracks the user's live location, captures an image of the surroundings, and sends these critical details to nearby authorities or pre-registered contacts via SMS or other communication methods. The objective of this project is to create a user-friendly device that enhances security by enabling quick and reliable alerts in dangerous situations. The captured images and location data provide crucial information that helps law enforcement respond promptly and effectively. By empowering women with this easy-to-use safety tool, the project aims to create a sense of security and reduce the risk of harm. This project combines location tracking and image capturing into one device to ensure timely intervention and assistance for women in distress, ultimately contributing to a safer environment for women in public spaces. The development of NIRBHAYA seeks to create a safer world for women by leveraging accessible, modern technology.

Key Terms—Women's safety, GPS tracking, wearable device, image capturing, emergency response system.

I.INTRODUCTION

Women's safety has become an increasingly important global issue, with the rising rates of violence and harassment highlighting the need for effective personal security solutions. While various safety mechanisms and awareness campaigns have been introduced, the need for real-time, technology-driven solutions remains critical. In response to this urgent demand, NIRBHAYA, a GPS tracking and image capturing smart device, has been designed to offer women a reliable, immediate response in situations of danger or distress.

The NIRBHAYA device integrates modern technology with a focus on accessibility and ease of use, enabling users to discreetly activate the system when they feel threatened. Upon activation, the device not only tracks the user's precise location via GPS but also captures images of the surrounding environment. These crucial details are instantly relayed to nearby authorities or pre-registered emergency contacts through SMS or other communication channels, ensuring swift intervention.

By combining the power of location tracking and visual documentation, this device aims to bridge the gap between an emergency situation and law enforcement's ability to respond

effectively. With its compact and wearable design, NIRBHAYA empowers women to take control of their safety, providing peace of mind and reducing the risk of harm in public or unfamiliar spaces. The development of this smart device reflects the potential of leveraging simple, accessible technology to protect vulnerable individuals, offering a tangible solution to the persistent challenge of ensuring women's safety.

This research paper explores the design, functionality, and effectiveness of the NIRBHAYA device, focusing on how it addresses the pressing need for real-time protection in emergency situations. It further examines the potential impact of such technology on public safety and the future of personal security solutions for women.The increasing prevalence of violence and harassment against women in public spaces poses a significant threat to their safety and well-being. Traditional safety measures are often inadequate and do not provide timely assistance in emergencies. There is a pressing need for an effective, real-time personal safety solution that empowers women to protect themselves in threatening situations. This project aims to develop NIRBHAYA, a GPS tracking and image capturing smart device that enables users to alert emergency contacts and authorities with a single action. By leveraging modern technology, the device will facilitate immediate location sharing, visual documentation, and rapid response to enhance women's safety and security. The goal is to create a user-friendly system that provides peace of mind, reduces response time in emergencies, and ultimately contributes to a safer environment for women.

II.RELATED WORKS

1.The Role of IoT in Woman's Safety: A Systematic Literature Review(IEEE)

Women'ssafetyhasbeenhighlightedasoneofthemajorconcernsof anysocietywhereseveral women are dealing with various safety issues like harassment, rape, molestation, and domestic violence due to different social or cultural reasons. Internet of Things (IoT) is becoming a promising technology to support day-to-day concerns and provide support in handling various affairs.

2.Wearable Women Safety Device(IEEE) One of the most pressing challenges in the current world is the safety of women. For women and girls all around the world, sexual harassment and other forms of sexual abuse in public areas, both urban and rural, is a daily occurrence. This reality restricts their freedom of movement, to participate in school, work, and public life. It limits their access to essential services and their enjoyment of cultural and recreational activities. This paper presents a Wearable Safety Device for women using ESP32 MCU which will help them to send location details to their loved ones in case of emergency. It will also be able to monitor various health parameters and hence can be used as a fitness band.

3. WeRSafe'(academia.edu) is a mobile-based application to send SOS calls. Women's safety is the most serious issue these days, and having a backup plan in the form of a safety device is essential. This study proposes an effective device for women's safety that automates the emergency alarm system and messages to the contacts with a press of the button. It can also record the video which can be used as proof..

3.Smart Security solutions for women based on the Internet of Things (IoT)(Research Gate) advocated the creation of a system that can track various health parameters and react to various conditions. It uploads the recorded information to the internet. It can even use the GPS module to track the victim's whereabouts.

4.Women safety device and application-FEMME(Amazon News) , is a mobile-based application that in the event of an emergency sends SOS to family members. To capture the incident and access the position, it also includes GPS, GSM, a camera, and an audio recorder.

5.A Mobile Application for Women's Safety: WoSApp(Research Gate) proposes a solution in which the app is activated by shaking the phone 40 times and an audio message is sent to the local police station helpline using the GPS coordinates and also to the registered mobile numbers.

6.Safeband(ACM Digital Library) The 'SafeBand' system is comprised of a wearable band to be used by the victim, and two

mobile applications to be used by the victim and by the police. Women can wear the device as a wristband or locket which will comprise of a button and a light. When the user (victim) presses the button, it identifies the location of the user through Global Positioning System (GPS) and sends a message incorporating the location to the nearest police station and previously saved contacts (number of relatives).

7.Society Harnessing Equipment (She) is a security system based on clothing. This one has a defense system in the form of a shock generator that can aid a victim in escaping from a dangerous circumstance.

8.Intelligent safety systems to prevent Acid Attacks **,** Corrosive assault and physical badgering sensors are included in the gadget (wrist band). It has a GSM and GPS module to aid in the location of the casualty. Framework on chip (SOC) technology can be used to convert the unit into a chip.

9.Smart foot device for women's safety , In the case of an attack, this paper shows a women's safety gadget that can be fastened into footwear and sends an SOS message. To activate the alarm, tap one foot four times behind the other. The SOS message comprises the victim's position and is sent through Bluetooth to a phone application. The naive Bayes classifier was used to determine the accuracy of the results.

10. An Android-based application for Women Security , the paper explains a mobile application that generates a warning when the phone is shaken. The software not only delivers notifications to registered cell devices, but also to everyone else in the vicinity who has installed the app.

IV.PROPOSED SYSTEM

The proposed system is a wearable safety device for women. The system activates when the user (victim) presses the button, and once it has the user's location determined using the Global Positioning System (GPS), it sends a message to the saved contacts (number of relatives) and the nearest police station. The location of the victim will be communicated to the nearest police station and family members. Additionally, the device captures a photo of the victim at the time of activation and sends it along with the location details. The wearable microcontroller functions as an embedded computing system, controlling all of the subsystems' actions. The band has a GPS module that allows it to deliver live location updates. There is also a feature that allows you to add or remove emergency contacts.

4.1 Hardware components used

Component List and Functionality:

4.1.1 Arduino UNO:

A microcontroller board that acts as the central unit of the system. It controls the entire operation by receiving inputs from sensors and the push button, and sending commands to the GSM module and OV7670 camera.

4.1.2 GSM Module (SIM800/900):

A communication module that sends SMS alerts containing the victim's GPS location and the captured image to emergency contacts and authorities. It enables real-time data transmission through cellular networks.

4.1.3 OV7670 Camera Module:

A low-cost camera sensor used to capture images of the surroundings when the device is triggered. The captured images are then sent to the police and emergency contacts for visual identification of the victim.

4.1.4 Push Button:

A simple input device that, when pressed, activates the system. It triggers the GPS location retrieval, image capture, and the transmission of alerts to emergency contacts and authorities.

4.1.5 Arduino IDE:

The software platform used for writing, compiling, and uploading code to the Arduino UNO. It facilitates the development and control of all functionalities in the system

V.WORKING

The wearable women's safety device functions as an emergency response system, designed to be activated with minimal effort by the user. Here's how it works:

Activation:

When the user feels threatened, she presses the push button on the device. This action triggers the entire system, instructing the Arduino UNO to begin the emergency protocol.

Location Detection:

Once activated, the GPS module retrieves the user's current location coordinates in real-time.

Image Capture:

Simultaneously, the OV7670 camera module captures an image of the surroundings, including the victim, which is crucial for identification and quick response by authorities.

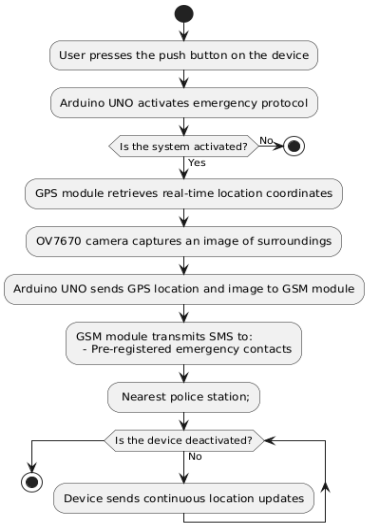
Data Transmission:

The Arduino UNO sends the GPS location and the captured image to the GSM module. The GSM module transmits this information via SMS to pre-registered emergency contacts (such as family members) and the nearest police station. The message contains the user's real-time location along with the photo for visual verification.

Continuous Updates:

The device continues to send location updates until deactivated or the situation is resolved, ensuring that the authorities can track the victim's movement in real-time if necessary.

By integrating location tracking and image capturing in a single, user-friendly system, the device provides crucial information quickly, enabling authorities and emergency contacts to respond efficiently and help the victim in distress.



VI.CONCLUSIONS

The NIRBHAYA smart device offers an innovative and practical solution to enhance women's safety by integrating GPS tracking and image capturing into a single wearable system. This project demonstrates how modern technologies can be harnessed to address critical social challenges. By enabling immediate location sharing and visual documentation during emergencies, the device ensures rapid response and effective intervention by authorities and emergency contacts. The compact design and user-friendly interface empower women to use the device discreetly and confidently. Future work will focus on improving battery efficiency, enhancing data security, and integrating additional functionalities like audio recording and health monitoring to further expand its utility. The ultimate goal is to contribute to creating a safer environment where women can feel secure in public and private spaces.

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