SMART WEARABLE DEVICE FOR SAFETY

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Abstract

In today's world staying safe is what people mostly prefer especially women where they face problems everywhere like during their night travel, workplace, in busy cities, people who travel alone. Despite all the technology around us, personal safety is still a real question. That's what made us to explore a wearable safety device, which can give hands in critical situation. In today's world there a is need for a device which has the property of automatically sensing the danger through the body temperature.. and rescues the victims. Therefore, we have proposed new approach which uses Internet of Things(IoT) technology for the safety of children especially women. This device is a smart wearable device which consists of various hardware and an app. This smart wearable device has a feature such that it has been connected to the person's smart phone to send SMS through internet. The device and app are connected to track the location through GPS, and also has a feature of messaging to send the information of the location and also an alert message. This device aims to provide a better solution for the safety of women and children. This development will ensure that the application and hardware, which includes the integration of the alert system and also the emergency calls. This device will make sure that the solution provide is a user-friendly and low cost approach, this is an effective solution in many of the critical situations. When you feel in danger or need help, whether it's because of harassment, a medical emergency or

something else, you press the hidden panic button, it triggers an alert that gets sent to trusted contacts, or even to emergency services. The device has built-in GPS to share your location and a loud alarm. Some versions can track stress signals using biometric or even include a tiny camera for capturing the situation. Therefore, this makes the solution to stay out because of it's low cost and it is easy to wear. This will really be helpful to lost of people which provides a safety without requiring to think about if frequently. As the world is getting quite a lot of issues, this is more risky for ladies. Danger for women are increasing day by day most terribly. The number of attacks against women has been increased in many nations. Therefore, the device is designed in such a way that it also has buzzer that calls out for help. There is a nee for smart wearable device for the safety of women and children. The device has a components such as a GPS to track the

location of the victim and save them. The device has been connected to app created by us with the appropriate details of the person which immediately sends an alert message. [1] ***The device has built-in GPS to share your location and a loud alarm. Some versions can track stress signals using biometric or even include a tiny camera for capturing the situation. The given answer to all of these questions will constantly provide a realistic picture and also an answer to issue of safety*** [2]**.**

At the end of the day, we are creating these wearables devices for the safety of the people which allows them handle any critical situation. The idea is that these devices can keep on eye on the things like stress, motion, and even tells us if there is any problem . The researchers looked at a bunch of expert opinions and used a couple of different methods to figure out which industries need this tech the most. In the end, the whole point is that bringing these wearables into risky work areas could seriously help prevent injuries and make workplaces safer. Also, the data these gadgets collect might be really helpful for health research too. [3] [4]

Keywords — Personal safety, smart wearable, emergency alert, GPS tracking, biometric monitoring, women protection, IoT security, emergency response system, occupational health, physical fatigue, stress monitoring, workplace safety, GSM module, IoT integration, ergonomics, construction management .

I. INTRODUCTION

In today's world, safety has become one of the biggest concerns especially for women. When we come across the National Crime Records Bureau there were over 300,000 cases of crimes in 2015. This growing trend shows that despite of all the strict laws and awareness campaigns, real time safety is still a major issue. With advancements of technology, wearable safety devices emerged as a real world solution.. [5] The workplace is frightened place with many sources of danger, especially in space with extreme harmful work condition. From many years , the work safety issue has been mandatory to the background by employers for sake of labor productivity. [6] These devices can be worn as accessories like bracelet or a ring or even can be clipped to bags or clothes, which can send location details during emergencies. They, alert messages, and even capture images or videos offer a practical way to respond quickly in critical situations. The goal of this project is to develop and test a smart wearable safety device that not only sends an emergency alert but also has a loud alarm, shares real-time location and captures visual evidence. This aims to help women and people in problem feel safer and more confident in their daily lives. Internet of Things is a physical device that uses a network, hardware components, vehicles, and other objects connected with software, sensor, and connectivity

The safety of the women and child is a major issue in today's world as the world is facing a lot of issues related to this. However, women continue to experience different issues like harassment. Safety and security are two of the biggest problems that women face. The problems that lead to the safety of women include violence against the female gender, and discrimination against the female gender [12-14]. Children aged 14 to 17 years are also going through various issues. The government has made the necessary changes in terms of laws and has taken different steps to solve the problem but there is still no solution. More and more, it is necessary to do so that women and children become safe in our society. In todays connected world, personal safety particularly for women has become a major issue that is growing rapidly. Methods that are old -fashioned are no longer adequate when it comes to providing fast and discreet protection during emergencies. This has triggered an exponential growth of smart wearable devices that are created for real-time safety. Panic-button jewelry or GPS-enabled clothing are among the examples of such small and fashionable gadgets that employ sensors and communication technology to carry out alert and location sharing functions. Now they become more affordable and of better quality, so such wearables are substantiating the concept of personal security and giving more power to the users. Our main task is to create a combination of software and hardware, based on which human safety will be enhanced by an alert system and emergency calls. In general, there have been explosive changes in the field of technological innovations and the development of digital technologies over the last years, which have inevitably increased [9]. Our works' extent involves the production of hardware and software to the solution being easy for the user, cheap, and even efficient in such situations as a crisis. Accordingly, the suggested method serves as an alternative solution to the problem of the safety of women and children.

Till date, security of the women in the new millennium is a challenge even with increased availability of information and better legal reforms globally. Gender-based violence, which ranges from harassment both on the streets and in public spaces to domestic violence, remains a curtail to women's freedom and well-being. Based on data which has been given by the National Crime Records Bureau (NCRB), there has been gradually increase in reported cases of crime against women in India which stresses the need for some serious and immediate action and a safety measures. According to this view, the fast development of wearables and Internet of Things (IoT) represent an opportunity to tackle these challenges through creative and forward-looking initiatives. Wearable smart peripherals present a combination of mobility, real-time monitoring, and communication potentials. Intended to be worn on the body without easy noticing (e.g., as a smart band, a pendant, a belt or a watch), such a device can sense environmental conditions and physiological signs but also identify potential threats. With live GPS location tracking, Body temperature, heart rate, and GSM modules are the vital signs that are monitored and are regarded as the most significant measurement parameters for intensive care. In order to communicate the occurrence of a crisis, these wearables are capable of sending, without any delay, a message to the emergency contacts who

have been already set or to the police. What follows is that, if these indicators get activated, it may result in a situation where one's life is at risk. That's not to mention the sensors built into most of our modern devices: everything from accelerometers to microphones to heart rate monitors, miniature cameras, and beyond are capturing snapshots of places and people they'd otherwise never "see". [7]

Additionally, some designs feature such capabilities as SOS alarms or electric shock modules to defend oneself and attract other people's attention. The functionality of smart devices increases, when smart devices are combined with mobile applications. What you can do on mobile platforms, such as custom Android app is setting up emergency numbers, tracking the location history and monitor device's operation. In some instances, AI and machine learning are incorporated to analyze sensor data and automatically identify abnormal behavior – so if the user is unable to press an alert button, intervention is still possible. For example, if a wearable forms an abrupt fall with high heart rate and a loud surrounding environment, it can take on a distress state by itself and initiate alerts. There has been a lot of interest in this area over the past ten years. Research has shown that such systems make response time faster and could even protect people from injury or worse. A few devices as those discussed by Pratheeba et al which combine GPS, GSM, and shock mechanisms in a wearable belt, or those by Malaj that include image capture and mobile app integration, illustrate the practical application of smart wearables in real-life scenarios. The availability, usage and the size of the device helps to increase the usuage of the particular device across the world to make the world a better place to live. [8]

While the taking in the consideration of the existing devices, ensuring to provide a better product and service to people is a challenging tasks. The major challenge would be security of the device, easy to handle, and feedback from the customers would be a tough step during the process. But still, the step taken to produce a Smart Wearable Device for Safety will surely help people especially women across the world. Therefore, strengths the Women Empowerment. This devices not only provide safety but also will be easy to handle certain emergency situations. Therefore, as the technologies evolve , the IoT and Sensors technology are majorily used to for accurate results, therefore, provide a safety solutions.

The new technologies such as Cloud Computing and Artificial Intelligence which are booming in today's world can be used in our project which helps in identifying the patterns and behavior to predict and prevent the upcoming danger in the real world environment. The Government, the startup companies and the partnership companies can take the initiatives by providing a helpful need for the development and deployment of the product. School, Colleges and Workplaces should promopt the safety criterial by taking in safety measures through the institutional policies.

The global movement which is moving toward digitization must provide the upmost priority towards for the women by providing a safe and secure situation in any corner of the world. Through the innovation of these devices will help the people to tackle the situation easily and smartly. Hardware platforms like Arduino microcontroller, sensors, actuators, buzzer, alarm paired with the mobile app through the Bluetooth have enabled the device work accurately and tackle any situation by helping the people in tough situation. Therefore, as more and more research have been done, this helps to provide a standard safety to the customer as a part of the Smart City.

Therefore, the rise of the Smart Wearable Device for Safety product not only provide safety, but also provide a overview of how to safeguard themselves in any situation through combining the existing new technologies into our product. Therefore, there is no need for the women to be the major culprit. Which combine GPS, GSM, and shock mechanisms in a wearable belt, or those by Malaj that include image capture and mobile app integration, illustrate the practical application of smart wearables in real-life scenarios. The availability of these devices with smart technologies will the help the women to overcome any type of situation and provide a safety and a secure environment to live.

II. LITERATURE REVIEW

A number of smart safety have been designed. A few projects have even incorporated into a wearable accessories which trigger SOS alert through GPS to predetermined contacts. Some contained cameras to take pictures or video when they went off, providing key evidence to help ID the attacker. Some also had heat rate sensor or motion sensors that could automatically detect when something was off or someone was panicking. For instance, some devices only function when there is a strong network signal, may don't offer easy to use controls and are not made easily to carry around the whole day, this might be one of the drawbacks. The issue of women's safety has driven an expansive field of research focusing on integrating technology into personal protection systems, particularly through the development of IoT-based smart wearable devices. These devices serve as proactive solutions for real-time monitoring, emergency response, and situational awareness. A wide array of studies has focused on various configurations, combining sensors like GPS, GSM modules, accelerometers, heart rate monitors, sound detectors, and camera modules to construct intelligent systems that trigger alerts in response to physical or environmental stimuli indicating distress. Seelam and Prasanti (2018) presented a comprehensive safety device based on Arduino and sensors, including MEMS accelerometer and sound sensors, which activate when a victim exhibits signs of abnormal physiological states, sending GPS coordinates to emergency contacts. Similarly, the person named Kiran et al. (2017) developed a tap based activation system, it typically helps to identify the text and the voice alert, therefore, it allows the system in real time tracking of the data and this does not require any human interaction physically, and helps in emergency situations.

Further many innovations was basically found by D. Paul et al. which included the use of machine learning algorithms which were incorporated with IoT, it helps to analyze sensor data and recognize any abnormal activity with high accuracy. Their system, incorporating GPS and accelerometers, alerts the nearest authority when distress patterns are detected. Tyagi V. et al. built on this by proposing a cloud-connected wearable that continuously sends location data via a mobile

app, enhancing the timeliness of emergency response. Other researchers like S. Joseph have expanded the scope of these devices to include biometric identification, employing facial recognition and fingerprint sensors in child safety applications to ensure only authorized individuals interact with children. Their system also integrates geofencing to alert guardians when a child leaves predefined zones. Distinctive wearable formats have been designed for practical use, such as Sakthimohan M's triangular-shaped wearable that combines GPS and panic button features within a bracelet or pendant. This ergonomic focus enhances user compliance and discreetness. Similarly, Sunith D et al. utilized health-related signals like heart rate and motion data, leveraging Bluetooth and smartphone applications to transmit alerts and location in real time. Malaj (2023) proposed a device embedding a camera to capture critical visual evidence, integrated with GPS and SOS functionality, with alerts sent to both police and family via an Android application, thereby augmenting both immediate support and post-incident investigation capabilities. [9]

Some of the notable works include the Gadhaveet al.'s "Electronic Jacket" and Jain et al.', it's a special approach where they integrated multiple sensors into a single device, it basically provided the response depending upon the threshold level and the sensor detection. This literature review integrates the GPS tracking which triggers the sensors based devices. The device is connected to their respective smartphones which enables easy scheduling of the work. [1] [10]

The major concerns were the privacy issues, false detection and infrastructure limitations were identified in these studies Moreover, false trigger can result in because of the unwanted noise from the environment which therefore, results in providing accurate results. Nevertheless, researchers like Harikiran and Gomathy have explored encryption and secure communication channels to address these vulnerabilities. In summary, the body of literature shows progressive innovation in the field of wearable safety technology, particularly for women. Technology is rapidly applied in personal safety using smart, wearable devices. The pioneers in this field combined GPS and communication modules, which made emergency response faster (Smith & Jones, 2018). These gadgets are connected with mental health advantages, thus the user's anxiety might be alleviated (Chen et al., 2019). New sensors that track biometrics allow for immediate interventions, depending on the heart rate and physical activity (Sharma & Gupta, 2020). User comfort and change as well as usability are still the main issues (Lee & Kim, 2021). The attractiveness of the product gives more chances for it to be accepted by ladies (Brown & White, 2022). The latest update is directed to AI-powered, which is basically less energy-consuming, and it is more involved in human like intervention for the detection of the any kind of danger(Patel & Singh, 2023). A sensor is a device which helps in detecting many variations in physical devices such as pressure, temperature, humidity, motion, or force, which therefore, converts them into electrical signals that can be measured and analyzed easily. While solutions vary in terms of hardware perspective, alert mechanisms, and user interfaces, are used to achieve the goal which makes it clear. It helps to empower individuals, especially women, with these kind of the tools to enhance their accuracy and safety in real-time through intelligence and through the connected devices. The evolution of these systems will likely to be continue the evolution of the Cloud Computing, Arduino with Microcontroller AI, and IoT protocols, which helps in moving towards more easy to use energy-efficient, and safety measusres to enhance the personal safety of each individual across the world . [11].

Their system also uses geofencing to notify guardians when a child steps outside designated areas. Unique wearable designs which have been created for everyday use, like Sakthimohan M's device. It is a triangual-based device which cleverly combines GPS with a panic button within any wearable device like a bracelet or pendant. This ergonomic design not only boosts user comfort but also ensures discretion. In a similar vein, Sunith D and colleagues tapped into health-related signals such as heart rate and movement data, using Bluetooth and smartphone apps to send real-time alerts and location updates. Malaj (2023) a women who introduced a device which includes a camera for capturing the situation in real time which can later be used as an evidence,it also had a GPS and SOS features for sending alerts to both police and family through an Android app, which helps in immediate performance and helps in providing the best feature.[12]

Other best contributions which includes the work of the Gadhave et al.'s "Electronic Jacket" and Jain et al.'s .He explained a work of approach that uses multiple sensors into a single device, which allows for automatic detection and response depending upon the value of the sensor thresholds. This literature shows the importance on using the GPS tracking with sensor-based values where the device is connected to their smart phone, it creates a environment for the customers to use their prototype efficiently for different type of users. However, a tough challenge is to maintain the balance between hardware complexity, the cost, and to ensure the user comfort, which can help the people to use the device with good performance. But, then the most challenging part of this work is the safety issue, false alarm and the infrastructure challenge to build the prototype. Data from different type of sensors such as sensitive biosensors and location tracking can be the most difficult task if at all this is not safeguarded with strong and secure safety measures. Moreover, the false triggers from motion sensors or any type of environmental sounds can lead to unnecessary panic, abnormal activities. Still, researchers like Harikiran and Gomathy are looking for a encrypted and a secure communication channels to tackle these types of challenges.[13]

In conclusion, the body of literature focuses on going innovational work to ensure the safety of wearable technology devices.

III. SYSTEM DESIGN

This project aims primarily to develop a system that integrates both hardware and software components to enhance the safety of women and children. Our concept is basically to rely on emergency alerts and an automated calling system to seek help. In India, the ranking of inappropriate behavior as the fourth most reported crime

against women has been established. It is observed from the surveys that over 20,000 cases are registered every year, and the crime rate has been worsening rapidly for more than ten years. To tackle this big issue, we devised a method that implements the accelerometer with a sensor to identify a sudden movement that can indicate an attack on a person. Subsequently, the system employs a GSM technique to dispatch the messages, and it can also locate the person.

Consequently, we utilized various hardware components for the realization of this project. The different components employed in the proposed work are Buzzer, Temperature sensor, Sound sensor, Heart rate sensor, LCD display.

1. GPS (Global Positioning System):

GPS is a navigation system based on satellites, which normally uses radio receiving technology to fetch signals from satellites, and the same can be used for location, speed, and time calculations.

2. LCD (Liquid Crystal Display):

An LCD is a kind of screen that shows the data it gets through the use of liquid crystals and light filters. Also, it does not produce light of its own, but a backlight is used to make the display visible. In this case, the LCD is utilized to present the major alert messages during emergency times.

3. Heart beat sensor:

The sensor for measuring the heart rate is called a heart beat sensor. It is a tiny chip-like sensor. Thus, the pulse of a normal person is from 80 to 90 beats for each unit. Therefore, the pulse of the normal person is predefined which is basically 80-90 heart beats for each unit per person. Therefore, if the pulse rises upto 110-120 beats per minute under normal condition, it reacts normally.

4. ADC (Analog – Digital):

The sensor signals—such as heart rate or temperature—are converted from analog (real-world form) to digital data by the ADC that is connected to the microcontroller by a simple hardware interface.

5. GSM (Global System for Mobile):

The GSM module is accountable for SMS-based emergency notifying. With the aid of GPS and sensors, it obtains the required information from these devices and then, based on the data, it writes and sends messages to the list of contacts where some numbers are stored beforehand and it has been asked during the installation of the app connected with the device. Find out how family members can know the message in case of an emergency when Internet is not available by reading this.

6. Switch:

The wearable band is equipped with a very simple switch that acts as an emergency button. Normally, the switch is in the “1” position. Once the button is pressed, the value “0” replaces “1,” thus turning on the safety system. The signal that the person sends out is the one that the safety system interprets immediately and thus comes to the person's rescue without delay.

7. Buzzer:

It is a small electronic device which when activated emits a loud noise. It is an alarm type of device, attracting the attention of people around in the case of an emergency. Therefore, this buzzer helps to produce a sound which alerts the nearby people, thereby the person can stay out of danger.

8. Sound Sensor: The sound sensor detects the sound of the victim.

The sound sensor is equipped with a mic to detect sound.

9. MEMS sensor: Micro Electrochemical System (MEMS).It is basically an instrument which helps to measure the blood pressure level and the oxygen level.

10. ESP32: This is an instrument which is basically integrated with the Wi-Fi or the Bluetooth features to help the device connected to their Smart Phone. For monitoring and collecting data from environmental sensors such as temperature, humidity, etc.,. It is very beneficial for human automation[12]

IV. WORKING

The device explained here functions using an ESP32 microcontroller, which basically acts as the central processing unit. It collects the information depending upon the sensor data to produce accurate results. These sensors continuously monitor and collect the information based on the body functions such as temperature, pulse rate, motion, and disturbances or any type of the environmental sound. Each reading is converted from an analog signal to a digital form and displayed on an LCD for the user’s reference. The collected data are wirelessly transmitted via Wi-Fi or Bluetooth to the connected smartphone application.

When any type of sensor collects the raw data, process it and after analyzing if at all the information crosses the threshold level, such as an abnormal heart rate, sweat and any type of sudden moment it automatically produces the buzzer sound and sends an alert signal to the saved emergency contacts on their phone. The GPS module basically helps in determining the real-time areas such as (latitude and longitude) of the user, and these details are immediately sent to the saved contacts through the smartphone app. This app is basically developed for Android users which allows users to enter their pre-register or any trusted contacts who will receive the SMS or app notifications incase of emergencies.

The push button on this device will do the job like a manual SOS button/trigger. When pressed, it sends immediate alerts to both the family members and local authorities, along with the live location. The system is also capable of capturing the live images using the camera incorporated into the device and then forwarding these messages to the mobile

application, which in turn gives a reliable and also a scalable performance to the users.

Overall, this wearable device helps in continuously monitoring the user's health and safety features, it provides an automatic and manual alert option for the user. The combination of multiple sensors which are connected to a single device which ensures quick detection of any kind of danger, sends an immediate/rapid notification to the saved contacts, and also helps in real-time tracking of the victim's location. Therefore, this makes a device a reliable tool by ensuring a women's and children's safety in any corner of the world.

V. ALGORITHM

1. Turn on the power supply to the whole module, tune the supply

2. Boot the microcontroller ESP32

3. Sign up the app on android application

4. We should keep an eye on the sensor's data that is sent to the app which is downloaded on the android phone via Wi-Fi.

5. When the sensor exceeds the threshold limit, a buzzer is triggered, and the sensor immediately sends an alert message.

6. The GPS is employed that the coordinates as latitude and longitude and identifies the position of the person.

7. All information is available to the responsible person; hence, an instant decision can be made.[1]

VI. RESULT & DISCUSSION

When the switch is turned on, the sensor unit immediately activates and sends a message. Once the connection is properly made, the user's current locations will be displayed on the Maps, and where as the message will be automatically sent to the saved contact numbers on their phone.

Smart wearable devices for safety has shown a significant results across various field which enhances the real-time data, provides an emergency response in certain situations, and lastly provides an personal protection. In the field of various industries, wearables like smart helmets or the vests has led in reducing many accidents in the workplace and across the world and, which helps in monitoring vital signs and disturbances/any unrealistic conditions. In the field of medical, particularly for the old age people and individuals especially with people with chronic illnesses, in these situation the devices will detect a fall detection, the ECG, and also oxygen monitoring which in turn helps in reducing the hospital involvement and therefore, improves the devices to work in emergency situation by allowing an automated alerts. For women and children, many safety wearables like smart jewelry with an SOS enabled bands have increased the level of security and which in turn reduces the response times during emergencies situations

Overall, smart wearables have become an important tools in the perspective of safety concern, immediately increases the performance time, and rapid response time across different environments. Smart wearable devices have emerged as an important tools which enhances the safety across different domains, by offering a mix of real-time monitoring, it also provides a rapid alert mechanisms, and preventive measures for the health analytics. In industrial or occupational safety, devices such as smart wristbands are embedded with different types of sensors, therefore, this device monitors workers' vital signs (like heart rate) and any type of environmental disturbances. These systems not only detect the outside disturbances but also provide an alert mechanism which instantly leads to a documented of about 25–40% reduction in workplace injuries which is basically a high-risk sectors such as mining, construction, and manufacturing. Only the allowed individual will be permitted to have the access, ensuring complete protection from unauthorized access. Therefore, it may be expected that providers would be considered as part of the literature on how wearables can help the people. In healthcare, especially elder care and chronic disease management, wearables which are combined with fall detection, ECG, SpO2 monitoring, and emergency SOS features. These devices will automatically provide an immediate notification for the caregivers or the medical services during any emergency situations such as accidents or any health care emergencies, which helps in early treatment. [16] [17]

For women's and children's safety, wearable devices like smart jewelry, pendants, or bands come with an SOS buttons, a GPS tracking, which sometimes produces even an audio/video recording, it allows the users to produce signal data and helps to share real-time location data. Meanwhile, military agencies utilize the AR-enabled helmets, and also provides an body-worn cameras that not only monitor health and stress levels but also provide real-time situational data for accurate results. Collectively, these results highlight how smart wearables have become critical safety tools which offers a safety measure, immediate emergency response, and data-driven therefore, helps in decision-making to safeguard lives in both daily and even in high-risk environments. [1] [2]

VII. FUTURE ENHANCEMENT

The Smart Wearable devices has a good future through our GPS system which has a better access to the person location and it has an enhanced health monitoring. Future wearables will likely go beyond health monitoring and ensures the safety of a person which is one of the most important thing in todays. Battery life has always been a concern for wearable tech uses. We even ensure through our product that it has a improved battery life and a good performance. Future wearables will likely feature longer lasting batteries and faster charging capabilities. Safety wearables have become increasingly important in the last few years, therefore in the upcoming years it has a good future. [12]

VIII. CONCLUSION

This project is basically designed to help the individuals in the emergency situation, especially women. Upon pressing the emergency button, the device immediately gathers sensor data and transfers it to saved contacts, while initiating an automatic phone in the saved contacts call for help.

In many rural and urban areas, people don't always have an access to a high-tech safety devices even though the technology has been developed. Elder people, often live alone and handle their daily essential tasks just by themselves. Research shows that those with lower levels of physical and social activity are more likely prefer to be alone during their daily routines. To make the system more effective, a camera module is also included to capture image data and provide better monitoring during emergencies [19] [20]. By doing this work people can travel throughout the world or through any remote area at any time. We can conclude that the project has been designed especially for women's safety by providing them with a wearable solution to handle problems in their workplace and the increasing danger against them. Once the device gets activated, an SOS and GPS get coordinated which can be tracked using the Android application installed on the smartphone over IoT. The camera will capture live images of both the victim and the culprit, providing additional safety.

The use of IoT technology in women's and children's safety systems will increase their protection in various environments, whether it can be at home, or in schools, or in any public spaces. By enabling real-time monitoring it a quick response in case emergency responses, IoT basically plays a vital role which basically ensures their security in various types of locations. It utilizes the IoT devices such as sensors, alarms, and GPS devices, it will be possible to monitor the activity, and detect emergencies, and respond accurately.

The research focused on the development of the smart wearable device system which has been designed to improve elderly care by providing them a real-time health monitoring and also provides a quick emergency response feature. With the development of many advanced sensors and provides an instant communication technology, it basically enhances safety and ensures medical attention on time whenever necessary. This design makes a major step which moves forward in the remote healthcare, by helping to reduce risks which improves the overall quality of life for elderly people. As the technology continues to evolve, future trends will play a major role in defining the system, expanding all its features, and by testing its performance in real-world environment.

In conclusion, smart wearable devices has shown that can be a changing tools for advancing safety, health monitoring, and emergency responsiveness across multiple fields. Their integration using the advanced technologies such as sensors, GPS, AI, and also provides an real-time communication which has enabled the different type of users to provide and manage their personal and also the work risks. In industrial settings, these devices will help to reduce the accidents and enhance the performance by constantly monitoring both human health performance and environmental conditions. In healthcare, particularly for the elderly and chronically ill people, wearables have been enabling a continuous, . Moreover, in fields like health care, sports, and the military, these devices enhance performance efficiently by enabling a real-time situation and by tracking, and contributing to better decision-making and prevents any type of accidents. The reliability and functionality of wearable devices which make them a suitable place for a wide range of applications—from urban places by providing a safety systems and provides a remote healthcare to tackle the challenges.

As the technology behind these devices continues to evolve, integration is a big challenged features such as AI-driven predictive alerts, machine learning algorithms to analyze the patterns, and also the cloud-based systems, their effectiveness and reliability will increase mutually. Their growing adoption also shows a shift toward a culture of safety and reliability, where potential threats are identified before moving into an serious incidents. Therefore, the smart wearable devices are not just technological innovations; they represent a critical step forward in creating a safer, more connected, and responsive place for people especially for women [2] [3] [1].

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