# Feminine Protection Wearable System Based on IoT


**Shubham Kumar Verma, Udai Raj Tiwari, Utkarsh Rau, Khadim Moin Siddiqui, Sandhya Srivastava, and Jayati Vaish**

**Abstract** Nowadays, women well-being is as vital issue as any developed or developing country. Women security has arisen as one of the main necessities considering what is going on of the urban areas and other huge urban communities. To assists with settling this issue, in this paper, a GPS-based women's security stun gloves are proposed. The fundamental working of this venture is that whenever as women sense risk, all she needs to do and it to hang on the pushbutton of the gadget. When the gadget is enacted, it tracks the location of the women utilizing global situating framework (GPS) and sends crisis messages to currently enlisted portable number and the police control room and the security gadget likewise incorporates alarm, and a shock provider circuit gloves. The heartbeat rate and temperature are additionally shown on a connected liquid crystal display (LCD). The beats sensor checks the beat of casualty, and in strange circumstances, the gadget likewise sends current GPS location to rescue vehicle or enrolled portable number in form of SMS. This security gadget works for self-preservation and counteraction of wrongdoing. In case of unfavorable circumstances, this gadget will behave as shock generators which women can use against aggressors for self-protection. The fundamental benefit of this framework is that this gadget is simple to operate and can be used by any girl or woman for her safety.

**Keywords** Women protection system · Emergency pushbutton · GPS tracker · Self-defense · Stun gloves · Buzzer · Temperature sensor · Heart rate sensor

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## 1 Introduction

In the twenty-first century, although technology is developing quickly, women and girls continue to have difficulties due to concerns about their safety. In our nation, women are not allowed to leave their homes at any time, particularly at night in the cities or the countryside. Hence, the technology needed to create a system that can provide protection and safety to the women. Even though this is an independent country, women do not feel safe traveling at night or occasionally even during the day in far-off places. The concept for this research work is based on news about women's safety that is frequently read in newspapers or seen on news channels. The figures for crime involving them are rising daily which can be seen in Fig. 1.

(i) Physical abuse of women accounts for almost 10% of all crimes in the nation.
(ii) Among the estimated 876 million individuals worldwide who are illiterate in both reading and writing, two-thirds are women.
(iii) Between 2001 and 2011, 30 lakh girl children died as a result of female infanticide.
(iv) There are still one in three illiterate women in India even after 75 years of freedom.
(v) In India, just 39.5% of women are employed, compared to 80% in China.
(vi) 70% of the 1.3 billion individuals who live in absolute poverty worldwide are women.
(vii) Women make up 10.9% of the population overall, while just 9.3% of agricultural workers (especially men) own land.

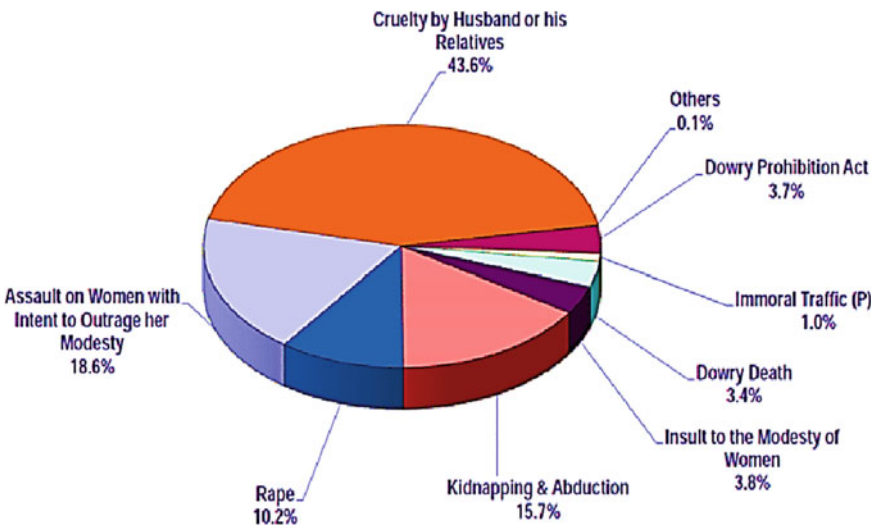


**Fig. 1** Statistics of crime related to women

If authors talk about domestic violence, the statistics are as follows:

(i) 12–15% of victims (women) say they have had their arms twisted, shook, kicked, pulled, beaten up, or had something thrown at them.
(ii) In India, over two-thirds of married women were victims of domestic abuse, where one serious act of violence resulted in a woman's death.
(iii) Every seventh woman who has ever been married has experienced bodily harm because of domestic abuse.
(iv) The first two years of their marriage are when most women have ever encountered marital abuse regarding dowry, status, etc.

These types of incidents are generally carried out by first-time offenders who generally look like students, and hence, it is difficult to track them. Security measures taken by the police department include only monitoring through cameras in and around the city which includes some tips to alert the public only.

In the present time, where technology is more advanced such as global positioning system (GPS) tracker which can be used by government and police to track women in danger. This will not only track the women in danger but also alert the guardian or nearby police station by sending alert message and the location of women in every 2 min. The developed system is 100% secure and will try to overcome majority of the above-said crimes, thereby ensuring the safety of women. Nowadays, many applications are developed for the woman security but the main drawback of these applications are required to detect initial interaction of women and that it is not easily possible.

In this paper, an alternate solution is developed in the form of wearable women smart bands or gloves based on IOT and Android applications. It is an innovative technology that has been designed specifically for the safety and security of women [1–8]. The system consists of a pair of gloves that are equipped with technology and are connected to the Internet through Internet of things (IoT) technology. The wearable gloves are capable of delivering a high-voltage electric shock to an attacker when activated by the wearer. The IoT technology allows the gloves to be remotely monitored and controlled by a central system, providing an added layer of security [8–15]. The issue of women's safety has been a major concern for society for a long time, and with the advancement of technology, there have been efforts to develop innovative solutions to address this problem. The women wearable system based on IoT is a step toward providing women with a tool to protect themselves against physical harm. In this system, the stun gloves are not only a self-defense tool but also a means to alert the authorities and send distress signals in case of an emergency. The gloves are connected to a mobile application that can be activated by the wearer, triggering an alarm and notifying the emergency services. The IoT technology enables the gloves to transmit the wearer's location and other relevant information to the authorities, allowing them to respond quickly and efficiently.

Overall, the women wearable system based on IoT is a promising technology that has the potential to enhance the safety and security of women in various situations. It provides a practical and effective means of self-defense while also enabling women to call for help when needed. In this proposed work, pulse sensor and temperature sensor are also used to determine the real-time pulse and heartbeat data of women in danger. The proposed system is wearable and consists of advanced sensors and signal danger. The proposed system can also be used as a self-defense system which consists of shocks generator. The severity of shock is intense enough to scare the attacker away [1, 2]. This watch protects women or children during any vulnerable attack. The proposed watch works on the concept of heartbeat. Later, many devices were developed for safety purposes. They are as follows.

A 'smart band' is reported in [3] for the protection of women. The smart band continuously communicates with smartphone that must have access of Internet. A 'Smart Girls security system' has been reported in [4] for providing the security of women. It works on the pressure-based sensor. An IoT-based smart device is reported in [5] for providing security of women. This device sends the location of woman when she is in problem. It works on GPS and GSM systems. A smart intelligent security system for women is reported in [6]. In this work, the Raspberry Pi 2 controller was used. This technique gave protection for women via tear gas and live streaming video.

The inclusion of 'Women Empowerment's' is one of the prime goals in the eight-millennium development. Goals underscore the relevance of this fact. Thus, in order to achieve the status of a developed country, India needs to transform its women forces into an effective human resource, and this is possible only through the safety and security of women.

The layout of paper is divided into five sections. Section 1 covers the introduction of the proposed safety device. The objective of the work is explained in Sect. 2. In Sect. 3, the methodology of the work is explained. The hardware implementation and results are covered in Sect. 4. The conclusion of the work is covered in Sect. 5.

## 2 Objective of the Work

In this work, a device has been developed for the women safety purpose. The objective of the proposed work is as follows:

1. The proposed device will intimate the parents and police about the current location of the women with the help of GPS system, and the GSM technology was also used to send messages in the pre-defined numbers.
2. In this work, a device has been used to give a tolerable current shock to culprit.
3. In our proposed system, an alarm device has also been used to warn neighbors.

4. The system has a GPS receiver, an umbrella controller, GSM modem, and GPS receivers for specific function purpose. Basically, the GPS system will be used to send the location of women, and GSM system will be used to send messages on the pre-defined numbers.
5. The suggested system contains security features that can assist women in need by allowing them to track emergency callers and provide information via notifications during situations by pushing the device's button right away. GPS tracking will be used to send updates on the victim's whereabouts to neighboring family members and police stations.

## 3 Methodology of the Work

The functional block diagram of the safety device is shown in Fig. 2. The solar panel and battery have been used for power backup. The solar panel will keep battery charged. The Arduino unit controller has been used for effective controlling purpose. The GPS module will send location of the victim, and GSM unit will send the message on the pre-define numbers. The temperature sensor will measure temperature of the victim, and heartbeat sensor will measure heartbeats of the victim. If both values will be more than the specified normal conditions, then the GSP module will send the location and message to the nearby police station and relatives. The buzzer is used for alarm purpose. The main novelty of this work is to provide a panic switch. When victim is in danger at that time, she can press panic button and culprit will get a current shock which will be unconscious for some moments. LCD display will be used for displaying purpose.

The electric shock in wearable gloves block diagram is shown in Fig. 3. In this system, a 9 V battery is used with resonator circuit and HFC transformer. This system will produce electric shock in case of emergency conditions [14, 15].

One can understand the operation of developed prototype from Fig. 4. The complete prototype can be understood via project flow diagram and shown in Fig. 5. The detailed operation is presented through the following chart in Fig. 6.

## 4 Hardware Implementation and Result Analysis

The proposed safety gadget is a cutting-edge instrument for offering security to women. This device is effective in determining a woman's real-time data, including her temperature, heartbeat, and GPS position. 38 °F and 75 beats per minute are the device's default settings. If these conditions alter in an emergency, a buzzer will turn on. Once it is turned on, it will use GSM to transmit the message to the police and any known relatives. Via a GPS location tracking gadget, the women's present location was included in the message. The gadget will record and display the temperature and heartbeat on the LCD display panel as shown in Fig. 7 when it is turned on and

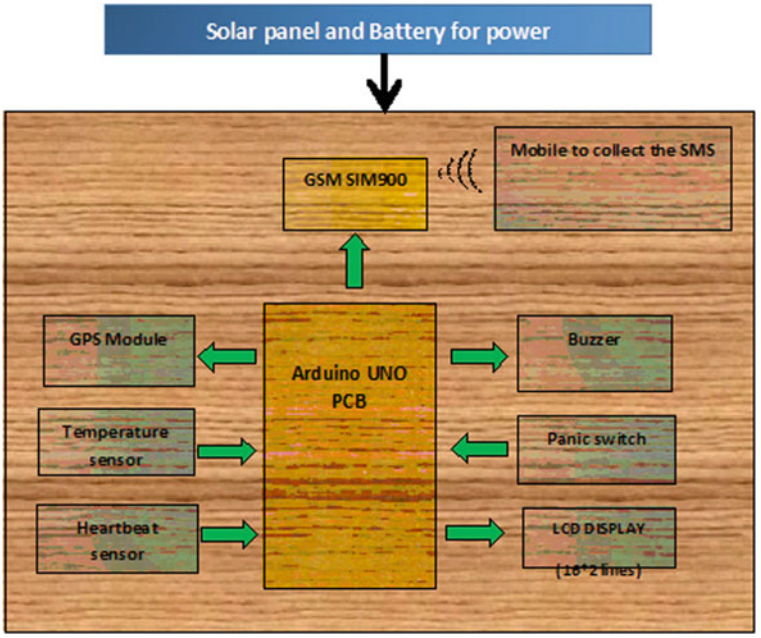


**Fig. 2** Functional block diagram of the system

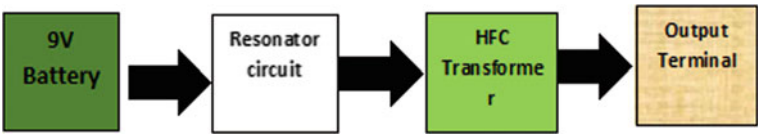


**Fig. 3** Electric shock in stun gloves

in contact with the female body. This will demonstrate whether or not the women's condition is critical.

If a situation calls for an emergency, the women can press the shock button for their own safety. Also, the gadget contains a siren button that can alarm others in the immediate area. Also, if a gadget is switched ON by default, it may send a deactivation message or alert to the police or family members. The hardware prototype for an electric shock cannon is shown in Fig. 8. Figure 9 depicts the entire design of the wearable women safety device.

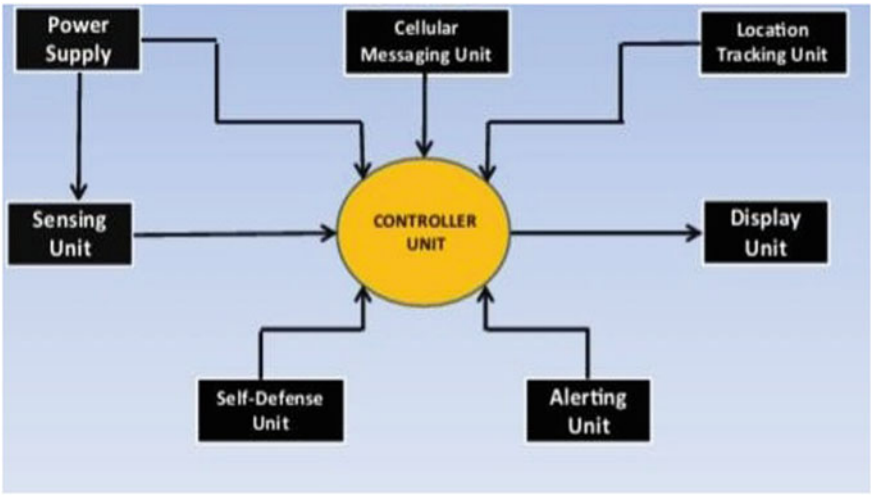


**Fig. 4** Operational diagram of women safety device

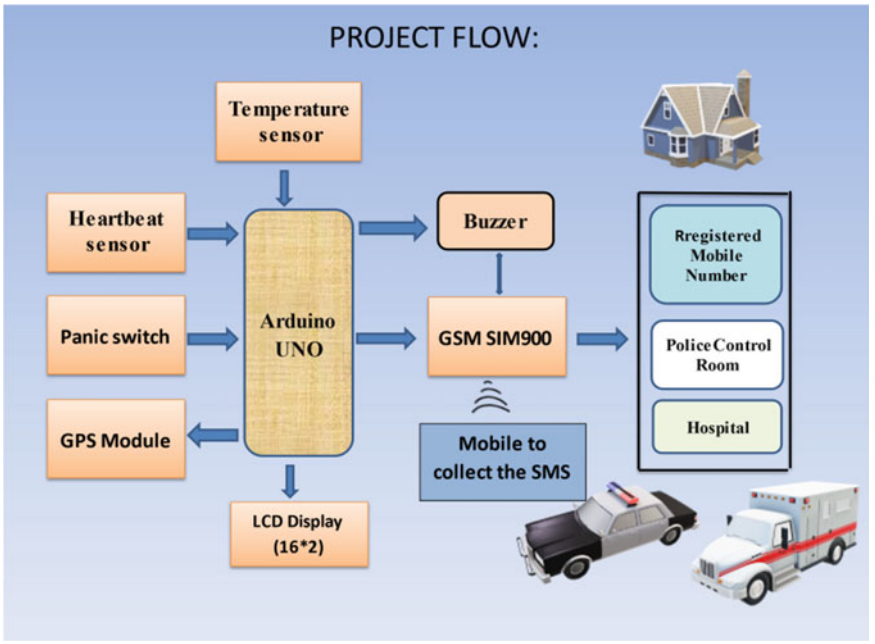


**Fig. 5** Project flow diagram

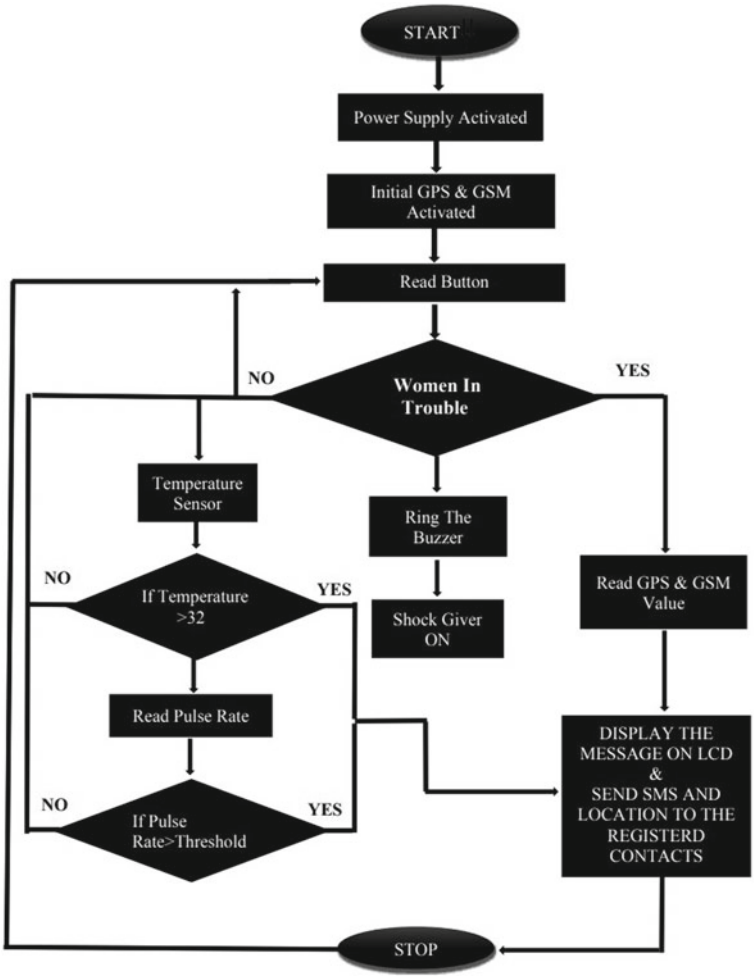


**Fig. 6** Flow chart of the proposed system

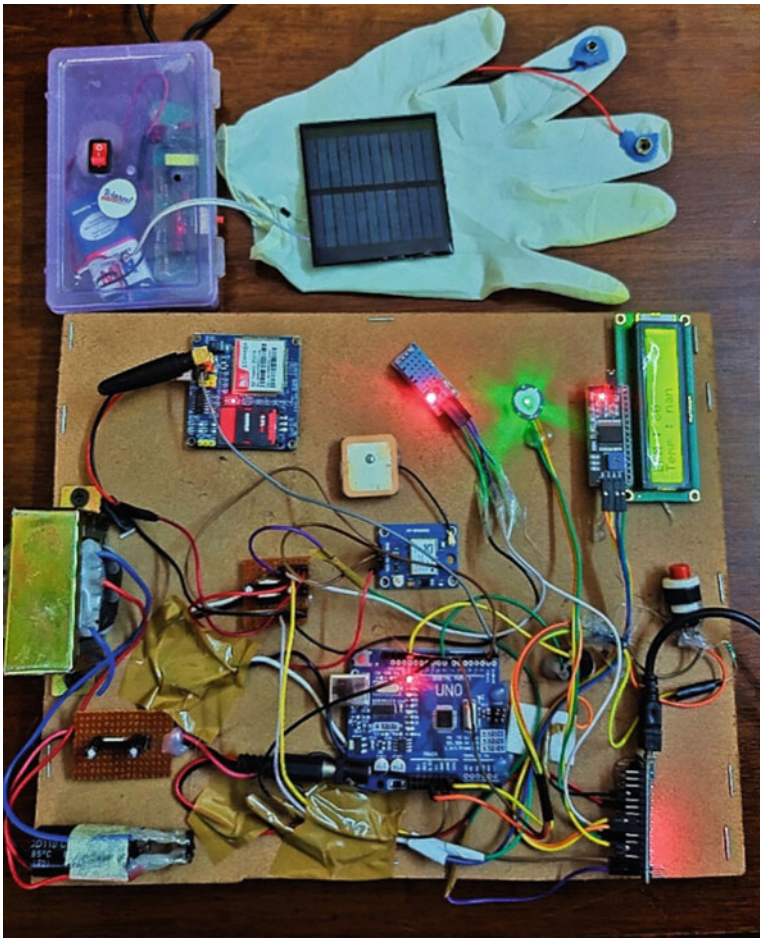


**Fig. 7** Prototype of stun gloves-based protection system


**Fig. 8** Electric shock gun implementation

**Fig. 9** Prototype testing of shock circuit gloves

## 5 Conclusion

The development of women wearable safety device is a significant step toward addressing the issue of women's safety in public spaces. The smart gloves, which are equipped with IOT technology, provide a non-lethal defense mechanism that women can use in case of an emergency. The wearable safety device has the potential to empower women and gives them greater confidence to navigate public spaces without fear. The women safety device is discreet, easy to use, and can be worn as a regular accessory, making them a practical and accessible solution for women's safety. While the device offers a promising solution, there are still concerns that need to be addressed, such as the risk of misuse and the legal implications of using shock technology. It is important to ensure that the use of these smart safety devices is regulated and that they are only used in situations where self-defense is necessary.

Overall, women wearable safety device is a step in the right direction toward creating a safer world for women. As technology continues to advance, more innovative solutions that will help women will be developed so that they can feel more secure and protected in public spaces. It is important to continue to invest in the development of such technologies and to work toward creating a more inclusive and safe society for all.

## References

1. Karri V, Daniel Lim JS (2005) Method and device communicate via SMS after a security intrusion. In: 1st international conference on sensing technology, Palmerston North, New Zealand, 21–23 Nov 2005
2. Zhao Y, Ye Z (2007) Low cost IOT/GPRS based wireless home security system. IEEE Trans Consum Electron 56(4):546–567
3. Bing Z, Yunhung G, Bo L, Guangwei Z, Tian T (2001) Home video security surveillance. In: 2001 international conference on info-tech and infonet, 2001, proceedings, ICII 2001, Beijing, vol 3, pp 202–208
4. Ghoshal S (2009) Embedded systems and robots projects using the 8051 microcontroller, 1st edn. Cengage Learning
5. Pantelopoulos A, Bourbakis NG (2010) A survey on wearable sensor-based systems for health monitoring and prognosis. IEEE Trans Syst Man Cybern Part C Appl Rev 40(1):1–12
6. Anto Bennet M, Sankar Babu G, Natarajan S (2015) Reverse room techniques for irreversible data hiding. J Chem Pharm Sci 08(03):469–475
7. Anto Bennet M, Sankara Narayanan S, Sankar Babu G (2015) Performance & analysis of effective iris recognition system using independent component analysis. J Chem Pharm Sci 08(03):571–576
8. Monisha DG, Monisha M, Pavithra G, Subhashini R (2016) Women safety device and application FEMME. Indian J Sci Technol 9(10)
9. Miriyala GP, Sunil PVVNDP, Yadlapalli RS, Pasam VRL, Kondapalli T, Miriyala A (2016) Smart intelligent security system for women. Int J Electron Commun Eng Technol (IJECET) 7(2)
10. Hammed RT, Mohamad OAW, Tapus N (2016) Health monitoring system based on wearable sensors and cloud platform. In: 20th international conference on system theory, control and computing (ICTSCC)

11. Vahini S, Vijaykumar N (2017) Efficient tracking for women safety and security using IoT. Int J Adv Res Comput Sci 8(9)
12. Tomar A et al (eds) (2022) Proceedings of 3rd international conference on machine learning, advances in computing, renewable energy and communication: MARC 2021, vol 915. Springer Nature, pp XV, 781. ISBN: 978-981-19-2830-7. https://doi.org/10.1007/978-981-19-2828-4
13. Ahmad MW et al (eds) (2022) Intelligent data analytics for power and energy systems. Springer Singapore, pp XXII, 641. ISBN: 978-981-16-6081-8. https://doi.org/10.1007/978-981-16-6081-8
14. Verma R, Singh A, Choudhary A, Letha SS (2021) PV-grid based electric vehicle charging station with modified interleaved boost converter. Aust J Electr Electron Eng 18(4):277–287
15. Khan MJ, Choudhary A (2021) Maximum power point tracking techniques for PV framework under partial shaded conditions. In: Artificial intelligence, machine learning and data science technologies, 1st edn. CRC Press