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Women's Security and Smart Surveillance

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Abstract

In a time where women's safety is concerned, there is this recommendation of having a total system of security for women with a deep learning technique, helping increase hazard detection and personal protection that uses powerful algorithms of computer vision along with machine learning models suggested system monitors the identification of a threat in real-time the primary constituents of this system are the facial recognition which identifies the known threats, the object detection that recognizes the suspicious activity, an alarm mechanism alerting authorities or emergency contact in case there is any potential hazard scanned the deep learning framework helps it learn through big data; this is how its accuracy and adaptability come along with several situations and more importantly user- friendly interface of access in order to enjoy safe features of location tracking and prime alerts.

Keywords : Women's Security, Facial recognition, Object detection, Location tracking, Deep learning

Introduction

Now a day's women are not getting a secure and safe environment. Women face a variety of forms of violence, including acid attacks, harassment, rape, murder, and molestation, regardless of their country's development. Every parent is getting fear to send their girl kids to school as well as young girls to college. Due to the rape , harassment and violence going around us is very worst.

Fig 1: Various Women Security Issues

As per the statistics the average of 88 rape cases has been calculated per day in India. It is difficult to control after some year. Deep learning for women's security and smart surveillance improves personal safety and monitoring systems. women's security and smart surveillance powered by deep learning offers novel approaches to improving safety and preventing crime. These systems use advanced artificial intelligence algorithms, particularly deep learning approaches, to examine video data in real time and detect potential threats or suspicious conduct. Furthermore, facial recognition and pattern analysis enable early threat detection, making public and private spaces safer for women. Deep learning-based security systems aim to minimize crime, increase security.

Literature Review:

A literature survey on Women security and smart surveillance would summarize the existing research, methodologies, challenges, and innovations in this domain.

In this paper [1], it is explain that the system can send the current location to family members, friends, and the police by pressing a button. As the criminal assaults the victim, the camera module captures the victim's image and alarms to attract the public's attention.

In this paper [2], it explains that the wearable smart gadget captures an image of the criminal, attaches it to the appropriate email address with information regarding where the victim is located as an attachment. In contrast, Self-defense without the internet relies on electric shock gloves, which provide electric shocks that divert the mind of the perpetrator.

In this paper [3], note the abnormal senses, the Heartbeat sensor, Tilt sensor, and Vibration sensor are connected to Arduino. In addition to sending alerts to nearby police stations, the scanned phone numbers will be sent to the police.

In this paper [4], it explains that the woman must first register her fingerprint in order to activate the device. In the event that the scanner does not detect a fingerprint, a buzzer will sound to alert the citizens. When an emergency occurs, the device will scan the fingerprint and send a text message to notify close family members and the police of the location of the victim. Women can use a shockwave generator to temporarily incapacitate an attacker if they feel the need for self-defense.

In this paper [5], the user wears a wristband on each hand. An

Arduino Uno and an EMG sensor are integrated within the wristband. A signal is triggered when the user flexes the forearm. Left-Left-Right- Right (LLRR) and Left- Right Left-Right (LRLR) are patterns of hand movements. A signal will be generated if the pattern matches and the officials will be notified.

Hardware Requirement

- Operating System : Windows 10
- Ram : 8 GB
- System : Intel I5 Processor.
- Sensor: GPS, GSM, Ultrasonic sensor
- Controller : Node MCU

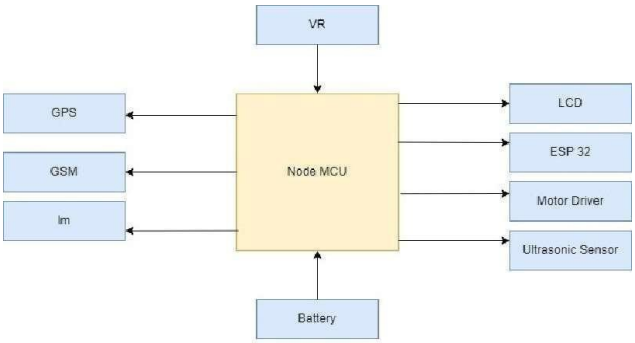

Fig 2 . Block Diagram

Block Diagram-

1.Node MCU: At the core of the system, the Node MCU microcontroller coordinates the functioning of all connected components. It processes data from various input devices and manages communication with output modules.

Specifications:-

1. Clock frequency - 240 MHz
2. Sram - 512 kB
3. Memory - 4 MB
4. Wireless standard - 802.11 b/g/n
5. Frequency - 2,4 GHz
6. Bt wireless connection - Classic / LE
7. Data interfaces - UART / I2C / SPI / DAC / ADC
8. Operating voltage - 3,3V (operable via 5V-microUSB)
9. Max. Current draw per gpio - 40 mA
10. Operating temperature - -40°C - 125°C

Fig 3. Node MCU

2.GPS (Global Positioning System): Connected to the Node MCU, GPS provides real-time location tracking, which is essential for locating the user in emergencies. This data can be sent to pre-defined contacts or authorities if a threat is detected. GSM (Global System for Mobile Communications, originally Groupe Special Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI). It was created to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones and is now the default global standard for mobile communications with over 90% market share, operating in over 219 countries and territories.

3.GSM (Global System for Mobile Communications): The GSM module enables the system to send alert messages and location data to emergency contacts via SMS, providing a reliable communication channel for the user's safety.

Specifications:-

1.Quad-band 850/900/1800/1900MHz.
2.GPRS multi slot class 12/10
3.GPRS mobile station class B
4.Low power consumption.

Fig 4. GSM

4.Voltage Regulator : A voltage regulator is a device that helps maintain a steady and regulated voltage level in an electrical circuit. They come in different types, such as linear regulators and switching regulators, each with its own advantages and applications. Voltage regulators play a crucial role in ensuring the stable and reliable operation of electrical systems.

Specifications:-

1. Input Voltage Range: This specifies the acceptable range of input voltages that the regulator can handle.
2. Output Voltage: This indicates the desired and regulated output voltage level provided by the regulator.
3. Load Regulation: It refers to how well the regulator maintains a stable output voltage when the load connected to it changes.
4. Line Regulation: It measures the ability of the regulator to maintain a constant output voltage when there are variations in the input voltage.

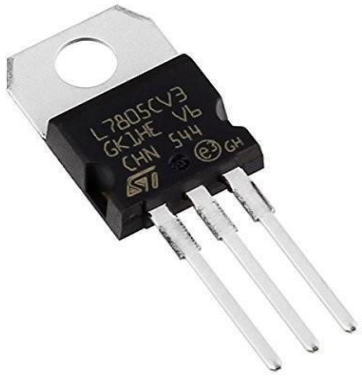

Fig 5. Voltage Regulator

5. **Ultrasonic Sensor:** This sensor detects the proximity of surrounding objects, identifying potential threats based on unusual movements or close range. It contributes to situational awareness in real-time. An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High frequency sound waves reflect across boundariesto produce distinct echo patterns.

Specifications:-

1.Power Supply: DC 5V
2.Working Current: 15mA
3. Working Frequency:40 Hz
4. Ranging Distance : 2cm – 400cm/4m
5.Resolution:0.3 Cm
6. Measuring Angle: 15 degree
7.Trigger Input Pulse width: 10uS
8. Dimension: 45mm x 20mm x 15mm

Fig 6. Ultrasonic Sensor

6. **Motor Driver:** The motor driver may be used to control an actuator, such as a vibration motor, which can provide haptic feedback to alert the user about nearby threats or activate certain mechanisms as part of the safety response.
7. **ESP32:** This module is used for wireless connectivity, enabling the system to send and receive data over Wi-Fi networks. It supports communication with mobile devices or cloud servers for data storage and further analysis.
8. **LCD (Liquid Crystal Display):** The LCD screen provides a visual interface for the user, displaying system status, alerts, or instructions. It is an important part of the user interface.
9.Battery: The battery powers the entire system, ensuring it operates independently and continuously, which is essential for a portable and reliable safety device.

Proposed System

Implementing a women safety security system using Deep Learning and IoT involves several key steps. Below is an outline of how this system could be implemented using OpenCV algorithms, IoT hardware, and deep learning.
Hardware Setup For this system, the main components based on the block diagram you provided include:
Node MCU: Microcontroller that connects various sensors and modules.

- GPS Module: Tracks the user's location.
- GSM Module: Sends emergency messages.
- Ultrasonic Sensor: Detects nearby objects.
- ESP32: Provides Wi-Fi connectivity for data transmission.
- LCD Display: Displays system status and emergency messages.
- Battery: Powers the system.

Connections

- Connect each sensor and module to the Node MCU's GPIO (General Purpose Input/Output) pins.
- Ensure the battery is connected and configured for portable operation**.**
- The Node MCU will act as the central processing unit, handling data from all input sources and triggering actions accordingly.
- Software Setup This setup includes programming the Node MCU, developing the deep learning model, and implementing OpenCV-based image processing algorithms.
- Tools and Libraries Needed: Arduino IDE For programming the Node MCU.

Use Case Diagram:

The use case diagram displays a female security system that uses deep learning technology. It has a "Woman User" who may activate security systems, initiate support requests, and send alarm messages in situations of emergency. The system recognizes the user's location and notifies nearby police stations, referred to as "Police Control." An "Administrator" can read incident reports and manage system users, ensuring efficient communication and assistance during an emergency.

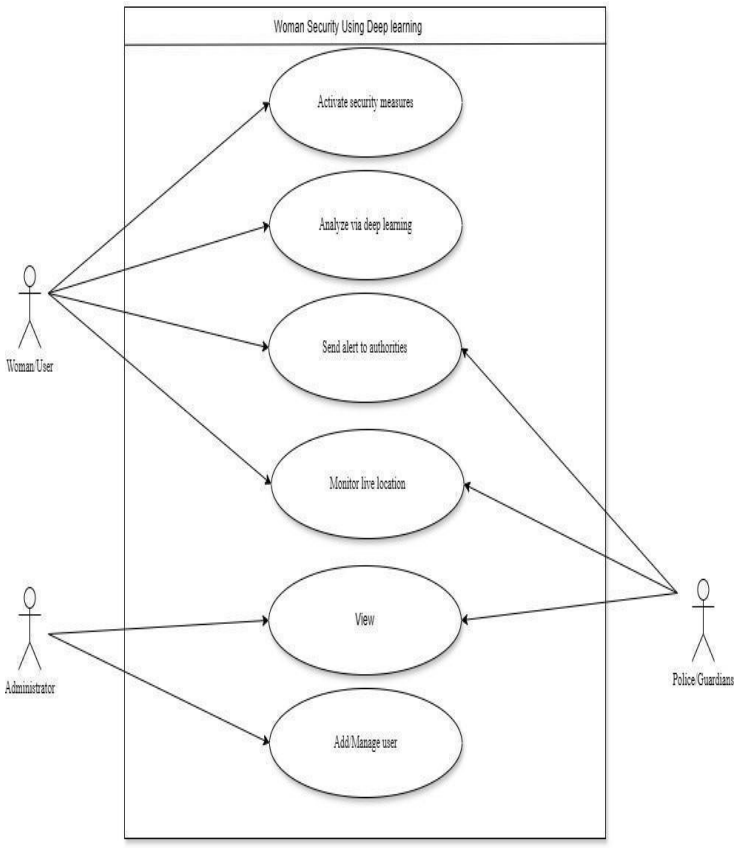

Fig 7. Use Case Diagram

Activity Diagram:

The workflow flow is depicted on an activity diagram for a deep learning-based lady security system. The process starts when the user presses an emergency button, which sends an alert to an IoT device and then to a deep learning model for examination. If a threat is detected, the system raises an alarm, monitors the user's location, and notifies law enforcement. If no threats are detected, the system will continue to watch. This design allows for rapid responses to potential threats.

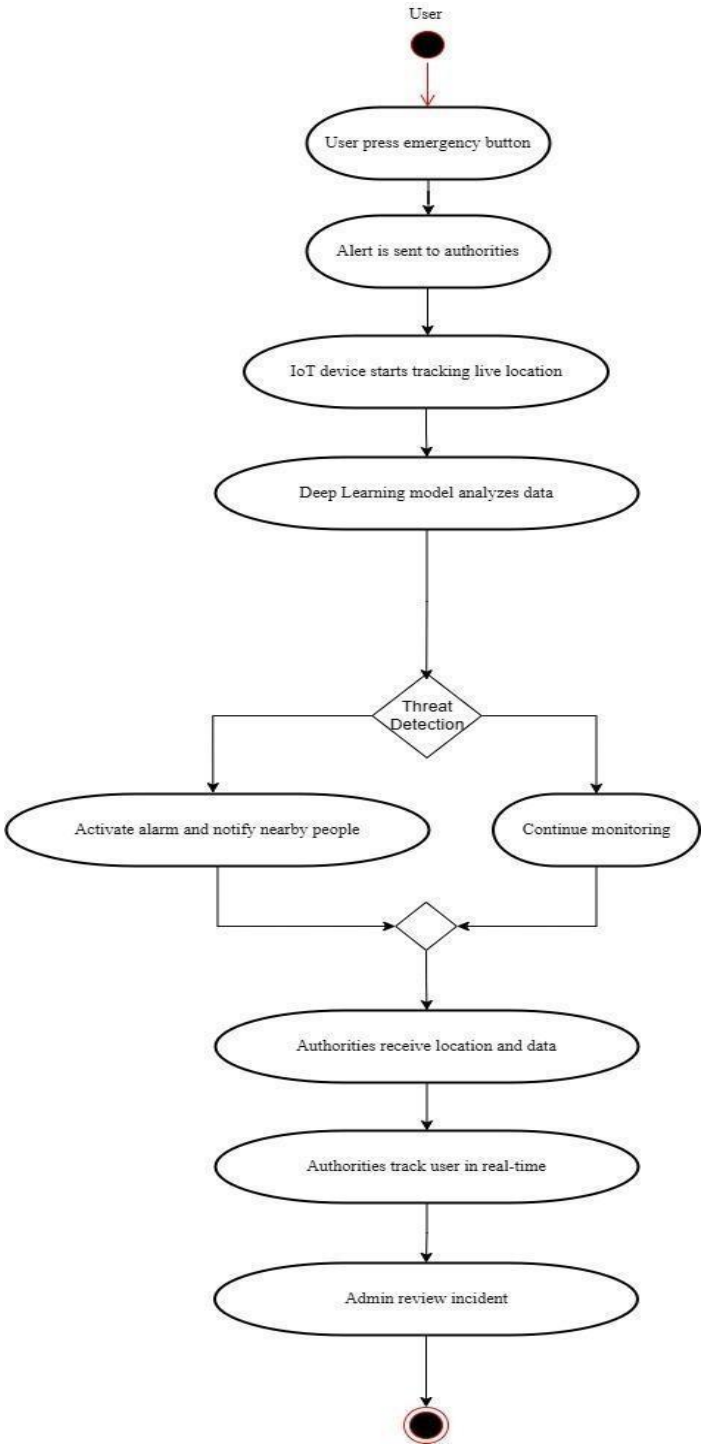

Fig 8. Activity Diagram

Sequence Diagram: In this sequence diagram, a female security system detects dangers through deep learning. When a user presses an emergency button, an IoT device sends the location to a deep learning model, which assesses the situation. If a risk is identified, the system sounds an alarm, monitors the user's current location, and notifies authorities. If no threat is detected, the system delivers feedback while continuing to monitor the individual to ensure their safety.

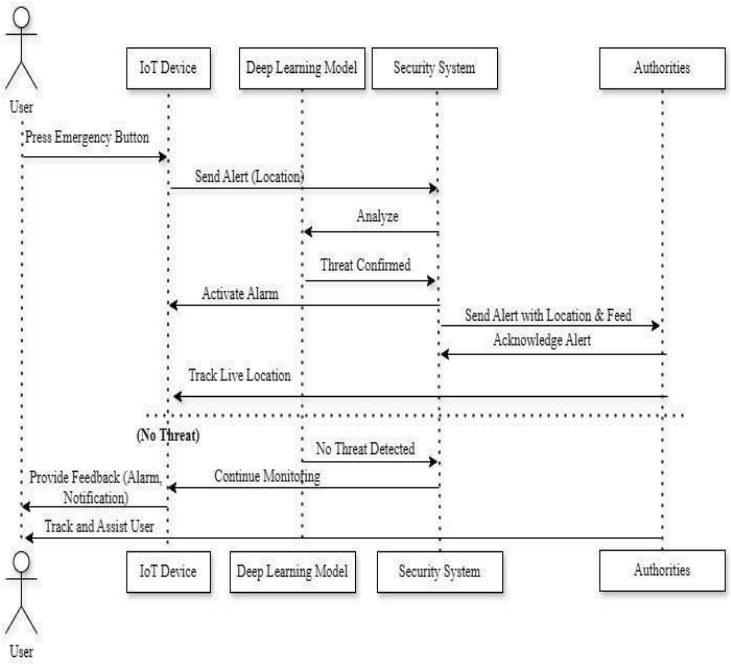

Fig 9. Sequence Diagram

Class Diagram: The class diagram depicts a woman's security system, which incorporates deep learning and IoT devices. The "User" class allows users to send notifications and enable security features. The "Security System" class analyzes data and generates alarms as needed. The "IoTDevice" class tracks and collects location information. The "Admin" class manages user data, while the "Authorities" class gets notifications and tracks the user's location. This structure enables real-time threat identification and assistance.

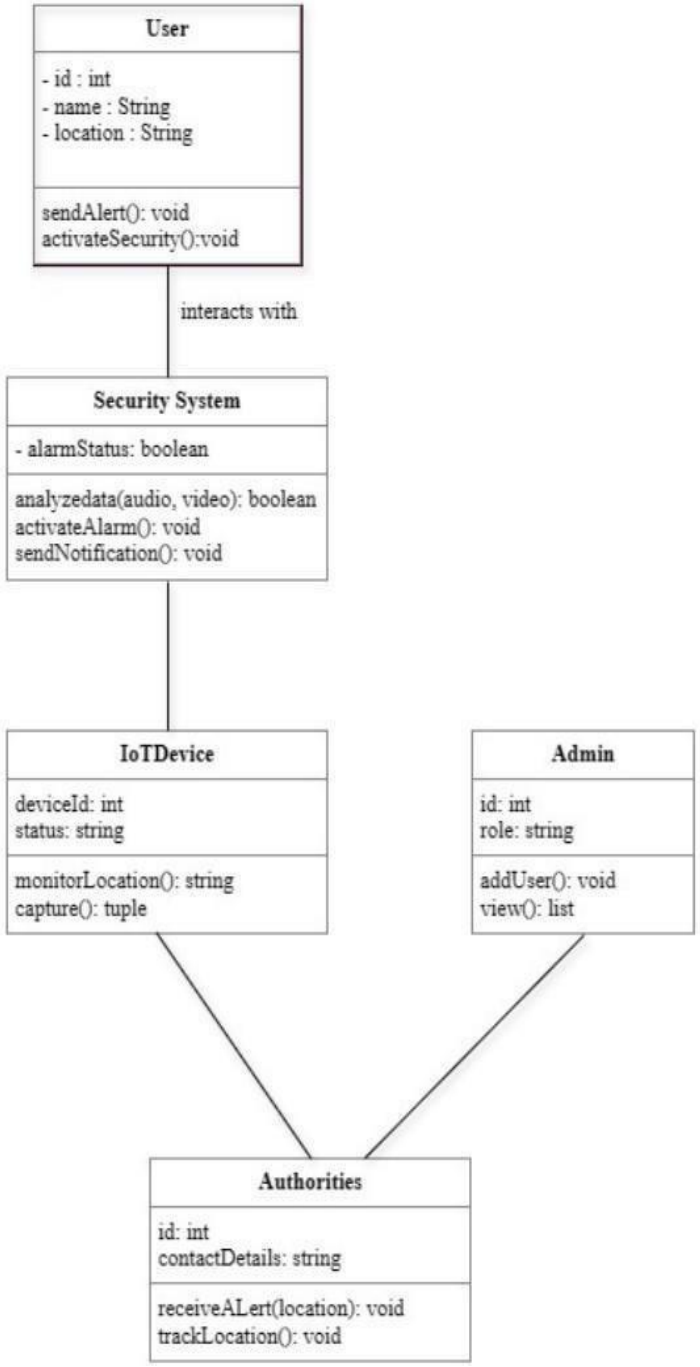

Fig 10. Class Diagram

Discussion

The Node MCU is the main CPU that will be interacting with several sensors and actuators. Position data will be gotten using GPS to track the object or warn in case of emergencies, while GSM offers a communication path using either SMS or call. IMU will give acceleration and angular velocity measurements. This unit will identify falls or sudden shocks. An ultrasonic sensor detects the presence of objects and intruders hence boosting security. The output devices are composed of an LCD to show information, an ESP32 for Wi-Fi connection, a motor driver for operating actuators such as alarms, and a virtual reality headset for immersive training or simulation. The entire device is powered by the battery. This integrated approach will be designed to provide total safety for women with alarms for emergencies, monitoring position, fall detection, intruder detection, and virtual training.

Abbreviation

Component name	Full Form/Description
1.GPS	Global Positioning System
2.GSM	Global System for Mobile Communication
3.LCD	Liquid Crystal Display
4.ESP32	Used for Wi-Fi connection
5.CPU	Central Processing Unit
6.IMU	Inertial Measurement Unit

Motivation

There is growing concern as far as women's security is concerned both in the public and private domains and hence the need for a more sophisticated form of protection. The classical surveillance does not really have a capability to deter crime since the human operator monitors quite a number of cameras at times with an error or delayGiven the alarming rise in harassment and violence towards women, it is now more crucial than ever that there must be an active, automatic, and reliable monitoring system in place.

Conclusion

Now-a-days, women safety in India is discussed everywhere. It has now become a major issue. The crime rate is on the spike. Women are neither safe outside nor at home. Women travellers from other countries are also in a dubious state while thinking about coming to India. However, this fear cannot keep them away from any kind of social activity. There are laws but proper safety measures need to be taken by the authorities where we must be very rigid to ensure there is no violence on these women.

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References

1] Priya Biradar, Priyanka Kolsure ,Sujata Khodaskar,Kishor.B. Bhangale,"IOT Based Smart Bracelet for Women Security" International Journal for Research in Applied Science and Engineering Technology (IJRASET) ISSN No: 2321- 9653, Vol 8, Issue No. 11, February 2020.

2] A.Jesudoss, Y. Nikhila, T. Sahithi Reddy, "Smart Solution for Women safety using IOT " International Journal of Pure and Applied Mathe- matics, ISSN No: 1314- 3395, Volume No 119, December 2018.

3] Wasim Akram, Mohit Jain, C. Sweetlin, Hemalatha, "Designof a Smart Safety Device for Women using IoT, "International Conference on recent trends in advanced computing(ICRTAC),ISSN No: 1877- 0509,Year- 2019.

4] A.Z. M. Tahmidul Kabir, Al Mamun Mizan, Tasnuva Tasneem, "Safety Solution For Women Using Smart Band AndCWS App ", 17th Inter- national Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON), DOI:10.1109/ECTI-CON49241.2020.9158134, August 2020.

5] P. Nandhini, K. Moorthi, A study on wearable devices forthe safety and security of a girl child and women. Int. J. Adv.Res. https://doi.org/10.21474/ijar01/7804,http://dx.doi.org/10.21474 / IJAR01/7804/2015.

6] B. Sathyasri, U. Jaishree Vidhya, G. V. K. Jothi Sree, T. Pratheeba, K. Ragapriya, Design and implementation of women safety system based on iot technology. Int. J. Recent Technol. Eng. (IJRTE), **7**(63) (2019). ISSN: 2277–3878.

7] Vamil B. Sangoi, "Smart security solutions," International Journal of Current Engineering and Technology, Vol.4, No.5, Oct-2014.

8] B.Chougula, "Smart girls security system," International Journal of Application or Innovation in Engineering & Management, Volume 3, Issue 4, April 2014.

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