IoT BASED WOMEN SAFETY DEVICE

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ABSTRACT: *The protection of women is currently the top priority, and a safety device must be developed to shield them from potentially harmful situations. In this project, an Internet of Things (IOT)-enabled smart gadget for women's safety is created for both personal security and on-demand help. To identify dangers or crises, the gadget has smart sensors and connection functions. Additionally, it has a smartphone app with GPS tracking that lets users set alarms and share their current position in real time with emergency services and trusted contacts. This suggested gadget seeks to empower people by using technology to make the world a safer place and provide support when people need it.*

1. INTRODUCTION

Even in these advanced technological times, women's safety has always been a concern. Women are not secure anywhere, and they are more at risk when they travel alone on desolate highways. The portable safety gadgets that are now on the market for women's protection must be activated by women, such as by shaking the device or pushing a button when they sense danger [1]. But for some reason, the safety device's function is unfulfilled if a woman is in danger and cannot activate it in time. Women's safety is seen as one of the most crucial concerns in a nation like India, where the incidence of crime—which includes rapes, murders, and break-ins—is thought to be higher than the pace of population increase. India is considered to be one of the world's most hazardous countries for women, and India is home to the largest number of child brides, per a Thomson Reuters Foundation analysis.

Women's safety is endangered in today's globe, particularly 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. The government has implemented several preventative measures to curb these unruly actions, but they haven't had any impact on the rising crime rate.While waiting to board or get off a school bus, students encounter situations such as child trafficking and kidnapping.With a tonne of security

applications for women, a smart phone may be used to notify people in case of an emergency and to send emergency notifications to designated recipients.

2. INTERNET OF THINGS(IOT)

Devices having software, sensors, computing power, and other technologies that link and share data with other devices and systems over the internet or other communication networks are referred to as "Internet of things" (IoT) devices [2]. The Internet of Things includes computer science, electronics, and communication engineering. The subject has evolved as a result of the convergence of several technologies, such as embedded systems, commodity sensors, and ubiquitous computing.

A smart gadget with network connectivity was created in 1982 to serve as a sensor's internet interface. The computer science department at Carnegie Mellon University has this gadget installed. Reza Raji first presented the idea in 1994 using the IEEE spectrum to represent little data packets sent to a large number of nodes. When Bill Joy included device-to-device communication in his six webs architecture, which he introduced at the World Economic Forum in Davos in 1999, the field took off.

The idea of the Internet of Things was initially introduced in a lecture given by Peter T. Lewis in September 1985 at the 15th annual legislative weekend of the congressional Black caucus foundation in Washington, D.C.IoT, according to the newspaper, is the fusion of technology, people, and connectable devices and sensors to allow for remote device modification, monitoring, and assessment.

The definition of the Internet of Things, or IoT, is simply the number of devices or things linked to the internet relative to the number of humans. The primary idea behind the Internet of Things is to embed short-range mobile transceivers into everyday objects and devices to allow for new kinds of communication between objects and between things.

3. Role of IoT in Woman's Safety

The Internet of Things (IIoT) has become a well-known area of research that provides assistance through technologically aided solutions of linked objects. We introduce a number of IoT gadgets to ensure the woman's safety. A handful of them use voice recognition technology to automatically detect and identify threats. These gadgets provide a variety of characteristics to aid with the cause, which is mostly concerned with alerting the trustee in the event that the ladies are in danger.As IoT-based devices for women's safety grow more

wireless and integrated into women's wearables, it is evident how these devices are developing.

Several sensors are attached to these devices [5]. These are wireless and compact. These electronics can be worn as smart tattoos or as clothing, accessories, or gadgets. Modules are activated by sensors that collect information from the specific device. Wearable technology is integrated into smart gadgets; depending on the item being used, smart foot devices may feature built-in sensors. For instance, the first smart foot gadget merely had an acceleration sensor. Similarly, a number of sensors are employed to measure heart rate, speed, and other parameters to determine whether or not the victim is in danger.

Several sensors are used by Internet of Things (IoT)-based devices for women's safety to monitor women's movements and states in order to identify potential threats. These sensors collect data from various bodily regions. The temperature, heartbeat, and pulse rate sensors are a few of the sensors that are utilised in this. A small number of them, like temperature and tilt sensors, receive data from any portion of the body; others, like heartbeat and pulse rate sensors, are exclusive to a particular location of the body.

4.   LITERATURE REVIEW

The aim of this study is to present a safety gadget for ladies. In the event that the victim feels threatened, she can hit the panic button on this gadget. An alarm message with the current position is delivered via GPS and GSM modules to the designated numbers when the panic button is hit [9]. The invention of a gadget that integrates several electronics and vibration sensors is suggested in this research. An ATMEGA 2560 microprocessor, IoT modules, and vibration sensors make up this gadget. It is recommended that the user grasp the trigger button on this wearable smart band to activate it [11]. When turned on, it sends a message to preset numbers alerting them of the user's present position. This study suggests a safety gadget that may be used to follow a kid's travels outside the house and find a missing youngster. The current position is sent via GPS and GSM.

"Design and implementation of Women Auspice System by Utilising GPS and GSM" was the proposal put up by Islam et al. They used to be able to reach the client's location fast with this technology. To illustrate the different types of accident casualties that need to be faced, three press catches are performed. The client can push any one of these three buttons if it encounters any problems at all. The microcontroller will then receive it and send an SMS to the specified phone number. The area of the client will be continually watched till the client

switched off the framework when saved. Moreover, they have used a PIC16F887A microcontroller powered by four to operate the complete system. A set of batteries. "Women Safety Device Designed using IoT machine learning" was put into practice by Muskan et al. [4]. The goal of the study is to create a gadget. The gadget is programmed to identify each user's unique pattern of heart rate and temperature. It then determines the threshold, and when one of these variables rises over it, an automated SMS with the user's location is sent to the emergency contact.

"SMARISA: A Raspberry Pi based smart ring for women safety using IoT" is the goal of Navya R. Sogi. A wearable device known as SMARISA has been developed specifically for women. It has a Rasberry Pi, camera, signal, and ctch to initiate the administrations and gadgets. It can be activated by tapping a catch that brings the user to her current location and captures an image of the aggressor using the camera and Rasberry pi, then sends it to the crisis contact number.

The proposal "Women Empowerment towards developing India" was made by A. Priyadarshini. Women's fortification is based on giving every woman in the nation the tools she needs to rule from all angles, to be aware of her rights, and to prepare herself for security [13]. This paper focusses on presenting the problems that women face in their daily lives, plans available for women's empowerment in India, and a proposal for a self-help group that will be upgraded in the future. It also provides a contextual analysis of women empowerment cells.

A system with a location tracking mechanism was proposed by D. G. Monisha et al. If the victim presses a button once, it sends an SOS message with the victim's current location to pre-set contacts every two minutes; if the victim clicks the button twice, it records the SOS message and sends it again, plus it calls the pre-set contact numbers after the victim presses the button for a prolonged period of time.
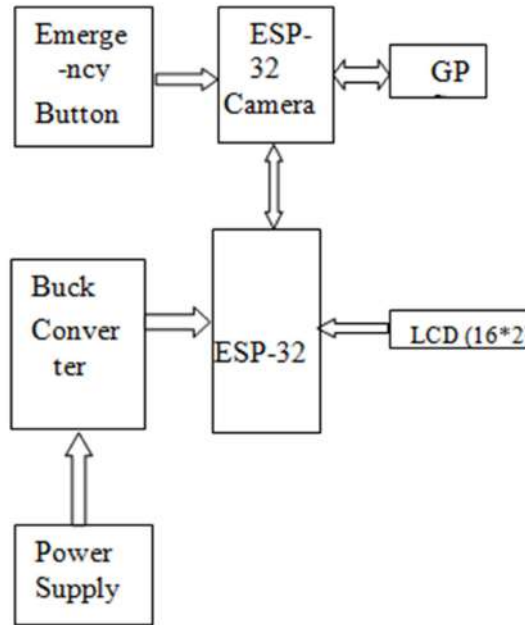
5.   BLOCK DIAGRAM:

FIGURE:5.1 BLOCKDIAGRAM OF IOT BASED WOMEN SAFETYDEVICE

5.1   ESP32 MICROCONTOLLER

A robust and adaptable system-on-chip (SoC), the ESP32 microcontroller is made for a variety of embedded systems, robotics, home automation, and internet of things (IoT) applications. With improved features and capabilities, Espress if Systems' ESP32 expands on the popularity of its predecessor, the ESP8266. The ESP32's dual-core Xtensa LX6 microprocessor, which can operate at up to 240 MHz, is its central component and offers sufficient processing power for demanding tasks. In addition, it has a wide range of interfaces and peripherals, including as WiFi, Bluetooth, UART, SPI, I2C, ABC, DAC, and more, making it extremely adaptable to different project requirements.

FIGURE:5.1ESP-32MICROCONTROLLER

The ESP32's inbuilt Wi-Fi and Bluetooth connection, which allows for smooth communication with other devices and the network, is one of its most notable features. A strong software ecosystem supports the ESP32, including extensive programming frameworks like the Micro Python, Arduino IDE, and Espress's own ESP-IDF (IoT programming Framework). This makes it possible for developers to quickly design, create, and implement apps by utilising an abundance of libraries and community assistance.

5.2 BUCK CONVERTER

An effective DC-DC converter for converting a larger DC voltage to a lower DC voltage is a buck converter, often referred to as a step-down converter. In order to regulate the output voltage, it works by adjusting the duty cycle of a switching transistor.

FIGURE:5.2 BUCK CONVERTER

By managing the switching of a transistor and making use of an inductor's energy storage and release properties, a buck converter effectively reduces a larger DC voltage to a lower DC voltage, providing consistent output voltage regulation for a range of electronic systems and devices [4]. The essential parts of a basic buck converter circuit are an inductor, a switching transistor, a diode, a capacitor, and a feedback loop for voltage control.
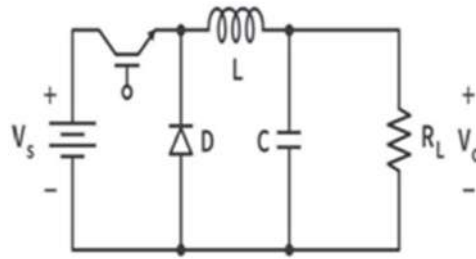
FIGURE:5.3 BUCK CONVERTER CIRCUIT

5.2   ESP32 CAMERA

The ESP32 camera is a small development board with a camera module and an ESP32 microcontroller that can broadcast video via WiFi and take pictures. Typically, the camera module is an OV2640 sensor, which can record video at resolutions up to 1600x1200 pixels and take still photos at a quality of up to 2 megapixels. The ESP32-CAM integrates the image capabilities of the camera module with the processing power and networking features of the ESP32 microcontroller to allow a variety of applications, such as video streaming devices, IoT cameras, and surveillance systems. Multiple essential components and capabilities are required for the ESP32-CAM to function [8].The system's general management is carried out by the ESP32 microcontroller, which also handles data transfer, networking, and image processing. It connects with the camera module using an interface such as serial camera control Bus(SCCB) or parallel camera interface(DCMI) regulating parameters such as resolution, frame rate and exposure settings. The camera module records light via its lens to create digital image data while taking a picture or streaming video. The ESP32 microcontroller, which can carry out operations like picture compression, encoding, and transmission, subsequently processes this data. JPEG and BMP are only two of the picture formats that the ESP32-CAM supports, making it possible to store and transfer image data via Wi-Fi in an effective manner.

FIGURE:5.4 ESP32 CAMERA

The ESP32-CAM can stream video by connecting to a Wi-Fi network and sending real-time video frames to a distant server or client device. It makes advantage of the ESP32 microcontroller's built-in Wi-Fi capabilities to create a wireless connection and stream video content over web sockets, RTSP, and HTTP protocols.Furthermore, the ESP32-CAM can have an SD card port or on-board flash memory for local storage of recorded photos and movies. The ESP32 CAM combines the functionality of the ESP32 microcontroller with the imaging capabilities of the camera module to give a flexible platform for collecting photos, streaming video, and constructing IoT camera applications. It is the perfect choice for a variety of applications needing camera capabilities because of its small size, inexpensive price, and wireless connection.

6.PROJECT WORKING

The women's safety gadget, which is based on the Internet of Things, functions by means of an all-encompassing approach that combines wearable technology, sensors, cloud computing, and smart networking to establish a resilient and anticipatory safety network. The wearable electronics, which were created especially for women's safety, are the central component of the system. These gadgets come in a variety of shapes and sizes, including embedded sensors such as ESP32 microcontroller, ESP camera, LCD display, emergency button, buck converter, and GPS module in smart clothes or jewellery [10]. The safety process is initiated when the sensors identify distinct motions, abrupt accelerations, or distress signals from the user. The wearable gadget connects to a specific mobile application that is loaded on the user's smartphone upon activation. The main centre for managing and regulating the safety features is this application. Through the app, users may quickly set off an alarm that will send a distress signal to pre-identified contacts and start safety procedures.

Through the embedded GPS module, the wearable gadget sends real-time location data to the mobile app. This location data is an essential part of the safety system that makes it possible to react quickly and precisely in an emergency. Users may quickly and covertly disclose their whereabouts with authorities and reliable individuals. After transmission, the data is processed and analysed on a cloud-based server. In order to manage the flood of data produced by several users and devices at once, cloud computing is essential. The system's embedded machine learning algorithms examine incoming data and make the distinction between questionable and routine activity. This guarantees that false alarms are kept to a minimum and helps the system to deliver a more accurate evaluation of possible risks.

Simultaneously, the IoT-based women's safety gadget that is being developed includes smart cameras that are deployed in public areas deliberately. These cameras keep an eye on the area around them and use machine learning and computer vision to identify any odd activity or potential threats. The camera system enhances overall security by providing an additional layer of surveillance in addition to the wearable gadgets. The system alerts designated contacts via the mobile app and communicates with local authorities when an alarm is issued. A timely and well-coordinated reaction to the distress signal is guaranteed by this connection with emergency services. Authorities can quickly and effectively contact the user thanks to the real-time location data they obtain. The IoT-based solution adds a safe path option to further improve user safety. The smartphone app uses the constantly updated data from the cloud-based server to direct people through places that are under close observation and away from any possible risk zones.

FIGURE:6.1 KIT WTH POWERSUPPLY

FIGURE:6.2 WOMEN SAFETY

FIGURE:6.3 OUTPUT

7.FUTURE ENHANCEMENT

The implementation of more precise location tracking technologies, such as A-GPS or in-door positioning systems, integration with smart home systems for smooth communication with other connected devices, and personalised alert options are just a few ways to improve the features of IoT-based women safety devices and thereby increase their effectiveness. incorporating wearable health monitoring features like heart rate monitoring or fall detection, enabling automatic coordination with emergency services for quicker response times, and facilitating communication and collaboration within community safety networks are some of the ways to improve situational awareness. Other ideas include adding real-time audio and video streaming capabilities. These feature improvements will enable IoT-based women safety devices to provide users with more thorough and customised protection, enabling women to feel safer and more confident in their everyday lives.

8.CONCLUSION

The use of IoT-based women safety devices to solve the urgent problem of women's safety is a significant technological achievement. These gadgets give women a proactive approach to personal protection by combining cutting-edge sensors, communication features, and clever algorithms, enabling them to move through the world with assurance and comfort. IoT-based women safety gadgets help in emergency circumstances by providing real-time monitoring, automatic distress signal creation, and seamless connection with pre-arranged contacts or emergency services.

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