Design And Implementation Of Smart Notifications For Human Safety In Patrolling Vehicles

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Abstract:

In many places of the world today, human safety is the top priority. Both men and women still experience terror in alone places. Hence, utilising esp32cam, we suggest a security patrolling robot here. The technology uses robotic vehicles with cameras and microphones installed on them to secure any location. It uses a camera to monitor each region and identify any issues. It can keep an eye on the building's noise level. When the area is quiet and the robot hears any sound, it begins to move in the direction of the sound along a predetermined course. Then, it scans the surroundings with its camera to look for any human faces. It offers ongoing surveillance and real-time transmission of the crime scene. The robot that designed to protect people by alerting them to any suspicious noises during the night. It has a buzzer, sound sensor, Bluetooth, and an ESP32CAM. Live photos are recorded by the ESP32CAM and Bluetooth. Any unusual sounds are picked up by the sound sensor, which then alerts the user's phone. In the event of any emergency, the buzzer is employed to provide an alarm sound. Via their smartphone, the user can operate the robot, and they can select to either view a live stream from the ESP32CAM or simply receive alerts for any suspicious sounds. A power button on the robot can be used to switch it on or off. The design and implementation of smart notifications for human safety in patrolling vehicles is a low-tech but efficient way to ensure night time human safety. It is compact and manageable in size.

Keywords: Buzzer indication, ESP32CAM, Arduino Controlled.

Introduction:

Human safety is important, as we are all aware, but we must also acknowledge that they need to be adequately protected. Finding and using resources to get out of unsafe circumstances is the best approach to reduce your risks of becoming a victim of violent crime. These programmes can lessen danger and provide aid when needed, whether it is an urgent issue or they become separated from pals during a night out and are unsure how to go home. Several of them were first created for students to lessen the possibility of harassment on campuses, but they are appropriate for all female People are preparing in many ways to fight back in light of the incident in Delhi(Nirbhaya case) that shocked the nation and made us aware of the safety challenges for our daughters. Over the past few millennia, there have been numerous significant changes to the position of women in India.Women in modern India nevertheless confront social hurdles and are frequently the targets of abuse and violent assaults. The goal of this project is a security robot created exclusively for the purpose of ensuring human security and safety so that even in the face of such social difficulties, they never feel helpless. These systems will be simple to manage and

easy to install. Low cost with high performance - The product will be inexpensive and operate at a high level of efficiency. System that is environmentally friendly - The system won't hurt the surroundings.

Literature review

Early computers, which date back to the 1930s and 1940s, were occasionally specialised for a single activity but were much too huge and expensive for the majority of activities that embedded computers now accomplish. Yet, over time, the idea of programmable controllers changed from conventional electromechanical sequencers to solid state devices to the application of computer technology. Charles Stark Draper created the Apollo Guidance Computer at the MIT Instrumentation Laboratory, one of the earliest instantly recognisable modern embedded systems. The Apollo guidance computer, which used the thennewly created monolithic integrated circuits to lessen the risk, was first seen as the most dangerous component of the Apollo project. weight and size. The 1961-released Autonetics D-17 missile guidance computer was an early example of a mass-produced embedded system. It had a hard disc for main memory and was constructed using transistor logic. The D-17 was replaced with a new computer that was the first high-volume application of integrated circuits when the Minuteman II entered into production in 1966. The design and implementation of smart notifications for human safety in patrolling vehicles is a lowtech but efficient way to ensure night time human safety. It is compact and manageable in size. The goal of this project is a security robot created exclusively for the purpose of ensuring human security and safety so that even in the face of such social difficulties, they never feel helpless.

PROPOSED DESIGN:

Methodology:

The idea behind this project is to provide security to humans. Any abnormal activity and small interaction of sound results in the alert of the concerned authority. Then robot automatically goes to the particular area and captures the image of that area and sends it to the user. It uses a predefined and dynamic line and dynamically generated lines to follow its path while patrolling. Robot stops at particular points and moves to the next points if the sound is detected or else the dynamic routing takes place. The system uses an Infrared (IR) based path following system for patrolling assigned areas. It monitors and sensors each area to detect any problem using a combination of two HD cameras. It can monitor and sensors sound on the premises.

Requirements:

The hardware requirements are as follows –

1.Power Supply*:* The design of stabilized supplies has been simplified dramatically by the introduction of transformer ICs like the L78xx and L79xx - three-terminal series regulators which give very stable output and include current limiter and thermal protection functions. The regulated power supply consists of a transformer and a bridge rectifier which may be a combination of 4 diodes connected in a very bridge shape. Bridge rectifier has the utmost efficiency and it's best than other rectifiers that's why we prefer it. This rectifier converts ac into pulsating dc. After the rectifier filter circuit is utilized, usually a capacitor in parallel is employed as a filter or we can use several capacitors in parallel and therefore the number of inductors is unsynchronized. these filters are low pass filters as we required dc at the o/p. Then after capacitor transformer is employed for observing the pure dc o/p. we can use various voltage regulators for obtaining pure dc o/p but we prefer 78xx series voltage regulators as they're simpler, cheaper and easier than others
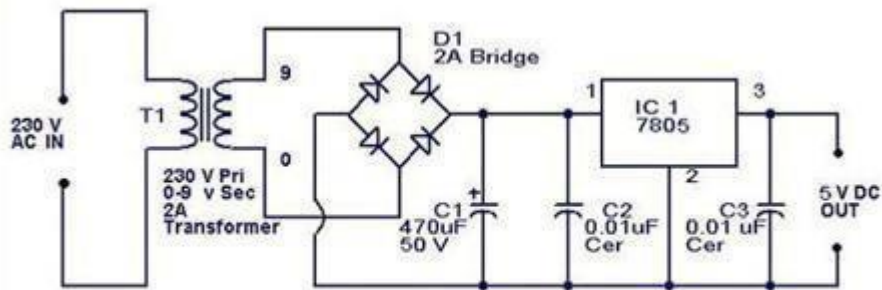
Circuit diagram of the regulated power supply section

2.Arduino: The Arduino is a family of microcontroller boards to simplify electronic design, prototyping and experimenting for artists, hackers, and hobbyists. Arduinos (we use the standard Arduino Uno) are built around an Atmega microcontroller essentially a complete computer with CPU, RAM, Flash memory, and input/output pins, all on a single chip. The Arduino connects to your computer via USB, where you program it in a simple language (C/C++, similar to Java) from inside the free Arduino IDE by uploading your compiled code to the board. Once programmed, the Arduino can run with the USB link back to your computer, or stand-alone without it no keyboard or screen is needed, just power.

3.ESP32 Camera: The ESP32-CAM is a small size, low power consumption camera module supported by ESP32. It comes with an OV2640 camera and provides an onboard TF card slot. The ESP32-CAM are often widely employed in intelligent IoT applications like wireless video monitoring, WIFI image upload, QR identification, and so on. Open a browser and sort the ESP32-CAM IP address. Press the beginning Streaming button to start video streaming. ESP32-CAM is widely utilized in various IoT applications. it's suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications.
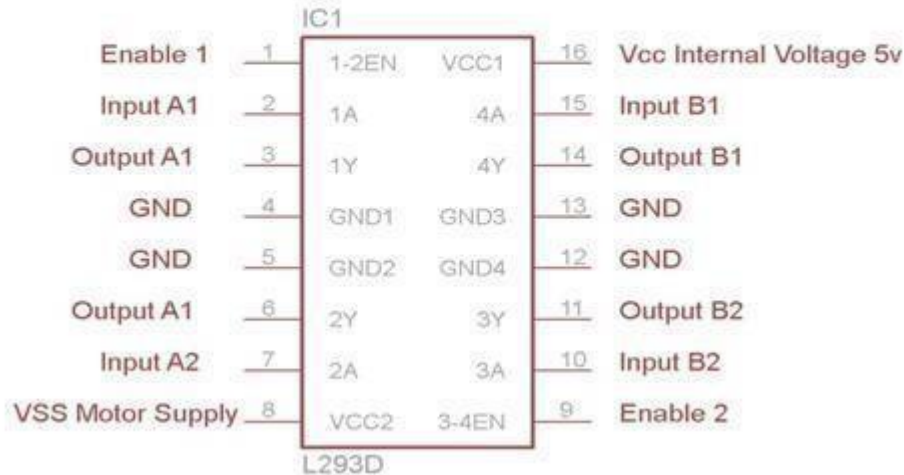

4.L293D Driver

L293D Motor Driver Module is an expansion board or driver module of L293D. L293D IC is a dual half bridge driver IC, therefore the module drives the motor in any direction and speed. it's compatible with any controllers and processors like Arduino, AVR, PIC, etc and with a straightforward interface. It makes it easy to form a project instead of using an IC.L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive in either direction. L293D may be a 16-pin IC which might control a collection of two DC motors simultaneously in any direction. It implies that you'll be able to control two motors with one L293D IC.

•   **Working:** There are 4 input pins for l293d, pin 2,7 on the left and pin 15,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of the motor connected across the left side and right input for the motor on the right-hand side.

•   **Logic Table**: Let's consider a Motor connected on the left side output pins (pin 3,6).

•   For rotating the motor in a clockwise direction the input pins have to be provided with Logic 1 and Logic 0.

- • Pin 2 = Logic 1 and Pin 7 = Logic 0 | Clockwise Direction
- • Pin 2 = Logic 0 and Pin 7 = Logic 1 | Anticlockwise Direction
- • Pin 2 = Logic 0 and Pin 7 = Logic 0 | Idle [No rotation] [Hi-Impedance state]
- • Pin 2 = Logic 1 and Pin 7 = Logic 1 | Idle [No rotation]

IC1

Enable 1	1	1-2EN	VCC1	16	Vcc Internal Voltage 5v
Input A1	2	1A	4A	15	Input B1
Output A1	3	1Y	4Y	14	Output B1
GND	4	GND1	GND3	13	GND
GND	5	GND2	GND4	12	GND
Output A1	6	2Y	3Y	11	Output B2
Input A2	7	2A	3A	10	Input B2
VSS Motor Supply	8	VCC2	3-4EN	9	Enable 2

L293D

5. Motor: DC motors like this are great for battery-powered toys, but you don't find them in many household appliances. Small appliances (things like coffee grinders or electric food blenders) tend to use what are called **universal motors**, which can be powered by either AC or DC. A universal motor has an electromagnet, instead of a permanent magnet, and it takes its power from the DC or AC power you feed in:

•   When you feed in DC, the electromagnet works like a conventional permanent magnet and produces a magnetic field that's always pointing in the same direction. The commutator reverses the coil current every time the coil flips over.

•   When you feed in AC, however, the current flowing through the electromagnet and the current flowing through the coil both reverse, exactly in step, so the force on the coil is always in the same direction and the motor always spins either clockwise or counter clockwise, So it doesn't matter what position the commutator is in at any given moment.
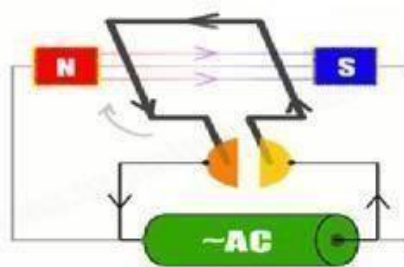
Block diagram :
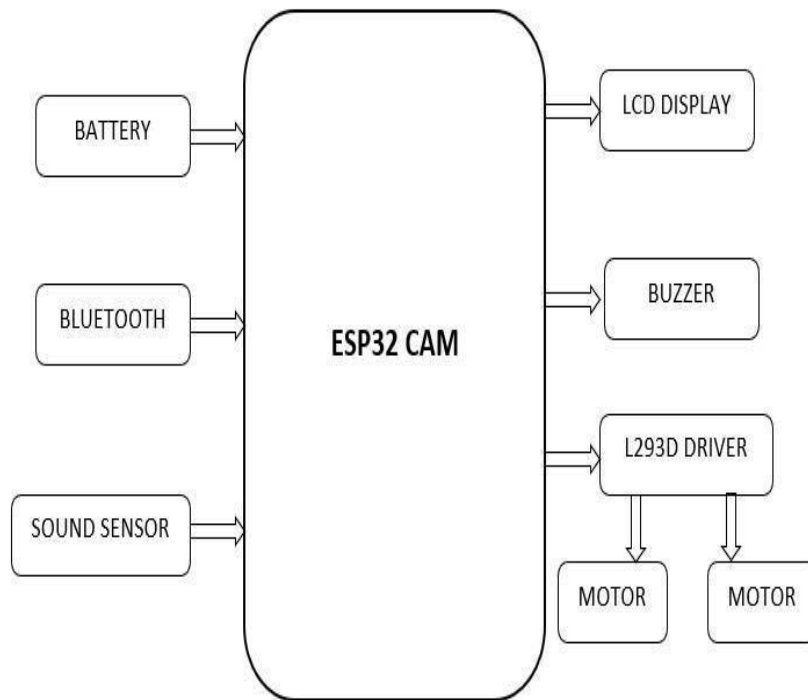
Working :

An autonomous robot that can move through interior or outdoor surroundings and spot any unexpected activity at night is the ESP32 night patrol robot. The robot employs the ESP32 microcontroller, a system on-a-chip (SoC) with a dual-core processor, Wi-Fi, and Bluetooth connectivity that is low-power, low cost, and highly integrated.

The ESP32 night patrol robot utilises a number of parts, including sensors, actuators, and a control system, to function. The robot has a number of sensors, including motion sensors, infrared sensors, and ultrasonic sensors, which enable it to recognise obstacles and movement in its surroundings. The robot also has a camera that it can use to record pictures or videos of its surroundings.

Software that enables the robot to move independently and react to various situations is part of the control system. The robot can navigate its environment using motorised wheels and avoid obstacles thanks to algorithms in the software. A line-following sensor can also be used by the robot to recognise and follow a predetermined path.

It is possible to programme the ESP32 night patrol robot to recognise any odd activities, like movement or sound, that occur at night. When the robot notices such behaviour, it can send a notification to a distant device, such a computer or smartphone, or it can sound an alarm. Also, the robot has the ability to record photographs or videos of the action and transmit them to the distant device for analysis. The ESP32 night patrol robot is an extremely adaptable and flexible system that can be tailored to satisfy a wide range of requirements. In many different settings, including homes, workplaces, factories, and public areas, it can offer improved security and monitoring capabilities.

The advantages of this project are:

Autonomous management , Rapid response, It has the ability to migrate from one place to another, Cameras can be employed both during the day and at night.
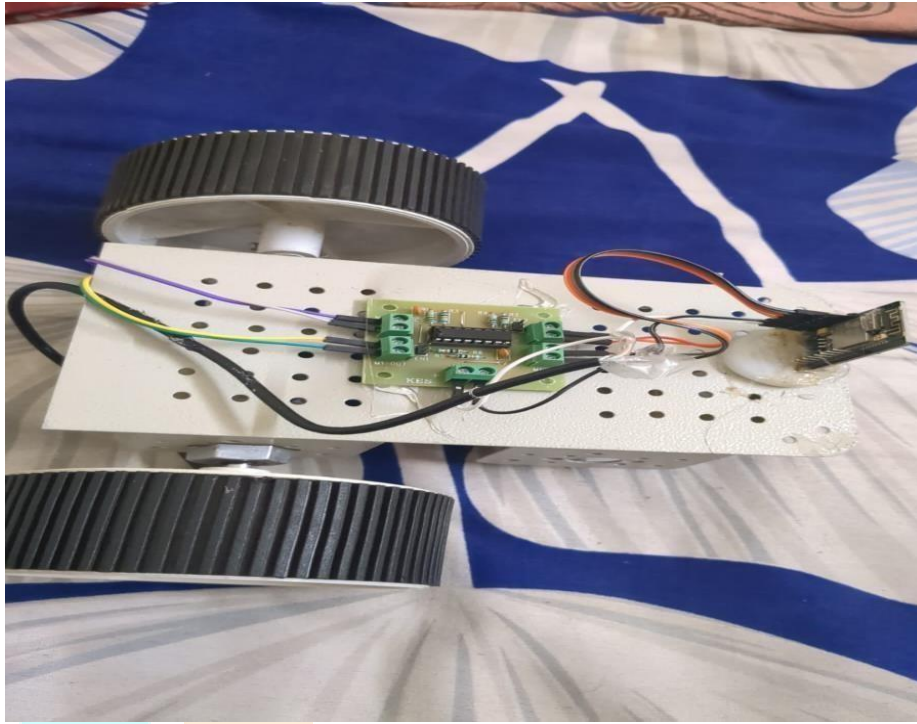
The applications are:

1. Applied to ensure human safety , Applied to protect children , Employed to record , Used to send videos for essential circumstances , Useful as criminal law evidence

Result:
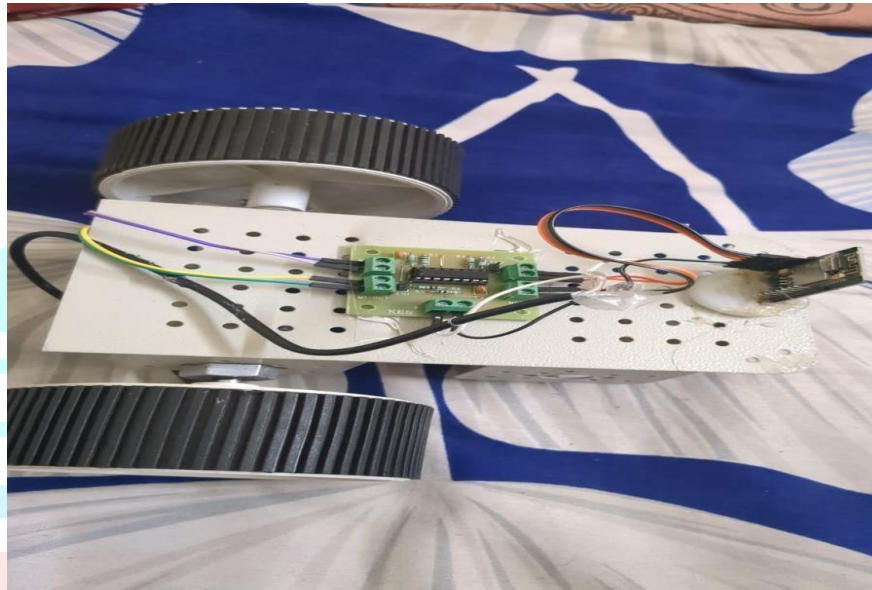
   This figure shows us the design and implementation of smart notifications for human safety in patrolling vehicles.

Conclusion:

Presently, mainly owing to increased aggression against them, human safety is the major problem in every region of the world. The current system either lacks one of these capabilities or calls for a high-end microcontroller, like the Raspberry Pi, to function properly. The suggested design and implementation of smart notifications for human safety in patrolling vehicles therefore maximises the utilisation of its features, including sound sensors, ultrasonic sensors, ESP cameras, and IoT to patrol its designated region with the least amount of human involvement.

The study ends with a proposal for a patrolling security robot that uses a night-vision camera to secure its surroundings. The robot moves in the same direction at specific intervals. Moreover, it has sound sensors and a camera with night vision. It is utilised by a predetermined path that the controller is given for the duration of patrolling. Directly to the control monitor room for further action, it records and sends the images. The robot that designed to protect people by alerting them to any suspicious noises during the night.

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