KONERU LAKSHMAIAH EDUCATION FOUNDATION

AZIZ NAGAR, HYDERABAD

DEPARTMENT OF ECE

Project Proposal

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	Course of Study:	B. TECH/ECE
	Year:	II
	Semester:	Ii
2.0	**Course Details:**	23SDEC02A EMBEDDED SYSTEM AUTOMATION
3.0	**Name of Supervisor:**	Dr. Mrs. Kosaraju Madhavi Associate Professor, KLEF/ECE
4.0	**Proposed Title:**	Surveillance Car using ESP32 CAM

5.0 INTRODUCTION

5.1 Objective: The objective of a surveillance car using ESP32-CAM is to enhance remote monitoring, security, and surveillance efficiency.

Key goals include:

- **Remote Surveillance:** Capturing live video feeds for monitoring areas remotely.
- **Motion Detection:** Detecting movement and triggering alerts for security purposes.
- **Wireless Control:** Enabling users to operate the car wirelessly via a mobile app.
- **Night Vision:** Supporting low-light monitoring using IR sensors.
- **User-Friendly Interface:** Allowing easy access and control through the Blynk IoT app.

5.2 Components and Sensors:

• **ESP32-CAM:** Captures and streams live video feed.

• **Ultrasonic Sensor:** Detects obstacles and prevents collisions.

• **PIR Motion Sensor:** Detects movement and triggers alerts.

• **Motor Driver (L298N):** Controls the movement of the car.

• **IR Sensors:** Enables night vision for better surveillance in low-light conditions.

5.3 Data Collection: The ESP32-CAM captures real-time video footage and sensor data for security monitoring.

5.4 Microcontroller Integration: The ESP32-CAM acts as the central unit, processing data from sensors, controlling the motor driver, and transmitting live video.

5.5 Data Transmission: The ESP32-CAM sends live video streams and sensor data via Wi-Fi to the Blynk IoT app, allowing remote access.

5.6 Analysis: The Blynk IoT app processes real-time video and sensor data, optimizing surveillance, sending alerts, and improving security monitoring.

5.7 Applications: Surveillance cars using ESP32-CAM and Blynk IoT are used for home security, patrolling restricted areas, monitoring warehouses, and tracking suspicious activities in real time.

5.8 Impact: Surveillance cars enhance security, reduce unauthorized access, provide real-time monitoring, and improve emergency response by offering a mobile surveillance system.

5.9 Problem Statement:

Here are a few variations of the problem statement for a surveillance car using ESP32-CAM and Blynk IoT:

• Traditional surveillance systems are stationary, limiting coverage. A surveillance car with ESP32-CAM enables mobile monitoring, enhancing security and surveillance efficiency.

• Manual monitoring lacks real-time alerts and automation. A smart surveillance car using ESP32-CAM and Blynk IoT ensures live video streaming, motion detection, and remote access.

• Fixed cameras have blind spots, making security vulnerable. A mobile surveillance car with ESP32-CAM eliminates blind spots by providing flexible movement and real-time tracking.

5.10 Objectives of the Study:

The surveillance car using ESP32-CAM and Blynk IoT aims to:

1. **Provide Live Video Feed –** Stream real-time surveillance footage.
2. **Enable Remote Access –** Allow users to control and monitor the car via a mobile app.
3. **Detect Motion –** Identify movement and trigger alerts.
4. **Avoid Obstacles –** Use ultrasonic sensors to prevent collisions.
5. **Support Night Vision –** Enhance visibility in low-light environments.
6. **Improve Security –** Offer a mobile solution for effective surveillance.

5.11 Scope of the Project:

The surveillance car using ESP32-CAM and Blynk IoT focuses on:

1. **Real-Time Video Streaming –** Captures and transmits live footage to the Blynk app.
2. **Wireless Operation –** Allows remote control via Wi-Fi.
3. **Motion Detection Alerts –** Notifies users of detected movement.
4. **Obstacle Avoidance –** Prevents collisions with ultrasonic sensors.
5. **Night Vision Capability –** Uses IR sensors for low-light monitoring.
6. **Security Enhancement –** Offers a flexible, mobile surveillance system.

5.12 Literature Review

Traditional Surveillance Systems: Fixed cameras are commonly used for security monitoring but have limitations such as blind spots and lack of mobility. Surveillance cars provide an adaptable and wider coverage solution.

Role of ESP32-CAM in Surveillance: The ESP32-CAM is an ideal microcontroller for IoT-based security systems due to its built-in camera module, Wi-Fi connectivity, and low power consumption, enabling real-time video streaming.

Motion Detection for Security: PIR motion sensors are widely used in security systems to detect unauthorized movement and trigger alerts, enhancing security measures.

Obstacle Avoidance for Mobility: Ultrasonic sensors assist in navigation, ensuring the surveillance car avoids obstacles and moves efficiently in its environment.

Real-Time Monitoring and Data Transmission: The ESP32-CAM allows live video streaming and sensor data transmission to a mobile app, making surveillance more interactive and remote-controlled.

Environmental Benefits: A mobile surveillance system helps reduce the need for multiple stationary cameras, optimizing security infrastructure and reducing costs.

6.0 Abstract:

This project focuses on developing a smart surveillance car using the ESP32-CAM microcontroller. The goal is to improve security by enabling mobile monitoring with real-time video streaming and motion detection. The system integrates an ultrasonic sensor for obstacle avoidance, a PIR motion sensor for detecting movement, and infrared sensors for night vision. The ESP32-CAM connects all these components and transmits live video and alerts to a mobile app for remote access. This project enhances surveillance efficiency, reduces blind spots, and provides a cost-effective, scalable solution for security monitoring.

7.0 Methodology

1. **Components Used:** The project incorporates ESP32-CAM, ultrasonic sensors, PIR motion sensors, IR sensors, and an L298N motor driver for movement control.
2. **Sensor Integration:**
    - ESP32-CAM streams live video.
    - Ultrasonic sensors detect obstacles.

    - PIR motion sensors trigger alerts upon movement detection.
    - IR sensors provide night vision capability.
3. **Programming:** The ESP32-CAM is programmed to process sensor data, control the car's movement, and transmit live video to the Blynk app.
4. **Real-Time Monitoring:** The Blynk IoT app receives live video and motion alerts, allowing remote access and control.
5. **Automation:** The system autonomously avoids obstacles and detects movement to enhance surveillance.
6. **Alerts:** The system sends notifications if motion is detected or obstacles are encountered.

8.0 Expected Output:

The expected output of the surveillance car using ESP32-CAM is a fully automated, mobile security system that streams real-time video, detects motion, avoids obstacles, and sends alerts to users via the Blynk IoT app. The car provides flexible surveillance coverage, enhances security monitoring, and enables remote access, improving security efficiency.

9.0 Other Relevant Information:

The surveillance car using ESP32-CAM is powered by rechargeable batteries and transmits data via Wi-Fi to the Blynk app for remote monitoring. The system is cost-effective, scalable, and easy to deploy, with potential applications in home security, patrolling, and industrial monitoring.

10.0 References:

1. **Internet of Things (IoT) and ESP32:**
    - "ESP32: The ESP32 and IoT" by Random Nerd Tutorials.
    - "Getting Started with ESP32" by Rui Santos.
2. **Surveillance Systems and IoT:**
    - Smith, J., & Patel, R. (2021). "IoT-based Mobile Surveillance Systems." Security Technology Journal.
3. **Blynk IoT Platform:**
    - "Getting Started with Blynk" by Blynk Documentation.
4. **Sensors Used in Surveillance Cars:**
    - "Ultrasonic and PIR Sensors in Security Systems" by M. Zhao et al. (2022). International Journal of Security Technology.

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