VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANA SANGAMA, BELAGAVI-590 018

Mini-Project Report

On

"RoboSentinel: Intelligent Remote Surveillance Car with Object & Gas Detection"

Submitted in Partial Fulfillment of the Requirements for the Award of Degree of

Bachelor of Engineering

in

Electronics and Communication Engineering

Submitted by

A S Prajwal Bhat	-1BI23EC001
A Vishal	-1BI23EC061
Bharath A N	-1BI23EC032
Hemanth R	-1BI23EC061

Under the guidance of

Bhavya K B

Assistant Professor

Department of ECE, BIT

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

BANGALORE INSTITUTE OF TECHNOLOGY

K.R. Road, V.V. Puram, Bengaluru 560004

2025-26

BANGALORE INSTITUTE OF TECHNOLOGY

K.R. Road, V .V Puram, Bangalore -560004

www.bit-bangalore.edu.in

Department of Electronics and Communication Engineering

Certificate

Certified that the mini-project work entitled **RoboSentinel: Intelligent Remote Surveillance Car with Object & Gas Detection** carried out by Mr. A S Prajwal Bhat, USN:1BI23EC001, Mr. A Vishal, USN:1BI23EC002, Mr. Bharath A N, USN:1BI23EC032, Mr. Hemanth R, USN:1BI23EC061, are bonafide students of **Bangalore Institute of Technology** in partial fulfillment for the award of **Bachelor of Engineering** in **Electronics and Communication Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2025- 2026. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The Mini- project report has been approved as it satisfies the academic requirements in respect of Mini-Project work prescribed for the above said Degree.

Bhavya K B
Assistant Professor
Dept. of ECE, BIT

Dr Kalpana A B
Professor & Head
Dept. of ECE, BIT

Acknowledgement

We would like to thank our guide **Bhavya K B**, Assistant Professor, Electronics and Communication Department, Bangalore Institute of Technology, Bengaluru for guiding untiringly all through my tenure.

We would like to thank the Mini Project Coordinator **Keshava A**, Associate Professor, and, **Bhavya K B,** Assistant Professor, Electronics and Communication Department, Bangalore Institute of Technology, Bengaluru for their guidance.

We would like to thank **Dr. Kalpana A B,** Head of the Department Electronics and Communication Department, Bangalore Institute of Technology, Bengaluru for this opportunity to present this **Mini Project** on **"RoboSentinel: Intelligent Remote Surveillance Car with Object & Gas Detection"** of our choice and interest.

We extend or gratitude to **Dr. Shanthala S**, Principal, Bangalore Institute of Technology, Bengaluru, for his encouragement and support.

We are fortunate for being part of Bangalore Institute of Technology, the institution that stood by our side and assisted us towards successfully completing the **Mini Project.** We also take this opportunity to thank the Department of Electronics and Communication, Bangalore Institute of Technology for their tremendous help and guidance.

A S Prajwal Bhat **(1BI23EC001)**
A Vishal **(1BI23EC002)**
Bharath A N **(1BI23EC032)**
Hemanth R **(1BI23EC061)**

Abstract

RoboSentinel is an intelligent, real-time surveillance and monitoring system designed to enhance security through automated video analysis, wireless streaming, and on-device decision-making. The project integrates embedded hardware, computer vision, and network communication to build a low-cost yet highly efficient autonomous monitoring platform suitable for indoor and outdoor environments. The primary objective of RoboSentinel is to overcome the limitations of conventional CCTV systems—such as passive monitoring, high latency, manual supervision, and inability to detect threats—by incorporating smart sensing and AI-powered detection capabilities.

The system architecture consists of an ESP32-CAM video acquisition module configured to capture and transmit live video over a Wi-Fi network using an IP streaming protocol. To ensure smooth remote access, multiple streaming methods were evaluated, and the configuration providing minimal latency and optimal frame quality was adopted. The incoming video stream is processed using lightweight computer-vision algorithms capable of performing human and object detection in real time. These algorithms enable the system to autonomously identify suspicious motion, track activity, and generate alerts without relying on continuous manual monitoring.

The developed prototype demonstrates that intelligent surveillance can be achieved using affordable embedded hardware when combined with optimized streaming and AI-based detection. RoboSentinel provides a scalable and adaptable solution for security applications in homes, institutions, industries, and public areas. Overall, the project illustrates the potential of integrating embedded systems, wireless communication, and computer vision to create an autonomous security platform capable of continuous, reliable, and intelligent monitoring.

Table of Contents

List Of Figures

Bangalore Institute of Technology

Vision

To establish and develop the Institute as a centre of higher learning, ever abreast with expanding horizon of knowledge in the field of engineering and technology, with entrepreneurial thinking, leadership excellence for life-long success and solve societal problem.

Mission

- Provide high quality education in the engineering disciplines from the undergraduate through doctoral levels with creative academic and professional programs.
- Develop the Institute as a leader in Science, Engineering, Technology and management, Research and apply knowledge for the benefit of society.
- Establish mutual beneficial partnerships with industry, alumni, local, state and central governments by public service assistance and collaborative research.
- Inculcate personality development through sports, cultural and extracurricular activities and engage in the social, economic and professional challenges.

Long Term Goals

- To be among top 3 private engineering colleges in Karnataka and top 20 in India.
- To be the most preferred choice of students and faculty.
- To be the preferred partner of corporate.
- To provide knowledge through education and research in engineering.
- To develop in each student mastery of fundamentals, versatility of mind, motivation for learning, intellectual discipline and self-reliance which provide the best foundation for continuing professional achievement.
- To provide a liberal; as well as a professional education so that each student acquiresa respect for moral values, a sense of their duties as a citizen, a feeling for taste and style, and a better human understanding.

Department of Electronics and Communication Engineering

Vision

Imparting **Quality Education** to achieve **Academic Excellence** in Electronics and Communication Engineering for **Global Competent Engineers**.

Mission

- Create **state of art infrastructure** for quality education.
- Nurture **innovative concepts** and problem **solving skills**.
- Delivering **Professional Engineers** to meet the **societal needs**.

Program Educational Objectives

- Prepare graduates to be **professionals**, Practicing engineers and entrepreneurs in the field of Electronics and communication.
- To acquire sufficient knowledge base for **innovative techniques** in design and development of systems.
- Capable of competing globally in **multidisciplinary** field.
- Achieve personal and professional success with awareness and commitment to **ethical and social responsibilities** as an individual as well as a team.
- Graduates will maintain and improve technical competence through **continuous learning process**.

Program Specific Outcomes

PSO1: Core Engineering: The graduates will be able to apply the principles of Electronics and Communication in core areas.

PSO2: Soft Skills: An ability to use latest hardware and software tools in Electronics and Communication engineering.

PSO3: Successful Career: Preparing Graduates to satisfy industrial needs and pursue higher studies with social-awareness and universal moral values.