

A
MINI PROJECT REPORT on
LASER BASED BORDER SECURITY SYSTEM
Submitted in partial fulfilment of the Requirements for the award of
Degree of
Bachelor of Technology in
ELECTRONICS & COMMUNICATION ENGINEERING
By

S.SAIRAM.

22681A0436

under the esteemed guidance

of

MR.K.CHIRANJEEVI Assistant professor



CHRISTU JYOTHI INSTITUTE OF TECHNOLOGY AND SCIENCE

Colombo Nagar, Yeshwanthpur, Jangaon, TS 506167, Telangana

Department of Electronics & Communication Engineering

(Accredited by National Board of Accreditation)

2024-2025

CHRISTU JYOTHI INSTITUTE OF TECHNOLOGY & SCIENCE

(Affiliated to JNTU, Hyderabad)

Colombonagar, Yeshwanthapur, Jangaon Dist. 506167, Telangana.

Dept. Electronics & Communication Engineering

2024-2025



CERTIFICATE

This is to certify that the work which is being presented in the B. Tech. Mini Project Report entitled "**LASER BASED BORDER SECURITY SYSTEM**" being submitted by **MADIKANTI MOHANASRIJA (22681A0436)** impartial fulfillment of the requirements for the award of the Bachelor of Technology in "**Electronics & Communication Engineering**" and submitted to the Department of Electronics & Communication Engineering of Christu Jyothi Institute of Technology and Science, Jangaon.

Signature of Guide

Mr.K.CHIRANJEEVI

ASSISTANT PROFESSOR

Signature of HOD

Mr. ALLANKI SANYASI RAO

ASSISTANT PROFESSOR

Signature of External Examiner

CHRISTU JYOTHI INSTITUTE OF TECHNOLOGY & SCIENCE

(Affiliated to JNTU, Hyderabad)

Colombonagar, Yeshwanthapur Jangaon Dist



Institute Vision and Mission Vision

To admit and groom students from rural background and be a truly rural technical institution, benefiting society and nation as a whole institute.

Mission

- The mission of the institution is to create, deliver and refine knowledge. Being a rural technical institute, our mission is to.
- Enhance our position to one of the best technical institutions and to measure our performance against the highest defined standards.
- Provide highest quality learning environment to our students for their greater well-being so as to equip them with highest technical and professional ethics.
- Produce engineering graduates fully equipped to meet the ever-growing needs of industry and society



Principal
Christu Jyoti Institute of Technology & Science
Colombo Nagar, Yeshwanthapuram (VILL)
Jangaon(MdI), Jangaon (Dist)-506167.

CHRISTU JYOTHI INSTITUTE OF TECHNOLOGY & SCIENCE

(Affiliated to JNTU, Hyderabad)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



VISION

To be an established center of excellence in Electronics and Communication Engineering facilitating youth towards professional, leadership and industrial needs.

MISSION

- Impart theoretical and practical technical education of high standard with quality resources and collaborations.
- Organize trainings and activities towards Overall personality development in time with industrial need.
- Promote innovation towards sustainable solutions with multi discipline team work with ethics.

HEAD OF THE DEPARTMENT

DECLARATION

I here by declare that the project entitled—"LASER BASED BORDER SECURITY SYSTEM", which us being submitted as Mini Project in Electronics and Communication Engineering to Christu Jyothi Institute of Technology & Science, is an authentic record of our genuine work done under the guidance of K.Chiranjeevi, Assistant Professor of ECE Dept.

M.MOHANASRIJA

22681A0436

ACKNOWLEDGMENT

I hereby express our sincere gratitude to the **Management of Christu Jyothi Institute of Technology & Science** for their kind encouragement bestowed up on us to do this Mini project.

I earnestly take the responsibility to acknowledge the following distinguished personalities who graciously allowed our project work successfully.

I express our sincere thanks to our director **Rev.Fr. D. Vijay Paul Reddy**, Principal **Mr. Dr. S. Chandrashekhar Reddy** for his encouragement, which has motivated us to strive hard to excel in our discipline of engineering.

I am greatly indebted to the professor and Head of the Department **Mr. Allanki Sanyasi Rao, Assistant Professor** for his motivation and guidance through the course of this project work. He has been responsible for providing us with lot of splendid opportunities, which has shaped our career. His advice ideas and constant support has engaged us on and helped us get through in difficult time.

I express our profound sense of appreciation and gratitude to our guide **K. CHIRANJEEVI, Assistant Professor** for providing generous assistance, and spending many hours of valuable time with us. This excellent guidance has made the timely completion of this mini project.

Last but not the least, I express our gratitude to the Teaching and Non-Teaching Staff of the Department of Electronics and communication for their needy and continuous support in technical assistance.

ABSTRACT

The laser-based border security system is an advanced surveillance technology designed to detect and prevent unauthorized crossings along secured perimeters. This system utilizes strategically placed laser emitters and receivers to form an invisible barrier, which, when disrupted, triggers real-time alerts and activates surveillance mechanisms. The key components include laser sensors, surveillance cameras, an alarm system, and an integrated control system, ensuring comprehensive monitoring. This technology offers high accuracy, low maintenance, and effective operation in diverse environmental conditions. It is widely

applicable in securing international borders, military zones, and high-security installations. By providing an automated and immediate response to potential intrusions, the laser-based border security system significantly enhances national security and border management.

CONTENTS

CHAPTER NUMBERS	TOPICS	PAGE NUMBER
	ABSTRACT	
1	INTRODUCTION	1-2
	1.1 Project outline	1
	1.2 Project objective	2
2	LITERATURE REVIEW	3-4
3	EMBEDDED SYSTEMS (ES)	5-6
	3.1. Introduction to Embedded System	5

	3.2. Characteristics of Embedded Systems	6
	3.3. Applications of Embedded Systems	6
4	MICROCONTROLLERS	7-8
	4.1. Microcontroller vs Microprocessor	7
	4.2. Microcontroller for Embedded Systems	7-8
5	HARDWARE COMPONENTS	9-30
	5.1 Laser light	9-10
	5.1.1 working principle	9
	5.1.2 specifications	9
	5.1.3 Advantages	10
	5.2 Arduino UNO Microcontroller	10-17
	5.2.1 Key components	11
	5.2.2 Working of Arduino UNO Board	11
	5.2.3 Features of Arduino UNO Board	12
	5.2.4 The I/O Pins of Arduino UNO Board	13
	5.2.5 GPIO Pins of Arduino UNO Board	13-15
	5.2.6 Analog Pins of ESP32	15
	5.2.7 ICSP Pin Connector	15-17
	5.3 LDR	17-19
	5.3.1 Working principle	17
	5.3.2 Applications	18
	5.3.3 Advantages	18-19
	5.4 16x2 LCD	19-21
	5.4.1 Pin Description of LCD	19
	5.4.2 16X2 LCD	20
	5.4.3 Specifications of LCD	20-21
	5.5 Servo Motor	21-22
	5.5.1 Features	21
	5.5.2 Specifications	22
	5.5.3 Usage	22
	5.6 Ultrasonic sensor	23-24

	5.6.1 Applications	23
	5.6.2 Advantages	24
	5.6.3 Specifications	24
	5.7 Traffic LED	24-25
	5.7.1 Applications	24
	5.7.2 Advantages	25
	5.7.3 Specifications	23
	5.8 Buzzer	26
	5.8.1 Advantages	26
	5.8.2 Specifications	26
	5.9 Jumper Cables	27
	5.10 Connecting Wires	28
	5.10.1 Types of Connectors	28-29
	5.11 Power Supply	30
6	Working	31
	6.1 Block Diagram	31
7	Software & Coding	32-42
	7.1 Introduction to Arduino IDE	32
	7.2 Software Code	33-42
8	Results	43
9	Advantages & Applications	44
	9.1 Advantages	44

	9.2 Applications	44
10	Conclusion & Future Scope	45
	10.1 Conclusion	45
	10.2 Future Scope	45
	References	46

LIST OF DIAGRAM

CHAPTER NUMBER	FIGURE	PAGE NUMBER
3.2	Embedded System	6
4.2	Microcontroller	8
5.1	Laser light	9
5.2	Arduino Uno	10

5.2.2	Arduino uno board	11
5.2.5	Pin diagram	13
5.3	LDR	16
5.4	16x2 LCD Display	18
5.4.1	16x2 LCD	19
5.5	Servo Motors	20
5.6	Ultrasonic sensor	21
5.7	Traffic LED	22
5.8	Buzzer	24
5.9	Jumpers	25
5.10	Connecting Wires	25
5.11	Adapter	27
7.1	USB Cable	32