

A project report on

**ENHANCED AUTONOMOUS ROBOT WITH CENTRAL  
NAVIGATION SYSTEM**

Submitted in the partial fulfillment of the requirements for the award of the degree of

**BACHELOR OF TECHNOLOGY**

IN

**ELECTRICAL AND ELECTRONICS ENGINEERING**

SUBMITTED BY

**T. Neelima** **18MH1A0204**

**Ch. Surya Vamsi** **19MH5A0213**

**G. Durga Surya Vamsi** **19MH5A0218**

**B. Venkataswamy** **19MH5A0207**

**B. Manikanta** **19MH5A0206**

Under the esteemed guidance of

**K. Manoz Kumar Reddy** Mtech,(Ph.D)  
Associate Professor



**Department of Electrical and Electronics Engineering**

**ADITYA COLLEGE OF ENGINEERING**

Approved by AICTE, Permanently Affiliated to JNTUK, & Accredited by NAAC Recognized by

UGC under section 2(f) and 12(B) of UGC Act 1956, Approved by A.I.C.T.E, New Delhi

Aditya Nagar, ADB Road, Surampalem-533437

2021-2022

## CERTIFICATE

## **DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

# **ADITYA COLLEGE OF ENGINEERING**

Approved by AICTE, Permanently Affiliated to JNTUK, & Accredited by NAAC Recognized by UGC under section 2(f) and 12(B) of UGC Act 1956. Approved by A.I.C.T.E., New Delhi.

Aditya Nagar, ADB Road, Surampalem-533437



This is to certify that the project report entitled "**ENHANCED AUTONOMOUS ROBOT WITH CENTRAL NAVIGATION SYSTEM**" being submitted by.

T. Neelima	18MH1A0204
Ch. Surya Vamsi	19MH5A0213
G. Durga Surya Vamsi	19MH5A0218
B. Venkataswamy	19MH5A0207
B. Manikanta	19MH5A0206

In the partial fulfillment of the requirement for the award of the degree of the **Bachelor of Technology** in **Electrical and Electronics Engineering** from Aditya college of engineering. It is the record of bonafide work, carried out by them at Aditya College of Engineering.

**Head of the Department**  
Sri. K. Manoz Kumarreddy M.Tech,(Ph.D)  
**Associate Professor**

## ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of any task would be incomplete without the mention of the people who made it possible and whose constant guidance and encouragement crown all the efforts with success. The acknowledgment transcends the reality of formality.

We are thankful to our beloved guide cum Head of the Department **Sri. K. M. K. REDDY**, M.Tech(Ph.D), M.Tech, Associate Professor who has spared his valuable time and append novel ideas to guide me in limelight. We are indebted to him without whom we may not have culminated in the pinnacle of the project.

We are thankful to **Dr.A.RAMESH**, M.Tech, Ph.D., Principal, Aditya College of Engineering for providing the appropriate environmental required for this project.

We also thankful to all staff members, lab technicians, librarians and friends who are directly and indirectly helped me in the completion of the project with flying colors.

With sincere regards

T. Neelima	18MH1A0204
Ch. Surya Vamsi	19MH5A0213
G. Durga Surya Vamsi	19MH5A0218
B. Venkataswamy	19MH5A0207
B. Manikanta	19MH5A0206

## **DECLARATION**

We hereby declare that this project titled "**ENHANCED AUTONOMOUS ROBOT WITH CENTRAL NAVIGATION SYSTEM**" has been undertaken and this work is submitted to **ADITYA COLLEGE OF ENGINEERING, Surampalem**, affiliated to **JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, Kakinada** in the partial fulfillment of the Degree of Bachelor of Technology.

We further declare that this project work has not been submitted in full or part for the award of any other degree in this or any other Educational institutions.

With sincere regards

T. Neelima	18MH1A0204
Ch. Surya Vamsi	19MH5A0213
G. Durga Surya Vamsi	19MH5A0218
B. Venkataswamy	19MH5A0207
B. Manikanta	19MH5A0206

## ABSTRACT

Many tasks which are beyond human ability can be performed with the help of robotics. In this project, autonomous robots with a central navigation system are used to deliver packages from source to destination.

The navigation of tracking the robot using Arduino is used to deliver the objects from source to destination quickly within an effective manner with accuracy without using the sensors. The camera is continuously monitoring the robot and assigns the path based on the software instructions.

In this project, we have used a python script with an open cv to track the robot with color and used mathematics formulas to triangulate the color boxes on the robot to find the position and orientation of the robot. Thereafter we have used the python requests module to send the respective commands to navigate the robot from the pc. A single-camera has been used to track two robots. The pc will send the commands to Robot through wifi.

Autonomous robots can be used to improve the speed and accuracy of routine operations, particularly in warehousing and manufacturing spaces; work side-by-side with humans for added efficiency, and reduce the risk of employee injury in dangerous environments.

Robots are useful in many ways. For instance, it boosts the economy because businesses need to be efficient to keep up with the industry competition. Therefore, having robots helps business owners to be competitive, because robots can do jobs better and faster than humans can, e.g. robots can be built, and assemble a car.

**Keywords :** Arduino uno Wi-Fi rev 2, DC motors, webcam, Servo motor, Battery.

## **CONTENT**

<b><u>Table of Content</u></b>	<b><u>Page.No</u></b>
1. Introduction	1
1.1 Introduction	1
1.2 Electrical Aspects	2
1.3 Scope of Robots	3
1.4 Advantage	3
1.5 Limitations	4
1.6 Application	4
2. Literature Survey	5-6
3. Existing and Proposed Methods	7
3.1 Existing Method	7
3.1.1 Line Follower Robot Circuit	7
3.1.2 Line Follower Robot Working	8
3.2 Proposed Method	9
3.2.1 Functional Block Diagram	9
4. Major Components	10
4.1 Arduino Uno Wi-Fi Rev2 Board	10
4.1.1 Details	11
4.1.2 Specifications	12
4.1.3 Details of Arduino Uno Wi-Fi Rev2 Board	12-13
4.1.4 Use of Arduino Uno Wi-Fi Rev2	13
4.1.5 Applications of Arduino Uno Wi-Fi Shield	13

4.2 Servo Motor	13
4.2.1 Servo Motor Theory	14
4.2.2. Servo Motor Working Mechanism	15
4.2.3 Servo Motor Working Principle	15
4.2.4 Interfacing of Servo Motor With Microcontrollers	16
4.2.5 Controlling of Servo Motor	16-17
4.3 Webcam	18
4.3.1 Technology	18
4.3.1.1 Image Sensor	19
4.3.1.2 Optics	19
4.3.1.3 Compression	19
4.3.1.4 Interface	20
4.3.1.5 Software	20
4.3.2 Characteristics	20-21
4.3.3 Uses	21
4.3.3.1 Video monitoring	21
4.3.3.2 Commerce	21
4.3.3.3 Video calling and video conferencing	21-22
4.3.3.4 Video security	22
4.3.3.5 Video clips and stills	22
4.3.3.6 Input control devices	22-23
4.3.3.7 Astro photography	23

4.3.3.8 Laser Beam Profile	23
4.4 Gear Motor	23
4.4.1 Introduction	23-25
4.4.1.1 Applications	26
4.5 Rechargeable Battery	26
4.5.1 Rechargeable Battery	26-27
4.5.2 Charging and Discharging	27
4.5.3 Rate of Discharge	27
4.5.4 Damage from Cell Reversal	28-29
4.5.5 Damage during storage in fully discharged state	29
4.5.6 Depth of Discharge	30
4.5.7 Lifespan and cycle stability	30
4.5.8 Recharging Time	30-31
4.5.9 Active Component	31
4.5.10 Types	31-33
4.6 Motor Driver Shield	33-34
4.7 USB	34
4.7.1 Introduction	34
4.7.2 USB Type – A Plug	35-36
4.7.3 USB Standard Connectors	37-39
4.7.4 USB 2.0	39-40
4.8 Arduino IDE Compiler	41-43

4.9 Python	43
4.9.1 Development Environment	43-44
4.9.2 Advantage of Python	44
5. Result Analysis	45
5.1 Working	45
5.2 GitHub Link for Code	46
5.3 Result	46
6. Conclusion and Future Scope	47
6.1 Conclusion	47
6.2 Future Scope	47
Reference	

## **LIST OF FIGURES**

<b><u>FIGURES</u></b>	<b><u>PAGE NUMBERS</u></b>
3.1 . Line Follower Robot Circuit	7
3.2 . Working of IR Sensor	8
3.3 . Block Diagram	9
4.1 . Arduino Uno Wi-Fi Rev 2 Board	11
4.2 . Servo Motor	14
4.3 . Timing Diagram	14
4.4 . Connections of Servo Motor	16
4.5 . Controlling of Servo Motor	17
4.6 . ASUS Webcam C3	18
4.7 . Basic Gear Motor	24
4.8 . Gear Motor	25
4.9 . Rechargeable Battery	27
4.10 . Battery Recharge and Discharge Time	28
4.11 . Ragone plot of common types	31
4.12 . Motor Driver Shield	34
4.13 . High Speed USB Logo	39
4.14 . A USB 2.0 PCI Expansion	39
4.15 . Arduino IDE Editor	42
5.1 . Camera setup	45
5.2 . Robots	45
5.3 . Final Output	46