FINAL YEAR PROJECT REPORT

AUTONOMOUS NAVIGATION & OBJECT TRACKING ROBOT

In fulfillment of the requirement
For degree of
BEE (Electrical Engineering)

By

RAYYAN IDREES — **57320 BEE (ELECTRICAL)**
AIMAN HAFEEZ — **57322 BEE(ELECTRICAL)**

SUPERVISED

BY

DR. HINA SHAKIR

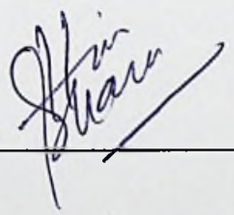
BAHRIA UNIVERSITY (KARACHI CAMPUS)

2018-2022

APPROVAL FOR SUBMISSION

We certify that this project report entitled "**AUTONOMOUS NAVIGATION AND OBJECT TRACKING ROBOT**" was prepared by **AIMAN HAFEEZ & RAYYAN IDREES** have met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of **Electrical Engineering** at Bahria University.

Approved by,

Signature : 

Supervisor: Dr. Hina Shakir

Date : 12/08/22

ACKNOWLEDGEMENTS

We would like to thank everyone who had contributed to the successful completion of this project. We would like to express gratitude to our research supervisor, Dr Hina Shakir for her invaluable advice, guidance and her enormous patience throughout the development of the research.

In addition, we would also like to express gratitude to our loving parents and friends who had helped and given us encouragement.

ABSTRACT

During the previous decades, a tremendous growth in the field of robotics automation has been made. Daily activities involve interaction with smart machines that present a certain level of autonomy. Robots ensure that a task can be done more accurately and efficiently. They can perform the repetitive task without any difficulty. In this autonomous robot, finding object in an unexplored area is a major mission in this work, for advance work the robot will pick the required object. A self-customized mobile robot having low-cost and low-power equipment's will be utilized in this project. The Robot Operating System or ROS is being executed with the help of Jetson Nano. Mapping is established using Rplidar . A mobile robot structure planning for object detection and navigation is being developed in this project. This work proposes a pose planning method to observe a target object using 2D information from Rplidar. The proposed planning method is utilized under the ROS environment; the ROS Navigation stacks nodes help to process sensor information. The mobile robot navigation is handled by the ROS Navigation stacks. 2D ROS navigation stack takes information of odometry, sensors and velocity of wheels to send to mobile robot. To be able to work on navigation stack the robot must be running ROS which has tf transform tree to place and publish sensor data using the correct ROS messages command. ROS navigation stack is also needed to configure robot pose, shape and structure to perform the high level tasks. The object detection model is trained through python. The camera will find where in the frame object is located by extracting its bounding boxes. Then it follows the goal point of the map generated by SLAM. In the end, robot moves towards the object and pick it up with the help of robotic arm.

TABLE OF CONTENTS