IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 4, June 2025
Impact Factor: 7.67

Arduino-Based Bluetooth-Controlled Multidirectional Forklift Robots

Roshan Shinde[1] and Vishal khandode[2],
Department Of Mechanical Engineering
Matoshri College of Engineering and Research Centre, Nashik
Savitribai Phule Pune University,

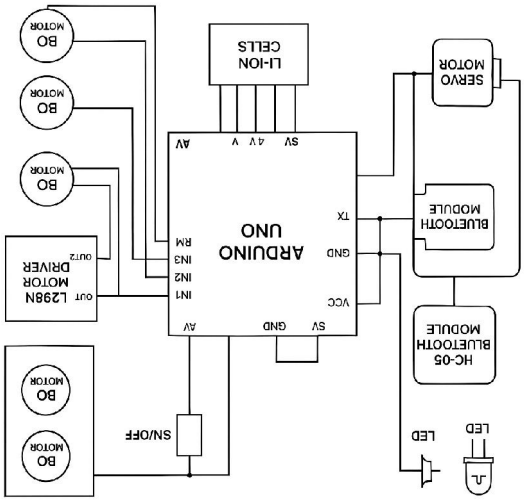
Abstract: *This project presents the design and development of an Arduino-based Bluetooth-controlled multidirectional forklift robot, aimed at enhancing automation in material handling systems. The robot integrates a robust chassis with mecanum wheels to enable omnidirectional movement, allowing precise navigation in constrained environments. An HC-05 Bluetooth module facilitates wireless communication between the robot and an Android smartphone, providing real-time control via a custom mobile application. The Arduino Uno microcontroller serves as the core of the system, managing motor control through an L298N motor driver and actuating the forklift mechanism via servo motors.*

Keywords: Arduino, Bluetooth Control, Motor Driver, Multidirectional Movement

I. INTRODUCTION

Technology is making our lives easier every day, and one of the areas it's helping the most is in factories, warehouses, and delivery centers. In these places, workers often need to lift and move heavy things, which can be tiring and even dangerous. That's where robots come in—they can do these jobs faster, safer, and more efficiently. This project is about building a small robot that can lift and move objects in different directions. It's called the "Arduino-based Bluetooth-controlled Multidirectional Forklift Robot."

This robot is designed to be smart, easy to use, and useful in places where bigger machines can't fit. Unlike regular forklifts that can only move forward and backward, this robot can move in all directions—even sideways and diagonally. That makes it much easier to use in small spaces where normal forklifts would have a hard time turning or fitting.



Block Diagram of Arduino-based Bluetooth-controlled Multidirectional Forklift Robots.

DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 4, June 2025
Impact Factor: 7.67

II. PROBLEM STATEMENT

In many factories, warehouses, and storage areas, workers have to lift and move heavy objects from one place to another. This kind of work can be tiring, time-consuming, and sometimes even dangerous, especially in small or crowded spaces. Traditional forklifts are big, expensive, and hard to use in tight areas. They also require trained operators and can cause accidents if not handled properly.

There is a need for a smaller, safer, and more flexible machine that can move in any direction and be controlled easily, even from a distance. A robot that can do these tasks would make work easier, faster, and safer for everyone involved.

This project aims to solve that problem by creating a Bluetooth-controlled forklift robot using an Arduino microcontroller. The robot can move in all directions and lift small loads. It is controlled using a smartphone, which means there's no need for wires or physical effort. The robot is also small enough to move around tight spaces and can be built at a low cost using simple components.

III. OBJECTIVES

1. To design and build a forklift robot that can move forward, backward, sideways, and diagonally using special wheels.
2. To control the robot wirelessly using a smartphone and a Bluetooth connection for easy operation without wires.
3. To use an Arduino as the main controller for managing motor movements and lifting functions.

4. To create a simple lifting mechanism (like a forklift) that can raise and lower light objects safely.
5. To learn how different parts work together, including motors, motor drivers, Bluetooth modules, and the Arduino.

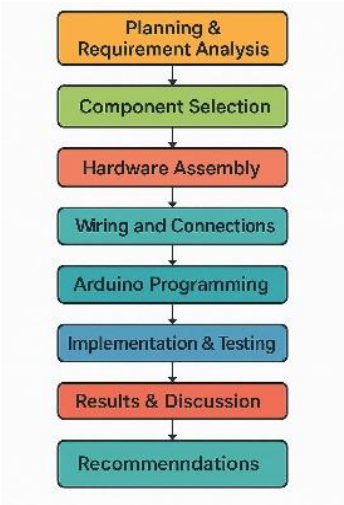
IV. SYSTEM OVERVIEW

The Arduino-based Bluetooth-controlled multidirectional forklift robot is a wirelessly operated system built to move and lift small loads in various directions. It uses an Arduino UNO as the main controller, which receives movement and control signals from a smartphone via a Bluetooth connection (using the HC-05 module).

Once the commands are received, the Arduino processes them and sends signals to a motor driver (like the L298N), which powers four DC motors attached to omnidirectional wheels. This allows the robot to move forward, backward, sideways, and diagonally. A servo motor is also connected to control the forklift arm, enabling it to raise or lower objects as needed.

This project is ideal for demonstrating basic automation, remote control via mobile devices, and the coordination of robotic movement and lifting tasks in a compact design.

V. METHODOLOGY



DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 4, June 2025
Impact Factor: 7.67

VI. CONCLUSION

In conclusion, the Arduino-based Bluetooth-controlled multidirectional forklift robot represents a practical and innovative project combining basic robotics, wireless communication, and motor control. By leveraging an Arduino microcontroller, Bluetooth module (like HC-05 or HC-06), and motors, this robot can be operated remotely using a smartphone or Bluetooth-enabled device. The multidirectional movement adds versatility, allowing the forklift to move in all directions, enhancing its efficiency in tasks like material handling in small environments.

VII. ACKNOWLEDGMENT

The project work is essential to an engineering student because it is part of education, and everything else is auxiliary to it. It gives not only the in-depth knowledge of the relevant field but also the skill of the subject. It makes the knowledge functional. The knowledge which is gained by reading, book discussion can only be verified through practical projects. Here one can witness knowledge being executed, which acts as not only cements linking of knowledge, but instils a sense of confidence in an engineering student. To Matoshri College of Engineering and Research Center , Nashik, we are grateful for this. We express our gratitude to the project guide Prof. Mr. Y.K Mogal for his constructive guidance and suggestions from time to time during the completion of the project. We are very grateful to our college principal, Dr. G.K. Kharate, and H.O.D, Dr. J.H. Bangale for their kind help. We also thank the staff of MECHANICAL ENGG DEPARTMENT whose support enabled the successful completion of the project. My special thanks goes to all friends who assisted me in several aspects of the project

REFERENCES

[1] WMHW Kadir, RE Samin, BSK Ibrahim. Internet controlled a robotic arm. Procedia Engineering. 2012.
[2] Araújo, D. Portugal, M. Couceiro, C. Figueiredo and R. Rocha, "TraxBot: Assembling and Programming of a Mobile Robotic Platform". In Proc. of the 4th International Conference on Agents and Artificial Intelligence (ICAART 2012), Vilamoura, Portugal, Feb 6-8, 2012.
[3] M. Quigley, B. Gerkey, K. Conley, J. Faust, T. Foote, J. Leibs, E. Berger, R. Wheeler, and A. Y. Ng, "ROS: an open-source Robot Operating System," in Proc. Open-Source Software workshop of the International Conference on Robotics and Automation, Kobe, Japan, May, 2009.
[4] Sciverse Science Direct; Internet Controlled Robotic Arm; Wan Muhamad Hanif Wan Kadira , Reza Ezuan Saminb , Babul Salam Kader Ibrahim (available at www.sciencedirect.com)
[5] Robot Arm Control Using Arduino-by Aimn Mohamed Ahmed Ghiet; RESEARCHGATE-June 2017; DOI: 10.13140/RG.2.2.10227.53286 Affiliation: University of Turkish Aeronautical Association