

Iot Based Mecanum Wheels Robot

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ABSTRACT:

The mecanum wheel is a direction. It is a conventional wheel with a series of rollers attached to its circumference. Each roller have an axis of rotation at 45° to the plane of the wheel and at 45° to a line through the center of the roller parallel to the axis of rotation of the wheel. A typical configuration is the four platform. By alternating wheels with left and right handed rollers, in such a way that each wheel applies force roughly at right angles to the wheelbase diagonally, the vehicle is stable and can be made to move in any direction. The present work is to develop a mecanum wheel based robot platform for industrial applications which is equipped with the Infrared (IR) sensor to detect the obstacle around it and move accordingly and also to such type of robot platform is used in the warehouse automation. And this robot integrated with ESP32 Cam which we can observe everything even in low condition.

KEYWORDS: IOT, ESP32 CAM, MECANUM WHEELS, IR SENSOR

I. INTRODUCTION

Omni-directional wheels have been used in robotics, in different industries and in logistics for many years. The first Omni-directional wheel was patented in 1919 by J. Grabowiecki in US, which was not famous. Mecanum Wheels were first invented in 1973 by Swedish inventor Bengt Ikon [1]. This wheel is designed in such a way that, the rollers are mounted around the circumference of the wheel at 45 degrees to the wheel plane. This design of wheel allows for in- place rotation which prevents ground friction to a great extent and results into low driving torque. AN AndyMark Mecanum Wheel has been re-designed for better performance and utilization by Helical Robotics. Mecanum Wheel is a complex "Omni-Directional" wheel that currently contains several drawbacks. The drawbacks include complex design, usage of hobby grade material, bumps in rollers, etc. A

comprehensive design of the Mecanum wheel is being presented using Computer Aided Software, CAD and analysis tools, such as Finite Element Analysis, FEA. The different concepts were hand sketched using various parameters and then implemented in a CAD software - CATIA. The Mecanum Wheel's feasibility was thoroughly studied through ANSYS software. Load analysis was performed using various materials and several manufacturing processes carefully, to check the achievability of the wheel. In conclusion, the Mecanum wheel was successfully re-designed and manufactured to meet the requirements and specifications of Helical robotics. Mecanum-style drive uses 4 wheels from which, 2 are "left" wheels and 2 are "right" wheels. One right and left wheel is on each side of the robot. Each wheel is driven independently which requires 4 individual motors [3]. The Figure 1.1 shows the magnetic climbing robot manufactured by Helical Robotics. This robot is lightweight and portable and the magnet used by the robot also does not touch the work surface. It can climb up to 7 ft. height without using any wireless components. This thesis study only concentrates on the designing of the Mecanum Wheel and analysing its manufacturing process and material.

II. OBJECTIVE

The main aim of the project is to design an IOT based mecanum wheel robot with Blynk APP to move in all direction adding features like wireless camera and IR Sensor with obstacle detection with auto stop. IR Sensor can measure the heat of the object as well as detects the motion with auto stop. ESP32 Cam is used for live video streaming in order to control the robot.

III. PROPOSED SYSTEM

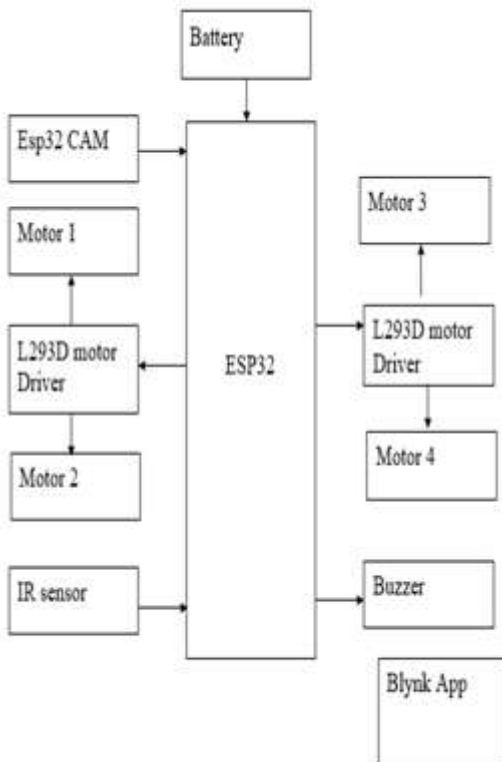
ESP32 calculates and displays these distance parameters on the mobile via Blynk android app, it sends these parameters to the Internet using IOT techniques. The process of sending data to the

internet using Wi-Fi is repeated after constant time intervals. The project connects and stores the data on a Blynk web server. Thus the user gets real time stop and start system conditions. Internet connectivity or Internet connection with Wi-Fi is compulsory in this IOT based mecanum wheel robot project. The robot can be moved in any direction using the Blynk app and IR Sensor notifies the user regarding the objects in front it also and also Robot is integrated with RF wireless night vision camera through which we can observe everything even in LOW light condition.

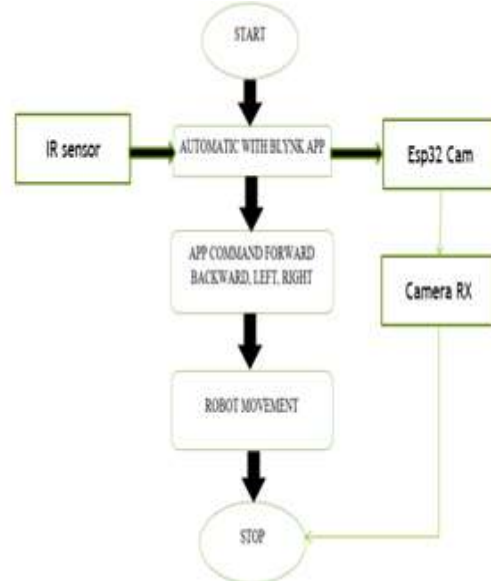


Fig1: proposed system

IV. BLOCK DIAGRAM



V. FLOW CHART



VI. RESULT

The steps of the mecanum wheels robots are

- Forward – all four wheels forward in
- Backward – all four wheels move backward at the same speed
- Right slide – wheel 1 and 4 forward, wheel 2 and 3 backward
- Left slide – wheel 2 and 3 forward, wheel 1 and 4 backward.
- Clockwise - wheel 1 and 3 forward, wheel 2 and 3 backward
- Counter-Clockwise – wheel 1 and 3 backward, wheel 2 and 3 forward
- An IR sensor can measure the heat of an object as well as detects the motion.
- And we also esp32 cam for live video streaming and it is widely used in various iot applications. It is suitable for industrial wireless control, wireless monitoring and other iot applications .



Fig 2: mecanum wheel robot

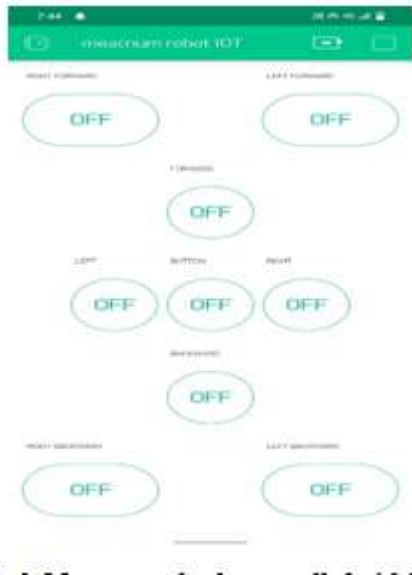


Fig 3: Mecanum wheels controlled with blynk App

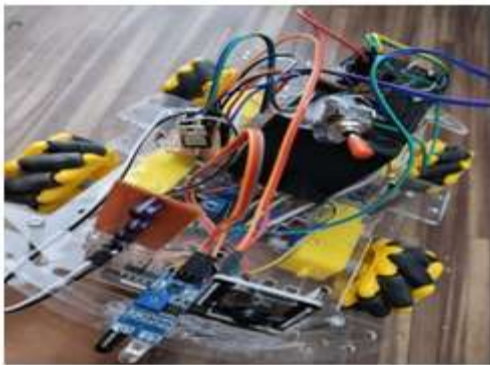


Fig 4: Mecanum Wheels Robot with IR sensor and ESP32 Cam



Fig 5: ESP32 Cam with live video streaming

VII. ADVANTAGES

- Simple to control
- High load capacity
- Live streaming with iot
- Can detects the objects and give the notification
- Can be moved in any direction.

VIII. APPLICATIONS

- This system can be used in military field like search, rescue missions & mine operations
- This system can be used in commercial vehicles
- Can be used for spying
- Can be used in industrial field like transporting long loads sideways through narrow way, comfort operator

IX. CONCLUSION

Mecanum wheels robot project and development of a mecanum-wheeled robot able to perform autonomous navigation tasks. The robot was built with 4 DC motors with attached wheel encoders and an esp32 board. A low-level base controller was developed together with a wifi communication system to control the robot during the mapping process from the app. A probabilistic approach was used to assure the robustness of the system against the uncertainties of motion and sensor measurements. The system was able to create consistent maps, being capable of localizing itself and able to navigate through the environment. The mecanum-wheel configuration allowed the robot to reach any space in the room, which assures a fast and robust map building. This robot is highly versatile and can be used in several scenarios, such as an office, civil construction, surveillance and for industrial tasks. Future works include adding an IMU sensor into the system to improve the pose estimation. Furthermore, a future goal is to perform autonomous mapping with exploration.

X. FUTURE SCOPE

These wheels provide an emerging system; called the holonomic drive system. This is currently being used in robots and industrial equipment such as forklift. They are under prototyping stage in future vehicles.

We can enhance this robot by implementing the Armor to this robot so that can be used for Military purpose for shooting.

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