Omnidirectional Vehicle

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PROBLEM STATEMENT

The automatic solar panel cleaner project aims to address the challenge of maintaining optimal efficiency and output from solar panels by developing a system that can automatically clean the panels on a regular basis. The accumulation of dust, dirt, and other debris on solar panels can significantly reduce their efficiency, leading to lower energy production. Manual cleaning of solar panels is time-consuming, labor-intensive, and not feasible for large-scale installations, making an automated solution necessary.

TEAM MEMBERS

INTRODUCTION

An omnidirectional vehicle, also known as an omni-vehicle or omni-car, is a type of vehicle that is capable of moving in any direction without the need for complex turning maneuvers. It is designed to have a high degree of maneuverability, allowing it to navigate tight spaces, change directions quickly, and exhibit omnidirectional movement.The concept of omnidirectional vehicles is rooted in the field of robotics and is often inspired by the movement abilities of certain animals, such as crabs or insects. These vehicles employ various mechanisms and technologies to achieve omnidirectional movement, enabling them to move not only forward and backward but also sideways, diagonally, or even rotate on the spot.One common design of an omnidirectional vehicle utilizes a set of wheels or rollers that are arranged in a particular configuration. This configuration often includes a combination of conventional wheels and additional wheels oriented at different angles. By

controlling the speed and direction of each wheel independently, the vehicle can achieve different types of motion, allowing it to move in any desired direction.Another approach to omnidirectional vehicles involves the use of holonomic drive systems, which typically employ omnidirectional wheels or ball-like structures. These wheels or balls can move in any direction without requiring a change in the orientation of the vehicle. By controlling the rotation and speed of these wheels, the vehicle can achieve omnidirectional movement. Omnidirectional vehicles have a wide range of potential applications. In industrial settings, they can be used for automated material handling, assembly line operations, or warehouse logistics. In the field of robotics, they can serve as agile and maneuverable platforms for research, exploration, or search and rescue operations. They may also find applications in transportation, entertainment, or even personal mobility.Overall, the concept of omnidirectional vehicles offers exciting possibilities for improving maneuverability and versatility in various domains, contributing to more efficient and adaptable systems for a wide range of tasks.
Background Today's society is to a large-scale dependent of microcontrollers. Things like cellphones, microwaves and refrigerators all have some kind of embedded system containing a microcontroller. One of the areas where microcontrollers are being used is within the factory industry, where microcontrollers are embedded in vehicles that transport goods. In order to fully utilize such vehicles, they need to be able to carry a heavy load while being flexible, which can be achieved using mecanum wheels. Mecanum wheels are included in the omnidirectional family of wheels and are therefore designed to be used for moving in any direction, which can be useful
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IDEA GENERATION

An extensive background study involving recent studies and theory about relevant components, such as omnidirectional wheels, wireless communication and hand gesture-based steering was made.

The first step was to construct a moving vehicle without any form of hand gesture control. This was made by assembling the four Direct Current (DC) motors, together with four H-bridges. To control the motors an Arduino Uno was used. These components, necessary power supply and Mecanum wheels were all mounted to a bottom plate and making up the vehicle. The steering was implemented with an IMU by first connecting it to the onboard Arduino Uno. Later on the steering was made wireless using Radio Frequency (RF) communication. This was accomplished by connecting the onboard Arduino Uno with an RF receiver and an offboard Arduino Nano, to which the IMU and an RF transmitter were connected.

PROTOTYPE IMAGES