



# SMART CARRIER

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## Introduction

The **Smart Carrier** is a robot that **follows** its user while **carrying** their items, **detecting** obstacles, and **warning** users when it finds itself stuck. Ideal for use in **indoor areas**, the robot is **versatile & easy to use**, just grab the **Smart Carrier's** tag and go!

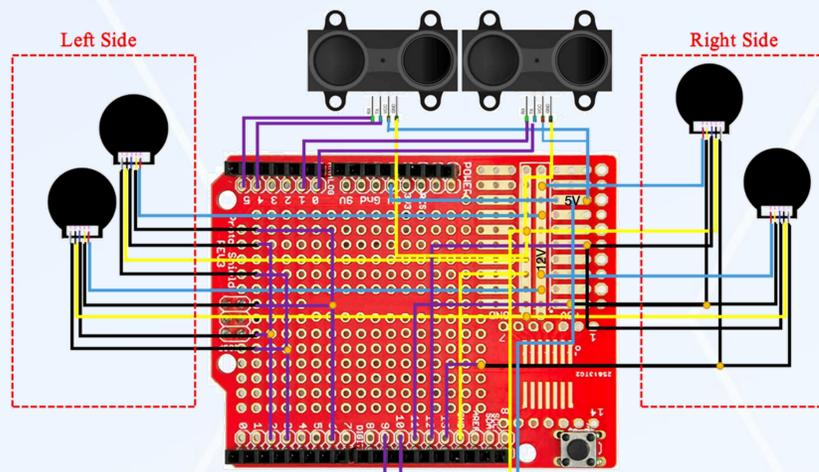
## Electrical

### Remote Activation and Operation

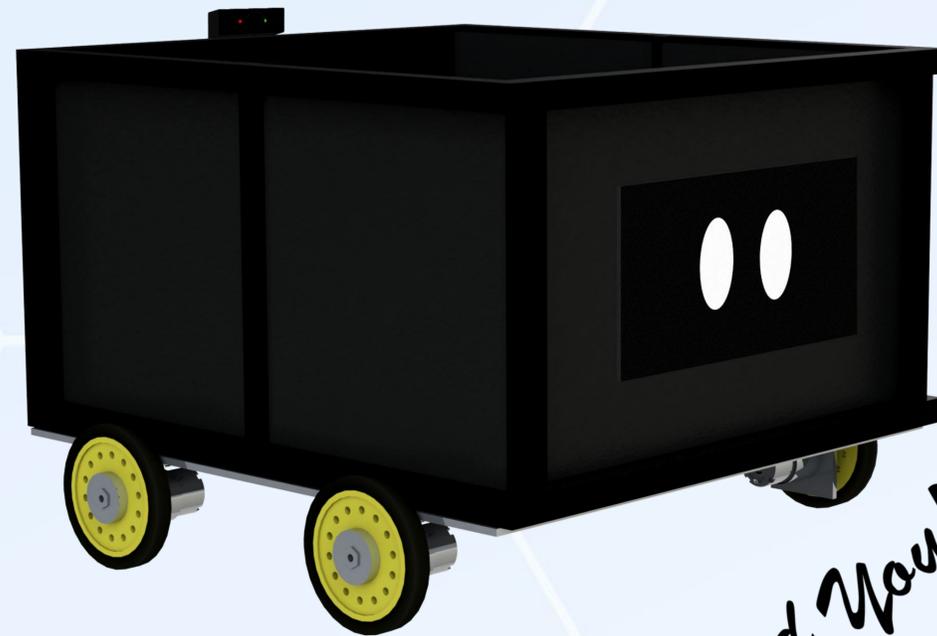
The robot can be **remotely activated** via the tag carried by the user. Using a **rechargeable DC battery**, the robot can operate for up to **two hours** before needing to recharge.

### Object Detection

Two **LIDAR sensors** mounted on the front of the robot can detect obstacles and inform the user through a **vibration motor** in the tag when the robot is faced with an obstacle.



Lidar and Motor Circuit



*Right Behind You!*

## Software

### Computer Vision Following System

The robot uses **machine learning** and **computer vision** to detect the pose of the user. The position of the user's shoulders will inform the robot of which direction it needs to go.

The **mounted computer** analyzes the actions of the robot, sends data to an **Arduino**, and **visualizes** its actions to the user in an interactive and expressive way.

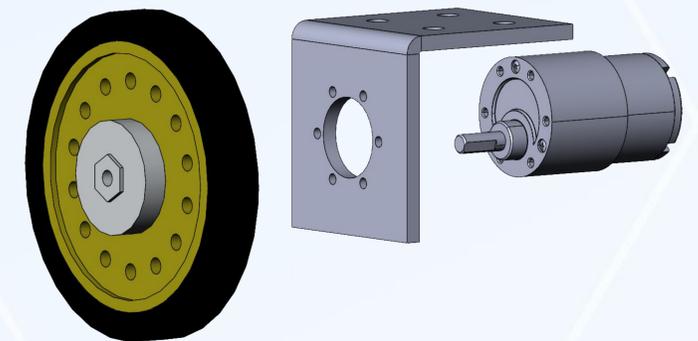
User ahead Go straight	User on left side Turn left	User on right side Turn right	User too far Speed up
User too close Stop	No user detected Stop	Screen tapped Custom function	Screen hold & release Terminate

## Mechanical

### Carrying Capacity

With a weight of **10 kgs**, the robot is capable of carrying up to **20 kgs of weight** inside its basket-like body. The robot has an **aluminum** base to ensure that the body is strong enough to operate under this load.

The gear motors are also graded to ensure that they produce **150 RPM** of torque, while still operating at an **average walking speed** to follow the user.



## Limitations & Future Improvements

### UWB Implementation

The current following system will automatically look for another person if the robot loses the current user. Implementation of a **UWB based following** system to track only one particular user at a time would be ideal

### Structural Design

Due to budget constraints, the design of the robot's chassis needed to be simplified, which made the robot **larger and heavier** than originally intended.