

Self-Parking Car

Team 14, Spring 2023

Team Members

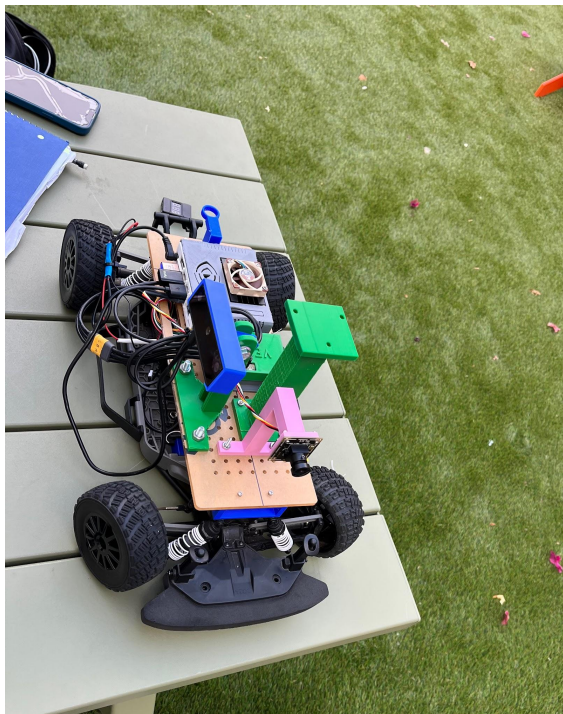
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Project Overview

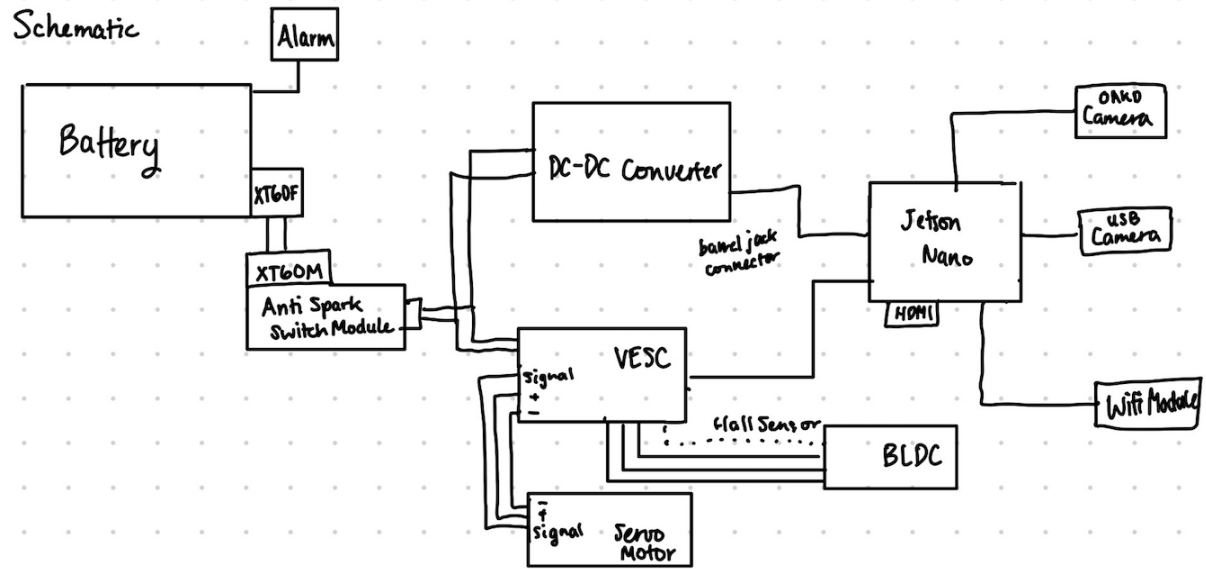
The goal of this project is to develop a self-parking system for a car utilizing lane detection, template matching, and OAKD camera. The system will enable the vehicle to autonomously locate and maneuver into an available parking spot. Unlike previous projects, which relied on other sensors such as Adafruit TOF sensor, this project will use the OAKD camera. The required materials for this project include the aforementioned OAKD camera, as well as existing components of the car such as the Jetson Nano, battery, VESC, etc. By combining vision-based algorithms with real-time data processing, the self-parking system aims to enhance convenience and safety in urban parking scenarios.

Main Components

Car



Schematic



Implementation

Software and Hardware List

- Jetson Nano
- 64GB MicroSD Card
- OAKD Camera
- USB Camera
- HDMI Adapter
- WiFi Adapter
- VESC
- DC-DC Converter
- 4S Battery
- Servo Motor
- BLDC
- Car Chassis

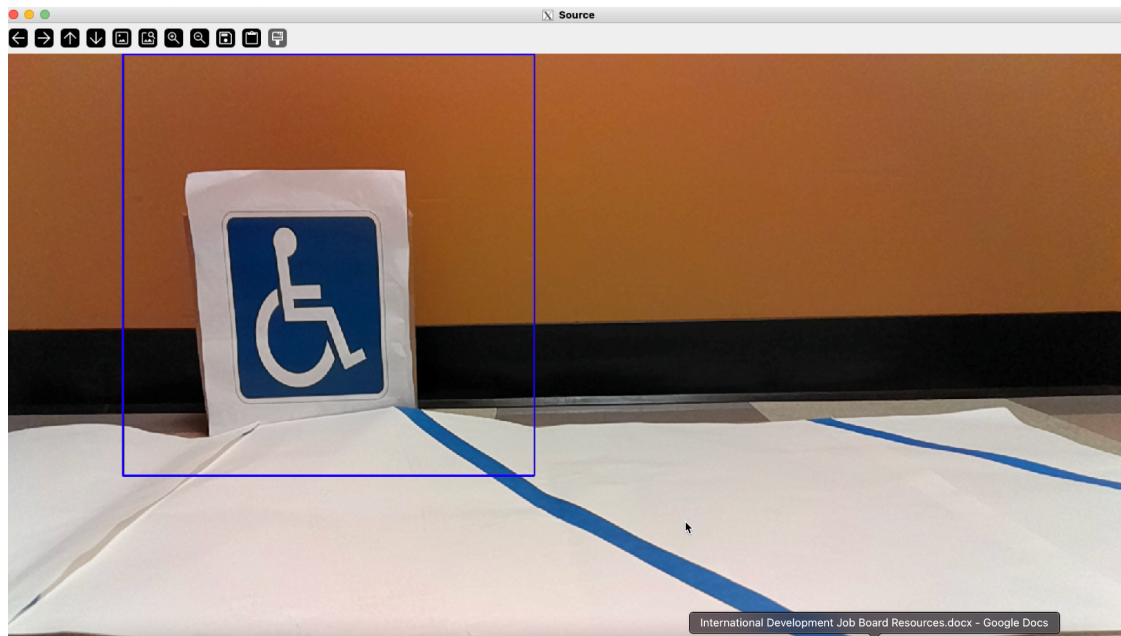
Source Code

- Code is in this repository
- park.py is the actual code used to park the car
 - It constantly is template matching, for the handicap sign
 - If the template is matched, it starts hough_lines detection
 - Calculating the angle using hough_lines, it sets the servo angle

- Throttles at the angle, then straightens out and throttles longer to pull into the parking space
- car_detection.py demonstrates the technologies we are using: HoughLines, Template Matching, and PyVESC
 - It pulls a frame, using .cvFrame(), from the pipelined live feed of the OAK-D
 - It will generate a live image, with a blue rectangle around a template match
 - It will generate another live image, a black and white version generated using cv.canny() and focusing on edges
 - On this second image, red lines representing the detecting hough lines are present
- For the future:
 - If you have a similar project, we recommend YOLO over template matching! Template matching was slow and had many false positives on images pulled from the OAKD live feed

Images from Implementation:

Template Match



Hough Lines

