Self-parking car

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Project Overview

- Perform fully autonomous parking without any help from the driver
- A scalable prototype of a real life vehicle with self-parking capability
- Low cost alternative by using ultrasonic sensors only
- Eliminate safety concern
- Increase efficiency of parking facilities

Relevant projects

- Construction of environment surrounding the vehicle

  - Using cameras in the parking facilities to provide birdview
  - Using RGB-D depth camera and laser scanner
  - Using range finder arrays to build a 3D occupancy grid
  - Build a 3D map of the entire facility using the vehicle’s wall-following trajectory
  - Using line figure extraction to perform line segment based indoor mapping

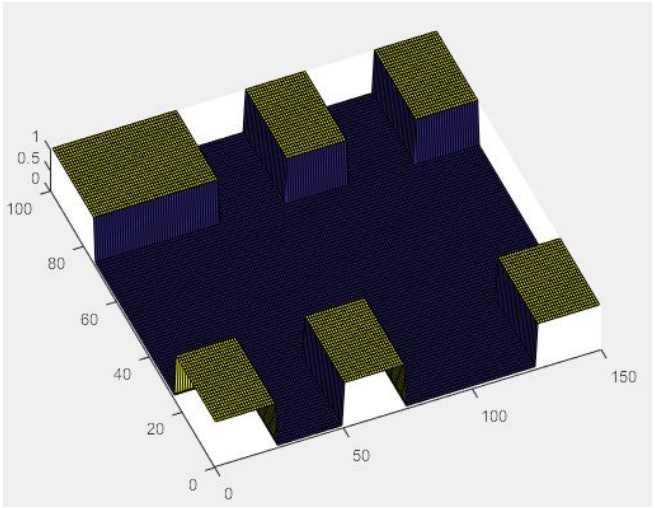
Relevant projects

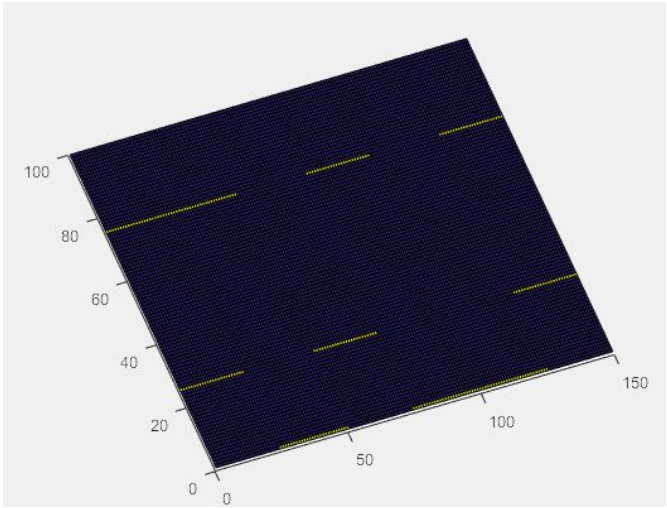
- Backwards path planning and following

  - Using numerical potential field for robotic path planning and navigation
  - Predefined backwards curved path using inverse kinematic and inverse jacobian
  - Path following based on fuzzy logic control system

My approach

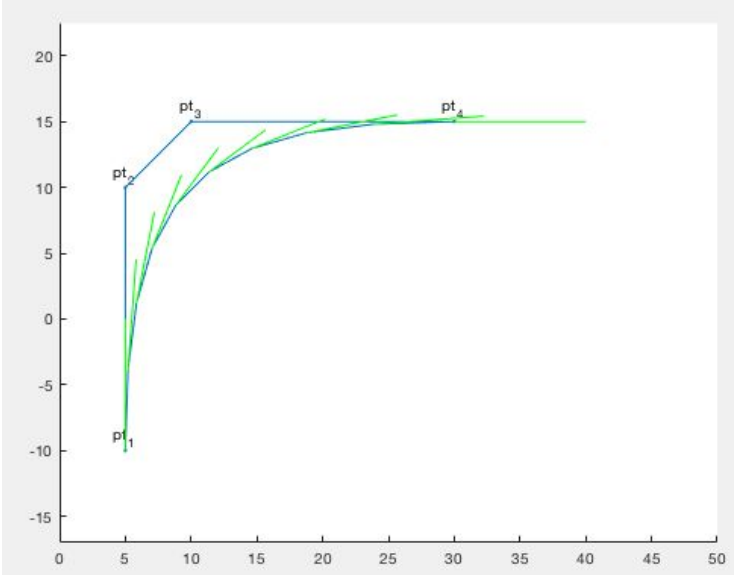
- Using sensors array to find empty parking slot





My approach

- Using cubic bezier curve to generate path
- Using locomotion and homogeneous transformation matrix to follow the points



Timeline and milestone

- Design and simulation (March 14)
  - Simulation results of both environmental mapping and robotic locomotion
  - Full documentation of components selection and placement
- Implementation (April 7)
  - Fully functional robotic car with speed and direction control
  - Sensor arrays that can generate 2d grid of the environment
  - Perform perpendicular parking
- Extra features (April 20)
  - Wireless control
  - Moving object detection / interrupt