

ELE 302 – INDEPENDENT PROJECT INITIAL PROPOSAL

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(Bench 207)

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1 Overview

- **Objective:** To build a robot/car capable of playing basic ping pong
- **General principles:**
 - We will use a camera (or two for stereoscopic vision if necessary) to track a ping pong ball and estimate its trajectory.
 - We will then move the robot to the required location (ideally using omni wheels or Mecanum wheels) and hit the ball back over the net.
 - We will use a combination of dead reckoning and a grid laid on the floor to determine the position of the robot

2 Progress steps and checkpoints

Hardware

- (1) Move around with new drive system (build H-bridges and other relevant circuit boards as necessary)
- (2) Track position of robot with grid and dead reckoning (with accelerometer and gyro)
- (3) Set up interface between camera and primary processor (either a Raspberry Pi or an Arduino) and PSoC
- (4) Set up interface between primary processor and PSoC

Software

- (1) Set up feedback control to execute movement commands
- (2) Determine the location of a static ping pong ball based on camera x/y coordinates and ball size
- (3) Predict the trajectory of a moving ping pong ball based on camera measurements
- (4) Calculate position to move car to in order to hit ping pong ball

Intermediate goals

- (1) Execute movement commands and track position
- (2) Track ping pong ball and rotate to face ball
- (3) Predict ball landing position X and move to point X in a non-time-dependent manner
- (4) Track ball and move so that the ball hits the robot's paddle after one bounce
- (5) Track ball and move to hit the ball back over the net after one bounce

3 Parts list

- Omnidirectional drive, ideally able to move sufficiently fast (2-3 feet/second)
- Raspberry Pi 3 (or perhaps an Arduino?)
- Pixy CMUcam5 (maybe two for stereo vision)
- Accelerometer and gyroscope
- Light sensor (either C-Cam-2A or photoresistor with bright LEDs)