EECS 373: Introduction to Embedded System Design

Table Tennis Feeding Machine

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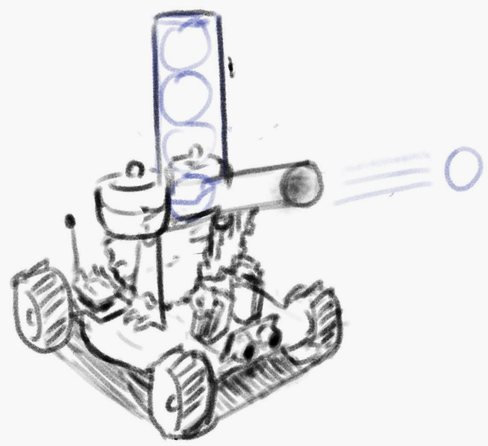
Play Table Tennis against a Robot and Have Fun!

Who needs a table tennis coach? You can do training on your own!
Feed table tennis balls from and towards various locations to train players on table tennis and have fun!

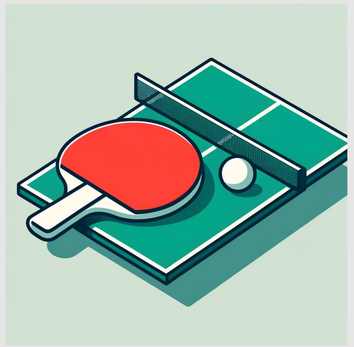
Manual Mode: (2 players)
- Control the robot with a PlayStation2 controller.

Autonomous Mode: (1 player)
- Track the player with a Pixy2 camera and shoot automatically.



Empowering Players: Elevating Table Tennis Training

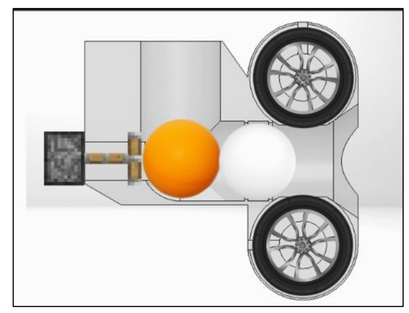
- **Enhanced Solo Practice Experience**
  - Allows players to practice table tennis without the need for a human partner, enabling consistent and focused training sessions.
- **Customizable Training Mode**
  - Provides the ability to adjust the speed, trajectory, and power of ball feeds, allowing players to tailor their training to specific skills and techniques.

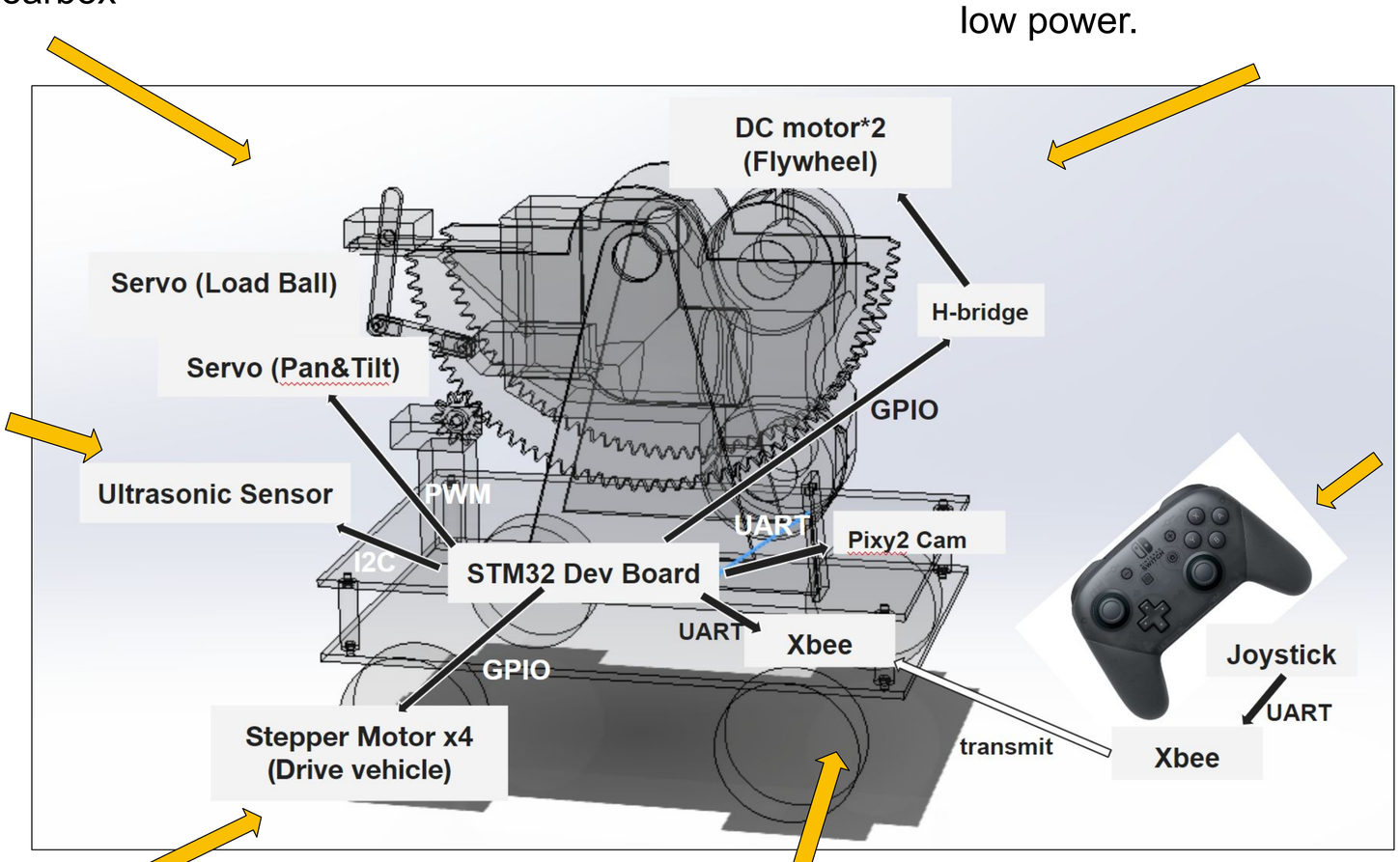


Solution: A Pitch Roller Launcher on top of a Moving Robot Chassis

2 PWM controlled servo motors: One is for loading the ball into the launch module. Another is for pan & tilt function through gearbox mechanism.

3D printed pinch roller structure: light and strong. Flywheel with brushless DC motors: low noise and low power.





Four ultrasonic sensors, positioned on each side of the chassis facing downward, continuously detect the proximity to the table edge and halt the system if it's too close to prevent falls during manual and auto modes.

For the remote control, we use a PS2 controller plus the XBee module to talk to the mcu. Since PS2 speaks in SPI, we need to transform its signal to UART and then send it via XBee.

A robot chassis powered by 4 stepper motors, features Mecanum wheels for omnidirectional movement.

Pixy Camera:
- Can detect human body by detecting high-contrast color blocks, which means the player need to wear vest with bright color when playing the auto mode.
- Use UART to transmit detected positions to the microcontroller for adaptive system responses.