Miniature Smart Car Hardware Design
Final Presentation

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Brief Project Overview

Our Car

Prior car kits

1/15 Scale

Orbit Smart City
Final Design

Bottom Assembly

Animated Cross Section of Drivetrain

Steering Assembly

Full Assembly

Full Car Assembled vs CAD
Square Wave Signals

Sending Square Wave as Speed Control

Square Wave

“On” Pulse

“Off” Pulse

Teensy 3.2

Stepper Motor Driver

Low Frequency (Slow Motor) vs. High Frequency (Fast Motor)
Software overview

Desired Car Speed + turning curvature

Desired RPM + Servo Angle

Square wave control signals

ROS

UP Board

Calculated Position Data

Teensy 3.2

Encoder Signal

Calculated Encoder Position

Encoder

Desired Car Speed + turning curvature

Square wave control signals
Odometry

Control Data

Sensor Data

ROS Node

UP Board

Teensy 3.2

Stepper Motor

Encoder

Servo

Feedback Loop Overview

Distance Traveled

Turn Radius
Conclusion + Future Work

- Pure pursuit spline following algorithm
- Lidar Sensor odometry
- Self driving AI through neural networks
Software

**Teensy**: Arduino software

**UP Board**: Ubuntu 20.04, Python, ROS Noetic

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1. RPM, Servo Angle → UP Board
   Position, angle → ROS

2. Encoder data, pulses/delays for motors

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3. Encoder data, pulses/delays for motors