Vision Based Robot System

Bala, Dhruv (School: Lane Technical College Prep High School)

Self-driving cars are becoming more prevalent throughout our everyday lives. Demand for same-day delivery services is expected to increase in popularity. To be employed in real world, self-driving delivery cars should be capable of examining their environments, executing driving maneuvers and following applicable traffic rules. This project attempts to produce an autonomously moving indoor small-scale vision-based driverless system that visually captures the terrain in front of the robot, detects driving lanes, computes the angle of the lanes, detects and follows common road signs to reach its programmed destination. A robot car system comprising of a four-wheeled robot chassis, DC motors, motor drivers, Intel Edison micro-controller was designed and built. A wide-angle video camera is mounted in front of the robot system. A personal computer with WiFi receives images from the robot and handles the image processing. Python Language with OpenCV is used for image processing. Applying Gaussian blue, performing Canny edge detection and Hough line transforms to each frame of the image the computer sends a predicted angle of the lane the robot for execution. Further, common road signs like Stop and Yield are detected along with a predicted distance from the robot. This design attempt of creating a self-driving robot car that is capable of localized navigation via lane detection and common street signs was successful. The system accurately predicts angles of the lanes with acceptable standard errors. The system also detected road signs shapes and their distance from the car with high accuracy and acceptable standard error.

Awards Won: