AUTONOMOUS LANE FOLLOWING & TRACKING OF RC CAR

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Abstract

Self-driving vehicles represent a technological leap forward that can offer solutions to current transportation problems and dramatically change how people approach mobility. The development of self-driving cars or autonomous vehicles has progressed at an unanticipated pace. Fuelled by advances in artificial intelligence, cars are getting smart enough to begin to drive themselves. But autonomous vehicles will do more than change how we get around. They have the potential to dramatically reduce the number of car crashes, shrink carbon emissions, and provide mobility to people who can't drive.

Driverless cars weren't possible until researchers adopted an AI technique known as deep learning, which relies on powerful GPUs, access to vast troves of data, and sophisticated algorithms for deep neural networks to solve complex problems. Deep learning is essential for autonomous vehicles because no one can write software that anticipates every possible scenario a self-driving car might encounter. With deep learning, the car's computer can learn, adapt, and improve.

In this Project we are trying to implement autonomous lane following in RC car.

Implementation

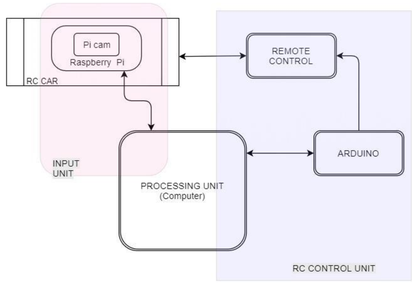
A scaled down version of self-driving system is implemented using a RC car, Raspberry Pi, Arduino and open source software. The system uses a Raspberry Pi with a camera as inputs, a processing computer that handles steering, and an Arduino board for RC car control.

Dependencies

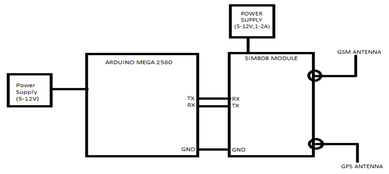
- Raspberry Pi:
  - o Picamera
- Computer:
  - o Numpy
  - o OpenCV
  - o Pygame
  - o PySerial
- GSM and GPS module.

Proposed solution

Lane Following Block Diagram -



Tracking Block Diagram -



The system consists of four subsystems: input unit (Pi camera), processing unit (Raspberry PI & computer) RC car control unit and tracking unit.

Input unit takes the images and sends it to the processing unit where the training or prediction takes place. The predicted output controls the RC car.

This project uses only one GPS device and two-way communication is achieved using a GSM modem. GSM modem with a SIM card used here implements the same communication technique as in a regular cell phone

Results

1. Lane Following

- Prediction on the testing samples returns an accuracy of greater than 80%.
- Overall, the RC car could successfully navigate on the track based on the predictions made by the MLP program and tracking mechanism gives accurate position of the location Sensitivity is given in graph
- The location is obtained and sent it to the mobile device using GSM.

References

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