

Jetson-Enabled Autonomous Vehicle

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Abstract

Image processing is a popular application within the growing field of AMR (autonomous mobile robots). One significant approach to image processing is HSV segmentation, which extracts significant elements (color, movement, and shapes) of images for analysis. The resultant extracted image data can be utilized for autonomous behavior. The purpose of the present study is to integrate the image processing framework for an autonomous vehicle using NVIDIA's Jetson TX1 supercomputer. The Jetson TX1 contains 256 CUDA cores which can utilize parallel processing to boost the computational efficiency of data-intensive applications, such as HSV segmentation. It can also be configured for mobile support. To accomplish this goal, we will implement a vehicular line following program that outputs positional error based on deviation from a tracked line. The output error data is fed into a PID control system that manages the vehicle's motors. The program and interface are developed using ROS, a robotics software framework. With this scheme, we can manipulate the autonomous movement subroutine on a course designed for the vehicle. We can also collect movement and error data to tune feedback parameters. Through this implementation, we present the Jetson TX1 as an accessible controller for an autonomous vehicle, using image processing as a framework.