VISION-BASED NAVIGATION FOR AUTONOMOUS GOLF CART

AUTOMATION ENGINEERING PROGRAM

Jirapasson Ponpimonangkul, Natthakan Piyawanich, Paiporn Muangthai
Assoc.Prof.Dr.Benjamas Panomruttanarug

INTRODUCTION

Self-driving vehicles have become extremely popular in society nowadays. Therefore, we need to develop the self-driving car using image processing techniques.

Project Objectives

- To design the golf cart that can be self-driving by using image processing by the segmentation idea
- To connect and communicate with systems while controlling the movement of the self-driving golf cart using software (ROS2)
- To improve the performance and safety of the self-driving golf cart

Project Scope

- Using segmentation to discriminate road
- Autonomously control the speed of a car
- Autonomously control the turning angle
- Move in the correct direction on the road
- Connect to a camera and low level control with ROS2

From S15

To Library

METHODS

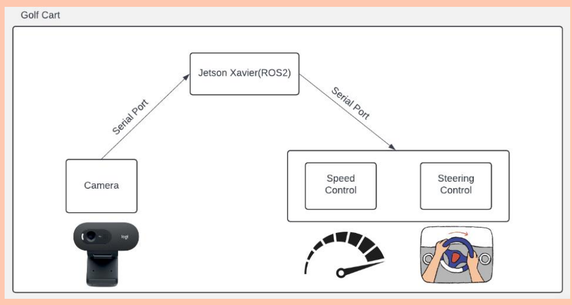


Figure 1: Block Diagram

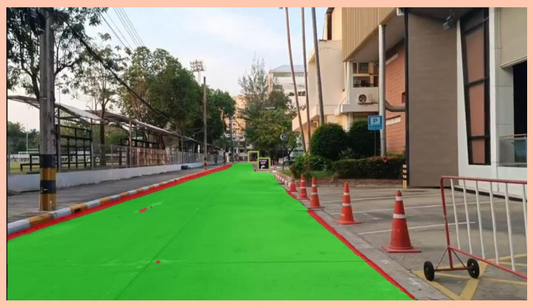


Figure 2: Output from YOLOP Model

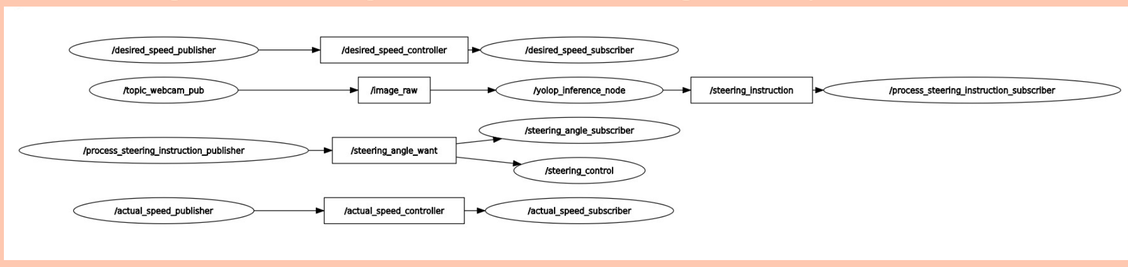
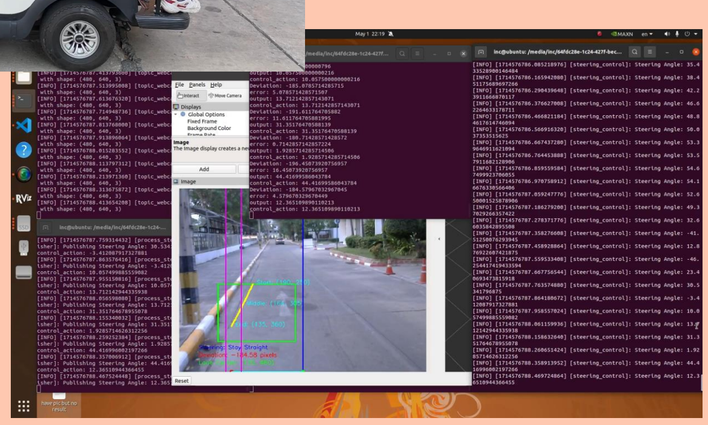


Figure 3: ROS2 Graph

RESULTS



DATA ANALYSIS

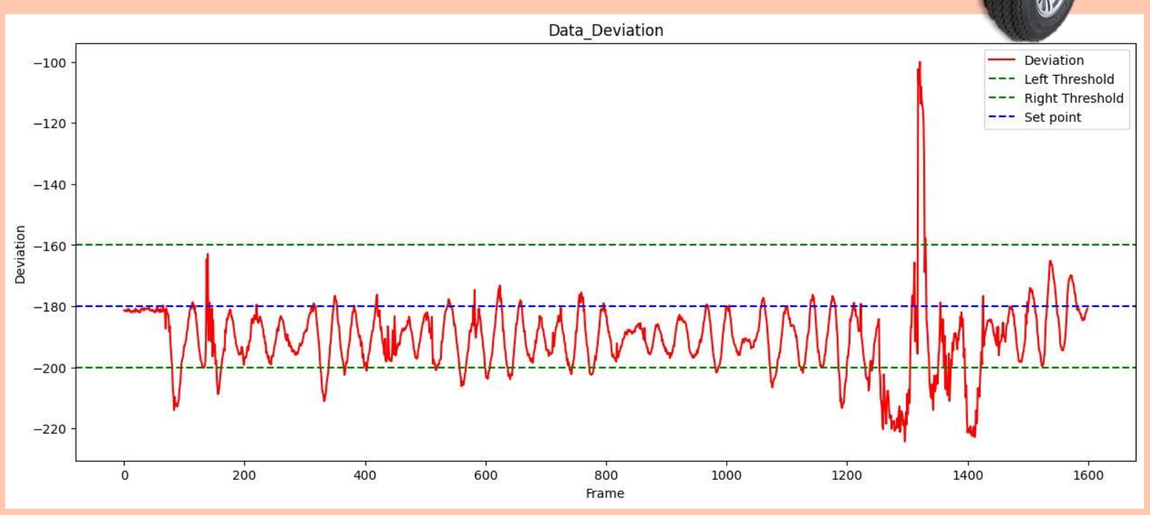


Figure 4: Data of Deviation per Frame

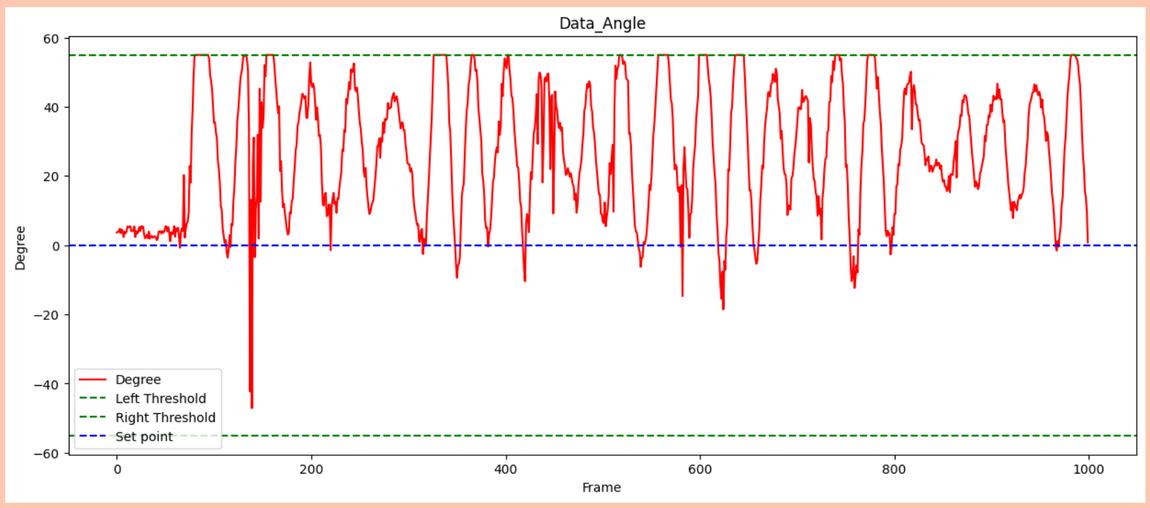


Figure 5: Data of Steering Angle (Degree) per Frame

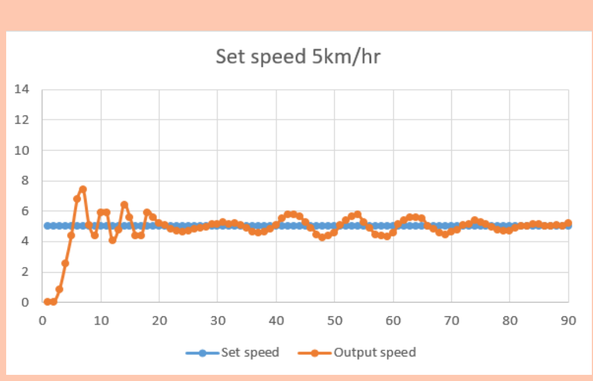


Figure 6: Output Speed at Set Speed 5 km/hr with Time

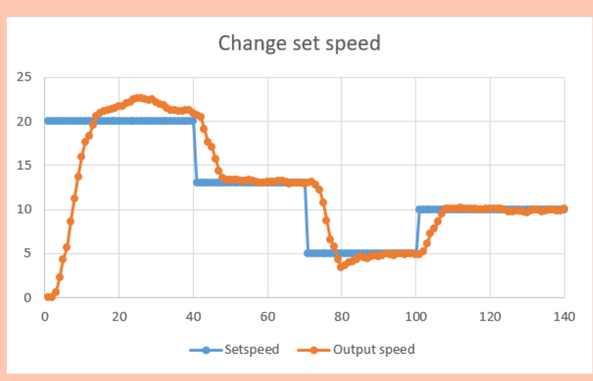


Figure 7: Output Speed at Each Set Speed with Time

CONCLUSION

From experiments of testing the golf cart on the road of King Mongkut's University of Technology Thonburi (KMUTT) in autonomous mode from S15 building to the Library using image processing and low-level control to enable communicate through Robot Operating System 2 (ROS2). The result is that the golf cart can automatically control the steering angle and drive autonomously within the lane at a constant speed, using a PID controller to control the steering angle and motor speed of the golf cart. As a result, the golf cart can drive autonomously along both straight and curved paths as specified.

REFERENCES

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Fisher Y., Haofeng C., Xin W., Wenqi X., Yingying C., Fangchen L., Vashisht M. and Trevor D., 2020,

[3] **BDD100K: A Diverse Driving Dataset for Heterogeneous Multitask Learning,** UC Berkeley., Cornell University., UC San Diego., Element, Inc., pp.1-4.

Department of Control Systems and Instrumentation Engineering, Faculty of Engineering
King Mongkut's University of Technology Thonburi (KMUTT)

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