

**AUTONOMOUS F1TENTH RACING CAR BASED ON ESP-IDF FREERTOS  
FIRMWARE**

By

Rio Kristian Jordi  
11901008

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SWISS GERMAN UNIVERSITY  
The Prominence Tower  
Jalan Jalur Sutera Barat No. 15, Alam Sutera  
Tangerang, Banten 15143 - Indonesia

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## STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.



Rio Kristian Jordi

Student

17<sup>th</sup> July 2023

Date

Approved by:



Dr. Rusman Rusyadl, B.Eng., M. Sc.

Thesis Advisor

17<sup>th</sup> July 2023

Date

Dr. Maulahikmah Gallinium, S. Kom., M. Sc.

Dean

25<sup>th</sup> July 2023

Date

## ABSTRACT

### AUTONOMOUS F1TENTH RACING CAR BASED ON ESP-IDF FREERTOS FIRMWARE

By

Rio Kristian Jordi  
Dr. Rusman Rusyadi, B. Eng., M. Sc., Advisor

SWISS GERMAN UNIVERSITY

This thesis project aims to make an autonomous F1Tenth racing car that is able to perform on an indoor track area along with the ability to avoid obstacles on the track. The purpose of this thesis is to make a further development of F1Tenth racing car by utilizing the benefits of ESP-IDF FreeRTOS firmware. LIDAR sensor is used as the main sensor that is responsible for taking real time data during the performance. The data that is taken will be computed by Raspberry Pi 400 mini-PC using algorithms like Wall Following and Follow the Gap. The data then transferred to ESP32 as a microcontroller that responsible for making the car move. The microcontroller will send PWM signal to Servo as a steering mechanism and Electronic Speed Controller (ESC) as the motor driver. These combinations of LIDAR and algorithm successfully create a fully autonomous system in the car without any human intervention which can perform well on the track along with its obstacle avoidance ability. In conclusion, ESP-IDF FreeRTOS is a promising platform for building an autonomous car like F1Tenth. It is also easier to work with a microcontroller like ESP32.

*Keywords: F1Tenth, Autonomous Mobile Robot, ROS2, ESP-IDF FreeRTOS, Wall following, Follow the Gap Method*



## **DEDICATION**

I dedicate this work to the future of the country I love, Indonesia and the development of autonomous technology in the Mechatronics field of study.



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