**CERTIFICATE**

This is to certify that the thesis entitled “Self-Driving Car” is being submitted by Rudranarayan Sahu (Roll No.: 15830V23028), Prabin Kumar Sahoo (Roll No.: 15830V23024) and Soumya Ranjan Panda (Roll No.: 15830V23032) to the Department of Computer Science and Applications, Utkal University, Vani Vihar, Bhubaneswar, for the award of the degree of Master of Computer Applications. It is an original research work carried out by them under my supervision and guidance. In my opinion, the thesis has fulfilled all the requirements as per the regulations of this University and has reached the standard needed for submission. The results embodied in this thesis has not been submitted to any other University or Institute for the award of any other degree or diploma.

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**DECLARATION**

We hereby declare that the work which is being presented in the thesis entitled “Self-Driving Car”, in partial fulfilment of the requirements for the award of the Master of Computer Applications is an authentic record of our own work carried out during the period January, 2025 to May, 2025 under the supervision of Dr. Lalatendu Muduli, Department of Computer Science and Applications, Utkal University, Vani Vihar, Bhubaneswar.

The matters and the results presented in this thesis has not been submitted by us for the award of any other degree elsewhere.

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**ABSTRACT**

Self-driving or autonomous driving technology represents a groundbreaking technical advancement in the field of transportation, artificial intelligence and machine learning algorithms to operate the vehicles by sensing its environment. The development of autonomous vehicle started back in year 1925 where the vehicles were controlled using radio frequency. We have experienced a very substantial changes in theses 100 years. Extensive network guided systems in conjunction with vision guided features is the future of autonomous vehicles. It can be predicted that by the end of this decade the automotive companies will commercially manufacture fully autonomous vehicles with no human assistance.

This thesis presents the design and implementation of a cost-effective, modular self-driving car prototype that integrates real-time computer vision, embedded systems, and IoT functionalities. The system utilizes a Raspberry Pi, ESP32 microcontroller, and L298N motor driver to provide autonomous navigation capabilities, making it an affordable solution for educational and experimental purposes.

The proposed system is equipped with a custom-trained YOLOv5 model for traffic sign recognition, real-time lane detection using OpenCV, and advanced safety features such as driver drowsiness and alcohol detection. The integration of a cloud-based monitoring system using ThingSpeak enables remote telemetry and data analysis, enhancing system reliability and scalability.

This work also includes a Bluetooth-enabled Android mobile application developed using React Native and Kotlin, allowing for manual control, debugging, and fail-safe operations. The modular architecture ensures the system's extensibility, supporting future enhancements like V2X communication and LiDAR integration.

The results demonstrate the effectiveness of the prototype in real-time traffic scenarios, showcasing its potential as an educational tool and a foundation for future advancements in autonomous vehicle technology.