

## ABSTRACT

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*This prototype system consists of hardware and software components. The focus of this final project is the implementation of a microcontroller and HMI (Human-Machine Interface) display in the development of a HUD (Head-Up Display) speedometer on electric motorcycles. The issue addressed in this final project is how to implement an Arduino and HMI display as a HUD speedometer, which can help users read information more easily and is expected to reduce the incidence of accidents while riding. The goals of this final project are to develop a HUD speedometer that can provide information such as speed, total distance traveled, vehicle temperature, time, battery level, turn signals, high or low beam lights, and an auditory notification that will alert the user when the motorcycle engine overheats. In this final project, the author uses the rapid prototyping method, which aims to make prototype development faster and more efficient by focusing on the initial objectives. The testing demonstrates that the prototype operates as intended. During the total distance tests, the prototype successfully completed 12 out of 12 trials, with the recorded total distance deviating by no more than  $\pm 1$  km. In the functional tests for displaying time, speed, turn signals, low beam, high beam, and buzzer notifications, the prototype succeeded in all instances. Additionally, during the current and voltage tests, the prototype accurately measured the current and voltage of each tested component. However, there were no substantial variations in the current and voltage values, as each component did not require significant amounts of current and voltage.*

*Keywords: Head-Up Display speedometer, Arduino, Human Machine Interface display, Nextion display.*