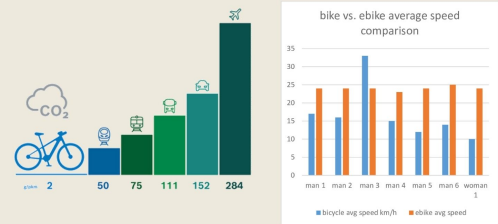


01. Introduction

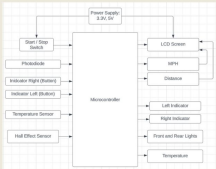
In recent years, electric bicycles (e-bikes) have gained significant popularity as an eco-friendly alternative to traditional bicycles and motorized vehicles. This project will undertake the design, construction, and programming of a prototype electric bicycle, leveraging modern technologies such as microcontrollers to enhance functionality. Testing on virtual software (proteus), in order to test the Magnetic Hall Effect sensor to confirm its effective as well as testing the prototype build and results will be recorded and analysed.



02. Objective

The primary objective of this project is to develop a functional e-bike prototype that demonstrates the integration of an electric motor with a traditional bicycle design. While also using a PIC microcontroller to add additional safety features. Final objective is the test and analyse the prototype and record results.

03. Systematic Block Diagram



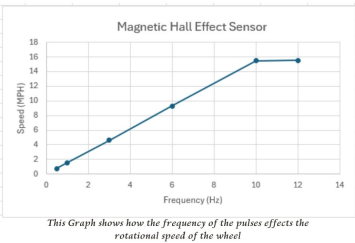
04. PIC Microcontroller Features:

- Automatic front and rear Lights:
- Light levels measured via Photodiode
- Right and Left Turn signals:
- Two push buttons for left and right indicator
 - Left and Right indicator bulbs with half second delay to simulate generic indicator bulbs
 - On screen indicator symbols for both left and right, visible for the rider, to avoid dangerous confusion

- Temperature:
- LM35 to measure temperature
 - Displayed on display visual for the rider
 - Ice warning for temperatures below 2 degrees celsius

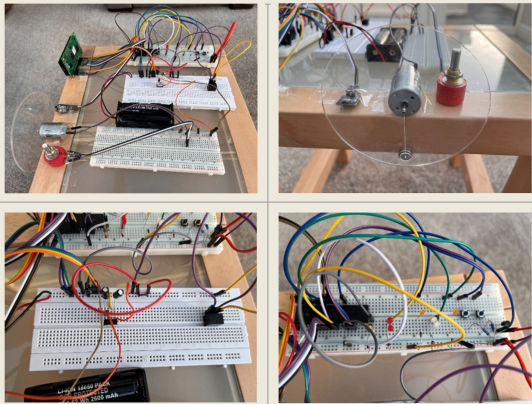
- Speed & Distance
- Measured using a Hall Effect Sensor
 - Magnet fixed to wheel in line of Hall Effect Sensor

05. Analysis



Upon analyzing the magnetic Hall effect sensor graph, a clear correlation emerges: as the frequency (Hz) increases, so does the rotational speed (MPH) of the wheel. However, an interesting observation arises as the graph flattens off at 15.5mph. This plateau occurs because the motor adheres to UK regulations, cutting off at this speed limit. This insight underscores the crucial role of sensor data in not only understanding performance but also in ensuring compliance with legal requirements.

06. Prototype Build



07. Conclusion

- Throughout the project, I have gained valuable insights into electric bike technology, electronic circuitry, microcontroller programming, and project management. Several avenues for further research and improvement. Some of these include:
- GPS Navigation, Theft Detection
 - Smartphone Integration
 - Regenerative Breaking
 - Solar Powered / Charging stations Solar Powered

