

EXECUTIVE SUMMARY

The challenge of commuting across a busy university campus on standard bicycles often leads to students arriving at classes feeling sweaty and exhausted. This common problem among student cyclists highlights a gap in the market for an efficient, non-taxing mode of transport. The E-Zoom conversion kit (Figure 1) is an electric bike attachment that offers a unique solution, effortlessly converting a regular bicycle into a hybrid one. The kit not only saves cyclists from the physical strain and discomfort that can come with traditional biking but also provides an option not readily available elsewhere - a simple, cost-effective upgrade to their existing bicycles. With the E-Zoom conversion kit, campus commutes become more convenient and less strenuous, filling a crucial need for a large segment of young, active individuals.

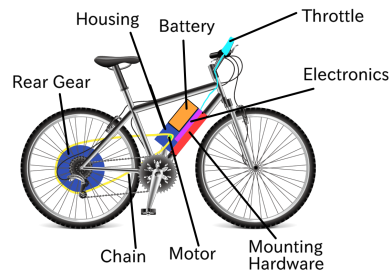


Figure 1 E-Zoom Diagram

The core requirements of the E-Zoom encompass easy assembly, featuring both manual and electric modes, a display showcasing real-time speed and battery data, a durable battery with a lifespan sufficient for 10 to 25 miles of riding, ample motor power, and a secure attachment to the bike. Additionally, the E-Zoom has economic, safety, and sustainability constraints such as product cost and federal regulations. The E-Zoom also complies with IPX4 water resistance standards, adheres to the ECFR 1512.2 federal regulation for e-bikes by limiting the speed to 20 mph, and meets the UL 2722 standards for electrical safety, demonstrating the E-Zoom's commitment to safety and quality.

The team's approach determined that the quality of the product and the value of the device are equitable factors. For these reasons, the E-Zoom conversion kit consists of parts that are easily purchased from a wide variety of manufacturers as well as parts that are common enough to keep their market prices low. An example of this can be seen in the provided sprocket and chain. The size of these parts are #410, a very common bike chain and tooth size. Furthermore, using the Arduino Uno as the microcontroller of choice allows for the use of common programming languages and better software support and functionality. The resulting product meets the core requirements while also satisfying the end user.

The team has confidence in the quality of the design and functionality of the E-Zoom conversion kit. With that being said, several areas can be improved upon to create an even better product. Custom gears are going to be added to the design to reach a specific speed and torque. An upgraded OLED display will allow for a more comfortable and easily readable output of data. All of the electronic connections will be standardized to ensure stability and provide easier means of connection and repairs. Some other potential additions that can be made to the E-Zoom kit are an app to add smartphone functionality and a reverse function added to the throttle of the bike. The planned additions and revisions will not only improve the functionality of this product but also make the end-user experience more enjoyable.