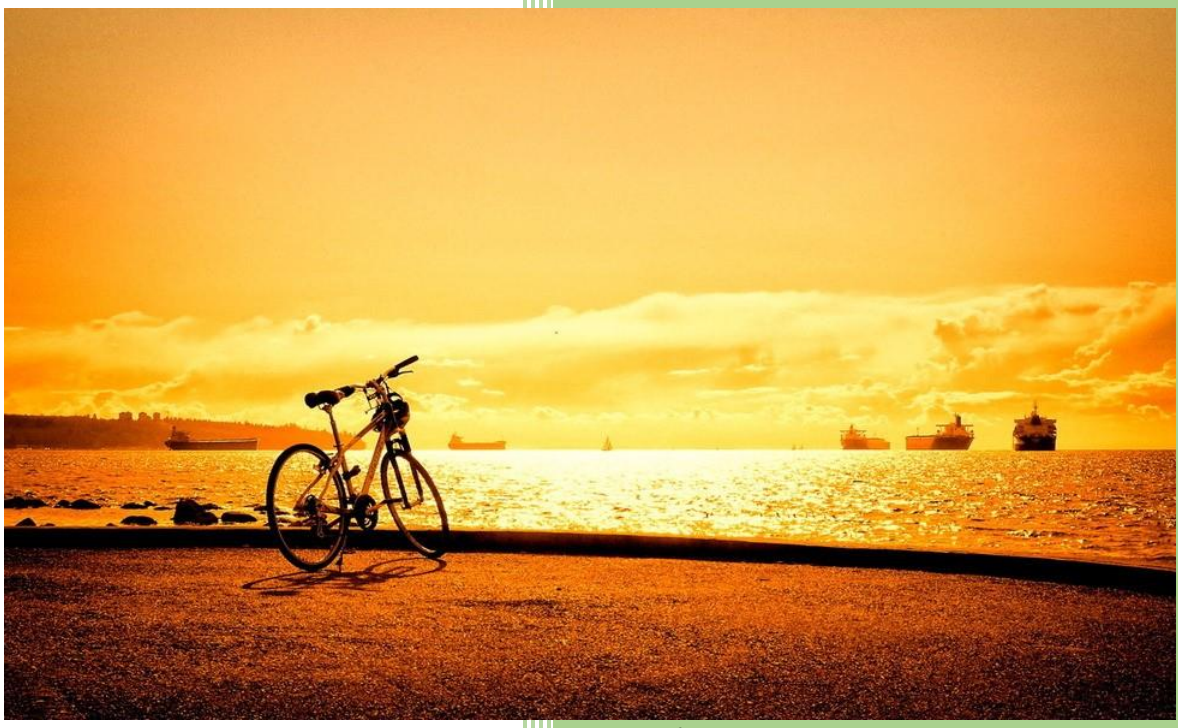
Design Specification

For A New Designed Hybrid Bicycle



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1. Introduction

With a wonderful energy conversion system, this new designed hybrid bicycle is a multi-functional bike, which is suitable for people of all ages. This design specification is implemented by all members of 4E technology Inc. Due to environmental issues generated by motor vehicles, the bicycle has become a more popular means of transportation. Therefore, we came up with the idea of a hybrid bike with energy conversion system. This new designed hybrid e-bicycle has an attractive feature where its kinetic energy can be converted into electrical energy and stored in battery and vice versa. When riders encounter bad road conditions, the stored electrical energy will be converted to kinetic energy automatically to enhance the mobility of bicycles.

2. Schedule

According to our original schedule, we have currently completed 80% of our final product. We ensured our proposal and finished our research as scheduled. We have received our components on time. Now we have completed power system. The remaining of tasks is to implement the generation system and generation system testing. We are debugging the generation system now. Although we are facing some problem, we could complete our final product before our demo, April 22nd 2016.

3. Financial

Table1 shows a simple breakdown of the budgeted spending and the actual spending. All parts are purchased and the only remaining spending anticipated are 3D printing and PCB.

Components	Budgeted	Actual	Remaining
bike	$500	$400	$100
Power & generation parts	$200	$100	$100
3D printing	$150	N/A	N/A
PCB	$100	N/A	N/A

4. Progress

The control of Hybrid e-bike is achieved by Arduino mega to control the MOSFET switches. We currently have finished the designing of the circuit and created our circuit by soldering components on prototype board. Since the high current feature of electric bike, the circuit cannot be implemented on a breadboard.

We also finished coding and connection of Arduino to the circuit and tested the motoring control with Arduino. The 3 phase BLDC motor propulsion have achieved by 36v Lead-Acid batteries with our controller. The speed control of motor is also achieved with potentiometer attached to analog input port of Arduino. The regenerative control feature of motor is still in progress. The problem we are encountering is that braking can be achieved with Arduino controlling the MOSFET switches yet the current couldn't flowing back to the batteries. This may be caused by perception mistakes of regenerative braking principle or logical error in coding.

The controller will be placed in a 3-D printed box. The box has already designed by Solidworks and will be sent factory to manufacture in the near future.

5. Conclusion

We have completed 80% of our product includes power system, driver circuit design and codes of BLDC motor driver. We have also tested our finished parts. Although we are facing problems for our generation system design, we could implement the generation system and finish generation system test on time before the demo, April 22nd 2016. We will finish our product properly and punctually