Tilt Control and User Interface Implementation on Existing Cruzbike Q45 Recumbent Bicycle

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Introduction

Recumbent bicycles like the Cruzbike Q45 are made for those people who want or need an alternative to traditional upright bicycles, but there are shortcomings as riders often find it difficult to start, stop, ride at low speeds, or balance at all. A tilting trike allows the rider to have the ability to lean into turns more easily ride and have the stability at slow speed to allow easier function, but unlevel surfaces still cause riders issues. Implementing a user interface to control this tilting mechanism allows a rider to keep themselves vertical, independent of uneven ground surfaces such as the slope of a road.

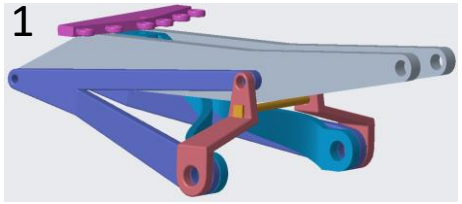
Methodology

1. Design bracket to mount existing tilting trike mechanism to Cruzbike Q45 recumbent bike
   - Allows user to switch from recumbent bike to tilting trike
   - Uses existing hardpoints of Q45 frame and causes no permanent changes
   - Operates using same geometry of existing bell crank and tilting mechanism design

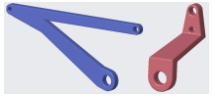
2. Design user interface for tilting mechanism
   - Mechanism can be operated safely by rider without being in the way during normal use
   - Interface utilizes lever mounted on the side of the rider with ball-joint linkage system
   - Rider applies torque on lever arm to balance trike while on unlevel ground
   - Mechanism does not require any significant force from rider as there will be no change in the height of the rider's center of gravity

Results

1

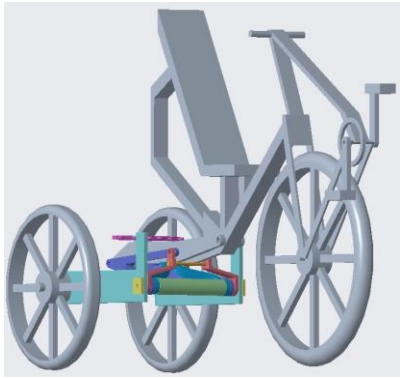


Complete Bracket Assembled and Mounted on Rear Cruzbike Frame



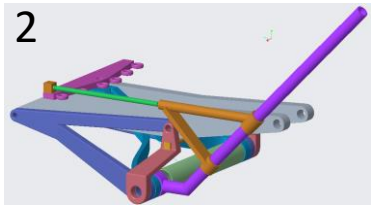
Bracket Pieces (Left)

Bell Crank Mount



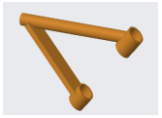
Full Assembly Model of Cruzbike Q45 with Tilting Trike Bracket

2

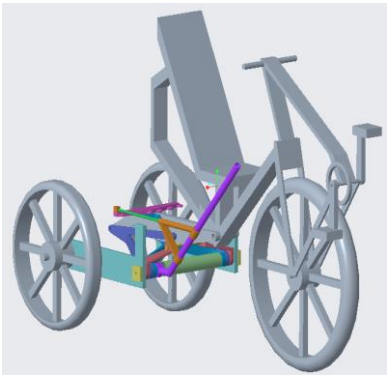


Complete Bracket and Tilt Control User Interface on Rear Cruzbike Frame

Ball Joint Mount and Linkage



Ball-Joint Support Linkage and Brace



Full Assembly Model of Cruzbike Q45 with Tilting Trike Bracket and Tilt Control User Interface

Conclusion

The tilt control user interface allows the rider to remain vertical even on tilted ground. The mechanism is currently in the 3D modeling phase. Creating a functioning prototype and creating a user interface for controlling the stability modes of the trike are the next objectives of this research. A more user-friendly trike will allow those who are unable to ride traditional bicycles the same mobility and exercise across unlevel surfaces.

Acknowledgements

Thank you to our sponsor Cruzbike for loaning us the Q45 bike, the UWM ASME HPVC for loaning the tilting trike prototype, and the SURF committee and Dr. Dressel for providing me with the resources and instruction in conducting this research