Bike Buddy
Team All I Ride Is Schwinn

General need for product
• No current product enables a single rider to safely and easily transport two bicycles
• Top reason for not cycling is lack of access to a bicycle

Customer Requirements
Safety
• Reliable tow connection
• Stability
• Visibility at night

Rear-mounted
Pros:
• Better straight riding performance
• More compact total bicycle volume
• Fewer components

Cons:
• Destabilizes during sharp turns
• Large bending stresses when bicycles lean

AHP Weights for CTQ Engineering Characteristics
Joined Bike Volume: 7%
No. Separate Components: 11%
Time to Attach: 16%
Tightening Torque: 4%
Steering Effort: 27%
Mechanism Design: 34%

AHP Alternative Value: 38%
AHP Alternative Value: 62%

Ease of Use
• Rideability
• Storage
• Adaptability to various bike models
• Low installation complexity

Rear-mounted
Pros:
• Stable during turns; minimal steering effort
• Significant stresses only during rapid longitudinal acceleration

Cons:
• Many components and separate stabilization system needed
• Cannot traverse narrow paths

AHP Alternative Value: 38%

Description and estimation of market size
• Road and high performance recreational cyclists
• Potentially 135,000 cyclists in the DC Metro area

Constraints
• Weight
• Device size
• Cannot obstruct riding

Steering Mechanism

Operation of Product
• Attach to primary bicycle and secondary bicycle
• Connect steering control mechanism and power on

Prototype and Testing

Optimization
• Sensitivity study to select critical component dimensions
• FEA based on anticipated operational loading

Test Procedure
• Verify numerical model
• Collect user feedback
• Analyze safety, comfort, and ergonomics

Future Work
• Implement optical steering control
• Customer feedback
• Reduce weight

Test Results and Future Work

Process Reflection
• Patent search aided with identifying potential mechanisms
• FEA allowed insight into optimization and failure modes

Subsystems
1. Folding mechanism for storage
2. Active electronic steering mechanism
3. Quick-release clamp connections to bike

Processes
• Machining
• Welding
• Soldering
• 3D Printing

Product Design Process
• Identified need for a single person to transport two bicycles
• Built two prototypes and selected our final design by utilizing AHP and Pugh selection processes
• Model and refinement of design
• Prototyped proof of concept

Future Work
• Patent search aided with identifying potential mechanisms
• FEA allowed insight into optimization and failure modes