Technical Objectives

Design and fabricate a recreational hand-cranked cycle ("handcycle"). The handcycle is constructed such that it is powered solely by the user's upper body, with no leg effort required. A combination of hand and body steering allows the user to power and steer the cycle with increased maneuverability. Cost, innovation, and ease of fabrication are considered in prototype design.

Design Parameters

- Four-wheeled
- Rear-wheel drive
- Combined hand and body steering
- Off-road capability
- Hand powered

Computer Aided Design Models

Front Components

- Hand crank with chain drive
- Front steering with 2 degrees of freedom (tilt and swivel steering)
- 1 shock implemented as front suspension

Rear Components

- Rear axle with single gear sprocket centrally located
- Independent rear suspension
- Seat mounted on central shaft to support tilt/lean steering

Full Assembly

Fabricated Prototype

Design Validation

FEA Analysis - Displacement

FEA Analysis - Stress

Social and Environmental Impact

- Prototype fabricated from recycled and recyclable materials
- Proceeds from materials sourced at The Hub in Midtown, Detroit benefit the Back Alley Bike youth education program
- Intended for handicapped who cannot use their legs