

# Hobie Cat Kayak

## Group Members

Matthew Ricciardi – Group Leader

Brian Back – Technical Liaison

Ryan Wackerly – Purchasing Agent

Zach Walker – Web Page Specialist



# *Advisors and Clients*

- Faculty Advisor

- Dr. Mohamed Samir Hefzy
- Dr. Mehdi Pourazady

- Client Advisor

- Ms. Jill Caruso
- Dr. Chris Beins

- Client

- Mr. Steve Grudzien  
CEO Patriot Products

- Project Sponsor

- The Ability Center of Toledo
- National Science Foundation

# *What is the Hobie Cat Kayak?*

The Hobie Cat Kayak is a non-traditional kayak powered by the Mirage Drive System.

- Foot powered propulsion system.
- More efficient than conventional paddles.
- Modeled from tuna fins and penguin flippers.
  - Foil Design



Matt Ricciardi

# *Project Description*

- Currently the device is not adaptable to individuals with limited or no use of their legs. Our focus is to transfer the user's arm motion to the Mirage Drive System.
- Our design centers around ease of use, simplicity, and keeping all functionality of the current Hobie Cat Kayak.
- Removal and installation of the device shall be as easy as for the Mirage Drive System.

# *Methodology*

- Design Guidelines
  - Operated by arms while in a sitting position.
  - Device will be located between inner thighs.
  - Corrosion resistant.
  - Light weight.
- Concepts
  - Two push pull rocker arms
  - Hand crank
  - Direct cables

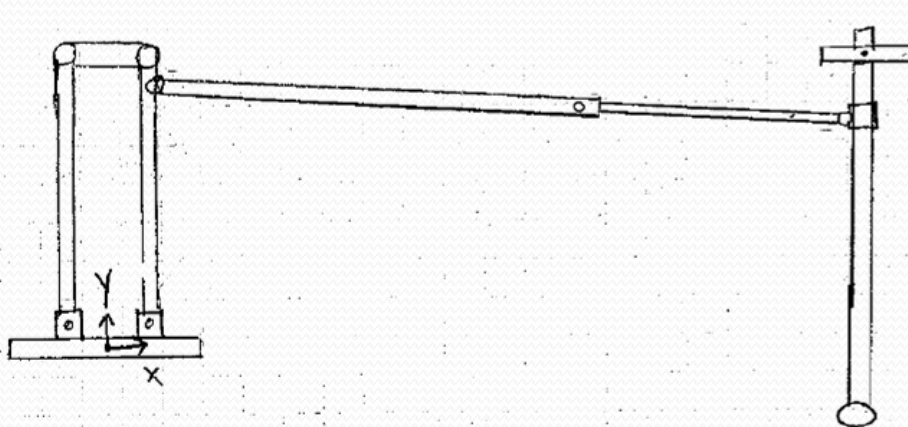
# *Design #1 – Two Push-Pull Rocker Arms*

## Advantages

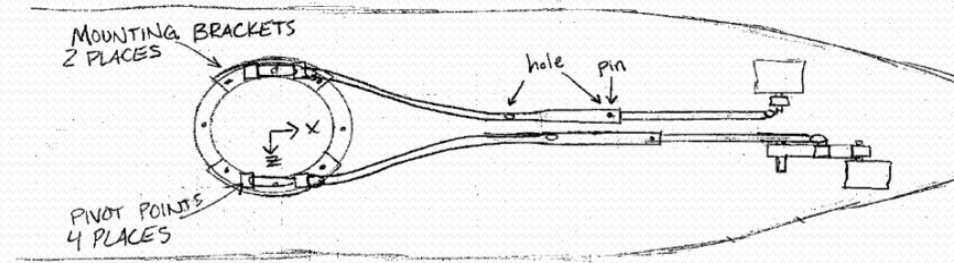
- Able to operate with one arm
- Rigid
- Good range of motion
- Easy to fabricate
- Hatch Accessibility

## Disadvantages

- Not able to use existing components
- Potential inner thigh discomfort.
- Connecting rod requires complex bends.



Elevation View



Plan View

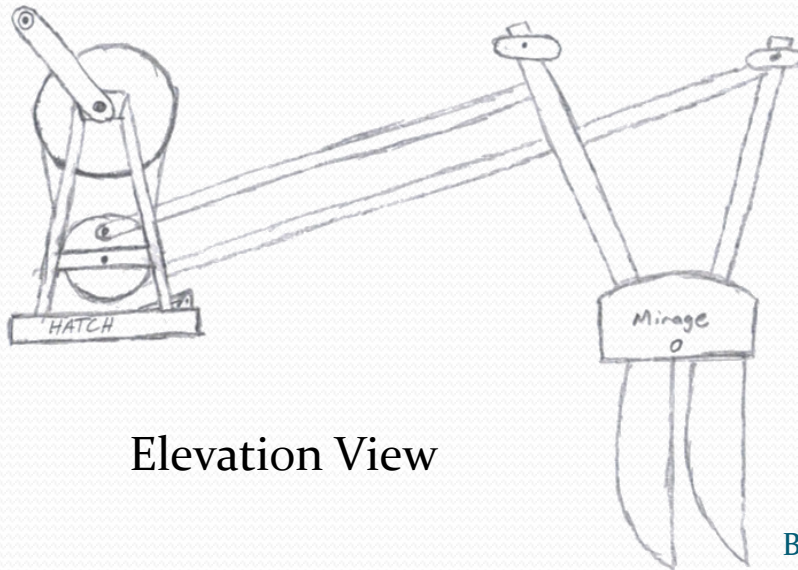
# *Design #2 - Hand Crank*

## Advantages

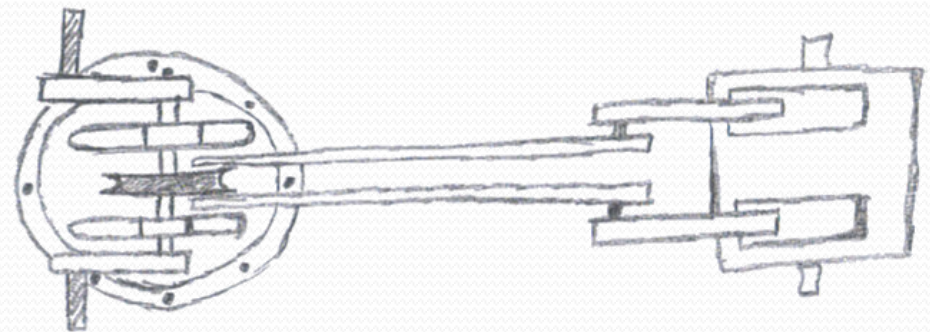
- Continuous motion
- Can use existing components
- Output ratio flexibility

## Disadvantages

- Complex system
- Bearing housing complications ( seals and weight )
- Range of motion



Elevation View



Plan View



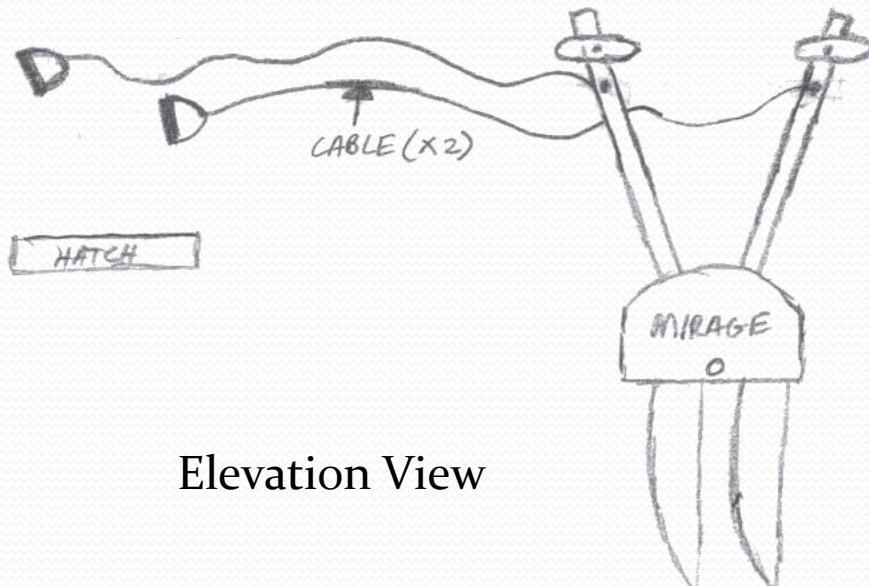
# Design #3 - Direct Cable

## Advantages

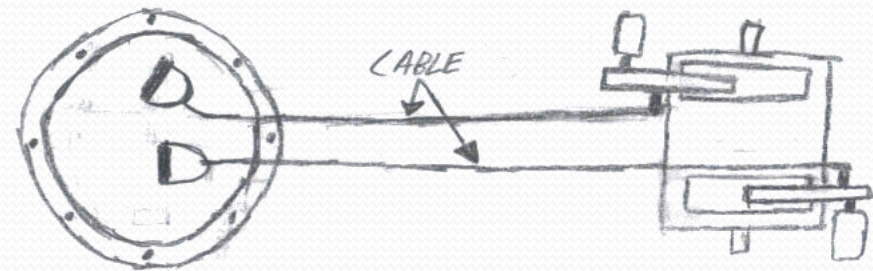
- Simple
- Light weight
- Inexpensive

## Disadvantages

- Only kind of input force is a pulling motion
- Need two arms to use
- Cant operate and steer



Elevation View



Plan View



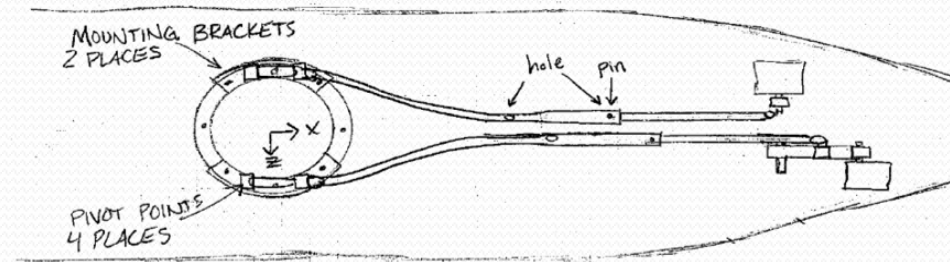
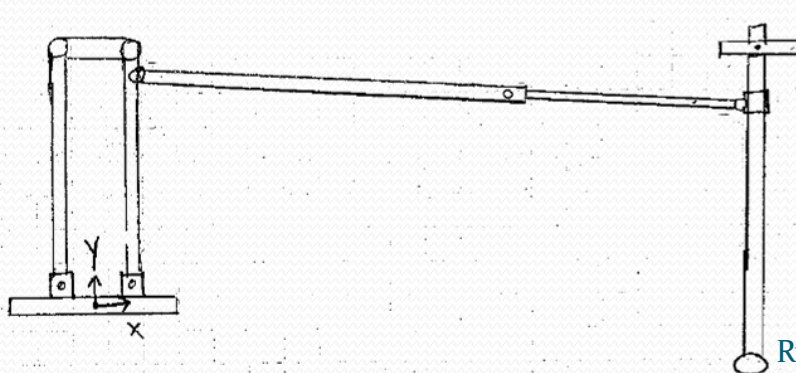
# House of Quality

	Importance	Rocker	Crank	Cable
Safety	4	4	4	5
Light Weight	4	4	3	5
Cost	3	4	3	5
Original Function	2	5	3	5
Ease of Use	4	5	3	3
Adaptable	5	5	4	1
Durable	5	4	3	4
Score		119	90	102

# *Selected Design*

- Design 1

- Allows for upper body to remain square with device, no rotation of spine required
- Allows for use of hatch.
- Handles do not move independently.
- Allows for simultaneous use of rudder while in operation.
- Lowers center of gravity, mounted closer to kayak hull.



# Work Plan & Project Deliverables

	January			February				March					April				May
	12	19	26	2	9	16	23	2	9	16	23	30	6	13	20	27	4
Establish Group																	
Assign Roles																	
Meet with Client																	
Meet with Client Advisors																	
Meet with Faculty Advisors																	
Brainstorming Sessions																	
Establish Multiple Designs																	
Design Selection																	
Proposal Presentation/Report																	
Design Modeling																	
Order Materials																	
Assemble/Test																	
Midterm Presentation/Report																	
Finished Product																	
Final Presentation/Report																	
Design Expo																	
NSF CD and Abstract																	
Evaluations/Final Paperwork																	

# Budget

Bulk Material:

\$150

- Stainless Steel Plate
- Stainless Steel Rods

Rod Connectors:

\$150

- Rod End
- Quick Connectors

Misc. Materials:

\$200

- Fasteners
- Bearings
- Handles
- Prototyping

Machining Costs:

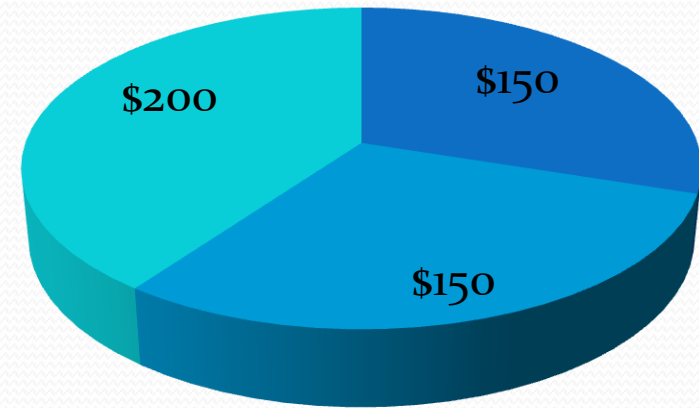
\$65/Hour

Testing Facilities:

\$50/Hour

Total:

\$500 + Machining and Test Time



■ Bulk Material

■ Rod Connectors

■ Misc. Materials

# *Questions*



*Thank you very much*