Figure-Eight Drive
WDDC/MIT PSC Fellowship

Association for the Physically Disabled of Kenya

June 1 - July 19, 2007

Nairobi, Kenya

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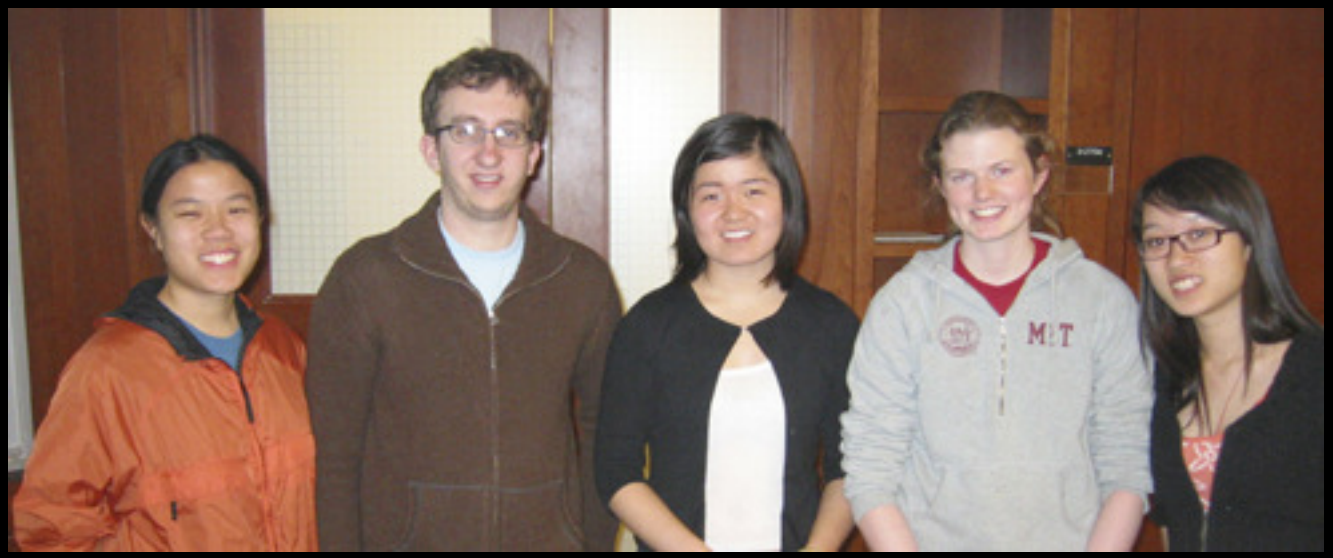
WDDC Biomech 2007



- Elizabeth Au, Mario Bollini, Xin He, Lindsay Todman, and Katherine Wong with Amos Winter and Gwyndaf Jones
- Looked into alternative tricycle propulsion techniques before deciding to try to optimize the tricycle gear ratios and shifting systems.
- Mario spent the summer at APDK in Kenya.
- Lindsay spent the summer at DAGE in Tanzania.


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Figure-Eight Drive

The Problem

- Current handcycles have a fixed gear ratio, making staring movement, hills, and ramps difficult.
- Multiple-gear systems use standard bicycles derailleurs but are difficult to manufacture, difficult to use, and fragile.

The Figure-Eight Drive

- Offers two gears that are switched between by changing the direction of pedaling. (A retro-direct drive train)
- Can be constructed out of parts APDK already orders for other products.
- Is cheaper than current multiple-gear systems.
- Takes only one additional hour and $3 more (total basic tricycle cost is $200) to construct than the entry-level tricycle.

Work at APDK

- The experience was an internship in Nairobi.
- Worked with a dedicated technician to develop the prototype to its third generation.
- Performed numerous tests with dozens of Kenyan handcycle users at the APDK compound.
- Created a testing rig to simulate over 100km of uphill pedaling.
- The prototype is in its final long-term testing phase and is nearing full production.

Video

http://www.youtube.com/watch?v=ZigZ4dnf2oo

The Fellowship Experience

- PSC funds the trip by paying an hourly wage.
- Spend up to 10 weeks in country (I spent 7) working on your project.
- Get an amazing hands-on experience in a new and exciting culture.
- In addition to developing a prototype that is headed for full production I:
  - Met and learned from amazing people
  - Went on Safari
  - Mountain biked in the Rift Valley
  - Visited tropical Zanzibar

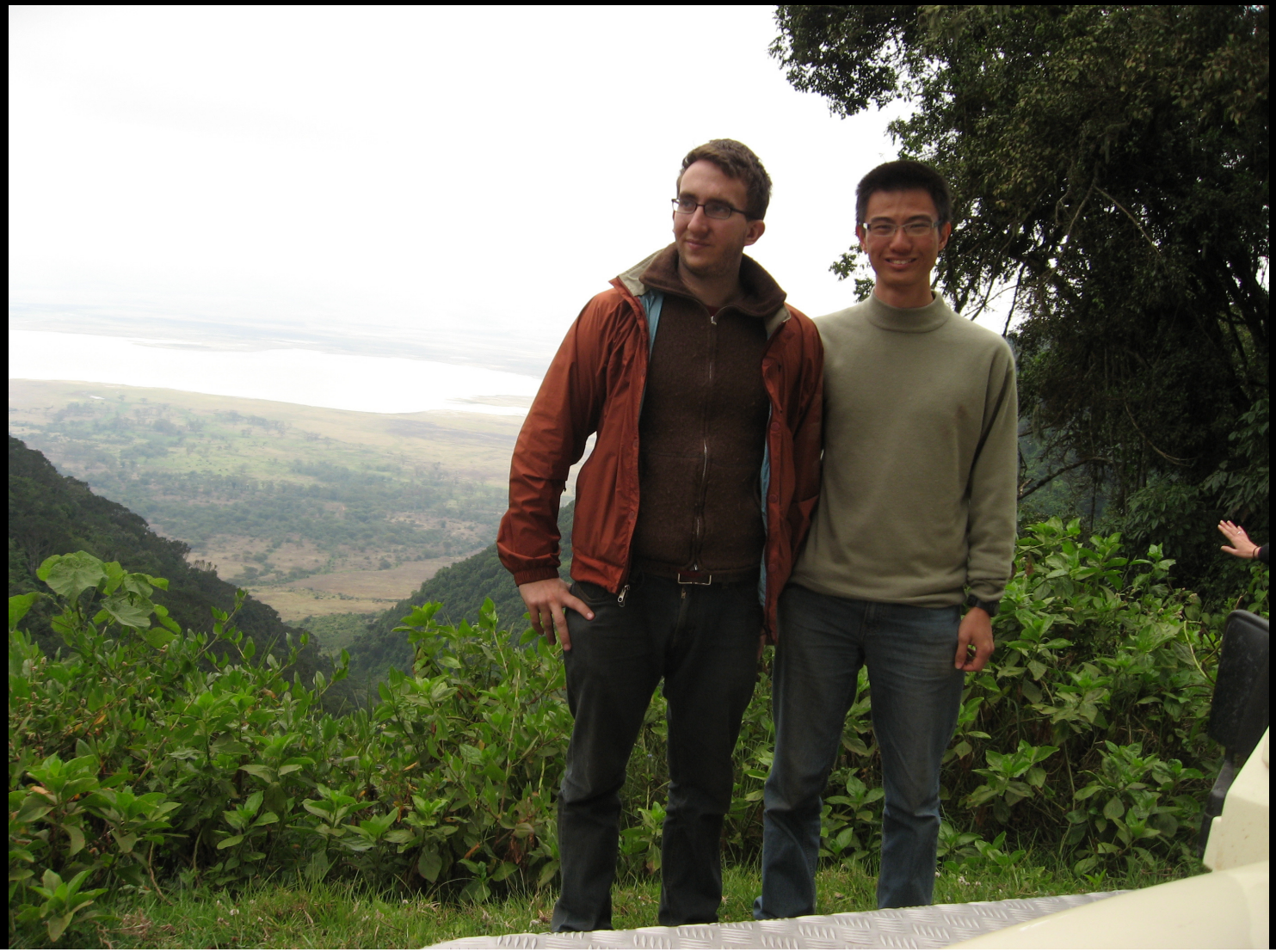
People

Culture

Safari

Safari

Safari



Zanzibar

Zanzibar

Acknowledgements

Thank you WDDC and MIT PSC for this excellent opportunity!

For more information about the fellowship and prototype, including complete manufacturing instructions and a record of development and experimentation, please visit:

http://web.mit.edu/mbollini/www/tricycle/