Second Generation Bicycle Charging Station Concept Generation

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Overview

- Project Background
- Concept Generation
- Concept Selection
- Project Timeline Progress
- Conclusion

Rob Rosenberg

The Project

- **Goal Statement**

  -Provide students with a way to understand and compare the amount of energy required to power and charge electronic devices with the amount of energy produced by pedaling a bicycle

Kori Molever

The Project

- **First bicycle charging station built in 2012**
- **Second generation station must provide –**

  -Greater educational value

  -Interactive display

  -Comfort for variety of users

  -Increased portability

Kori Molever

Concept Generation

- **Gearing**
- **User Adjustability**
- **Power Storage**
- **Portability**

Gearing

- **Single Speed**
  -Cost effective
  -Less complicated

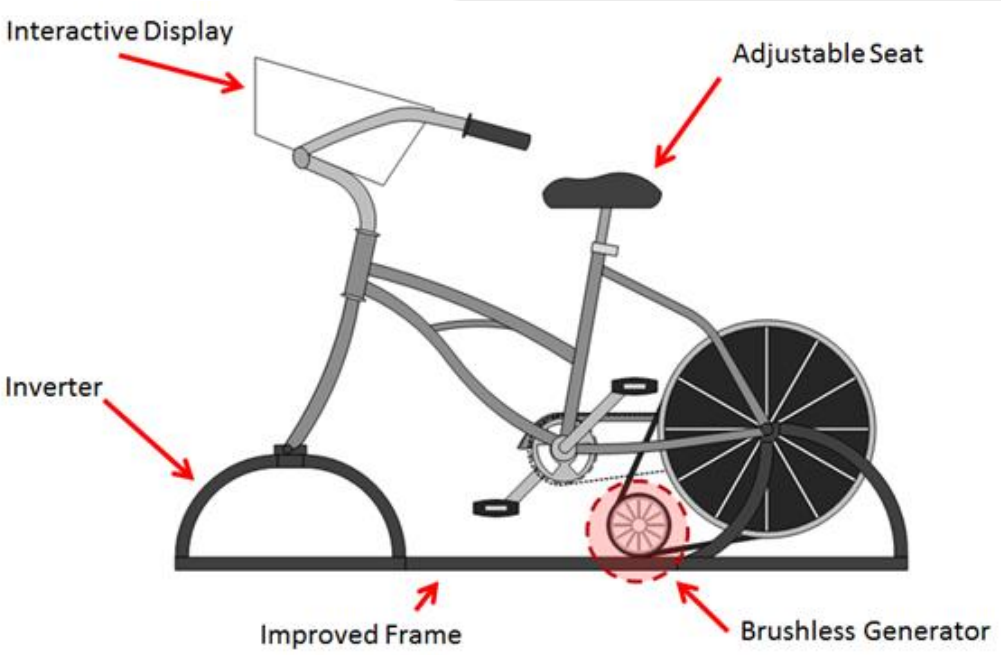
- **Geared Bike**
  -Allows for higher RPMs
  -More expensive

http://www.meijer.com

Michael Klinefelter

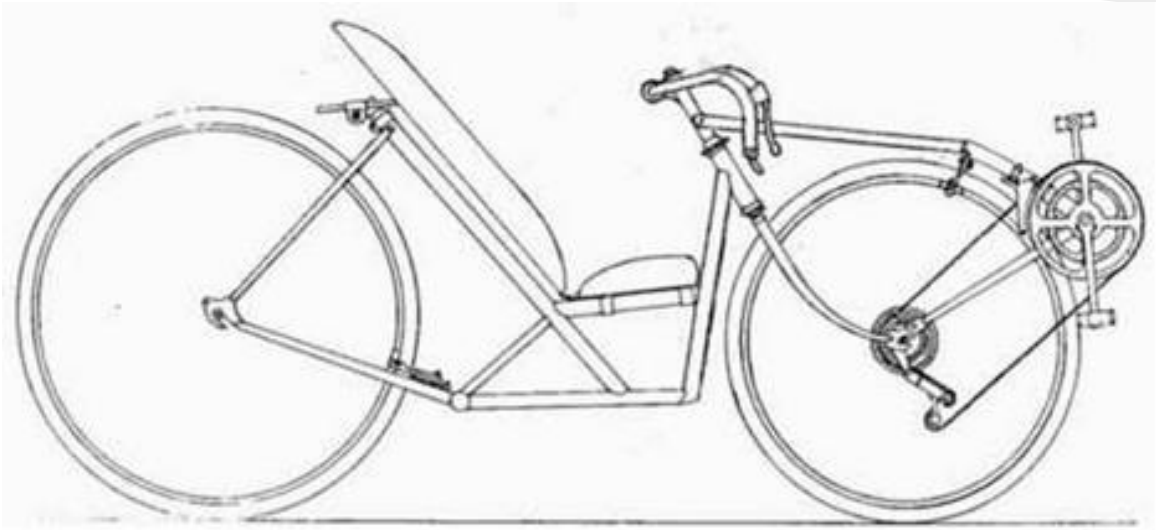
User Adjustability

- **Upright configuration**
  - **-**Readily Available
  - -Seat Adjustability to 12 inches
  - -Lower cost



Adjustability

- **Recumbent Frame**
  -Ergonomic advantage
  -Higher cost
  -Increased size



bentrideronline.com

Jonathan Jerome

Power Storage

- **Battery**
  - -Must be initially charged before supplying power
  - -Charge depletes over time
- **Capacitor**
  - -Conducive to immediate charging
  - -Rapid discharge

wholesalebatteriesdirect.com

mccreavy.com

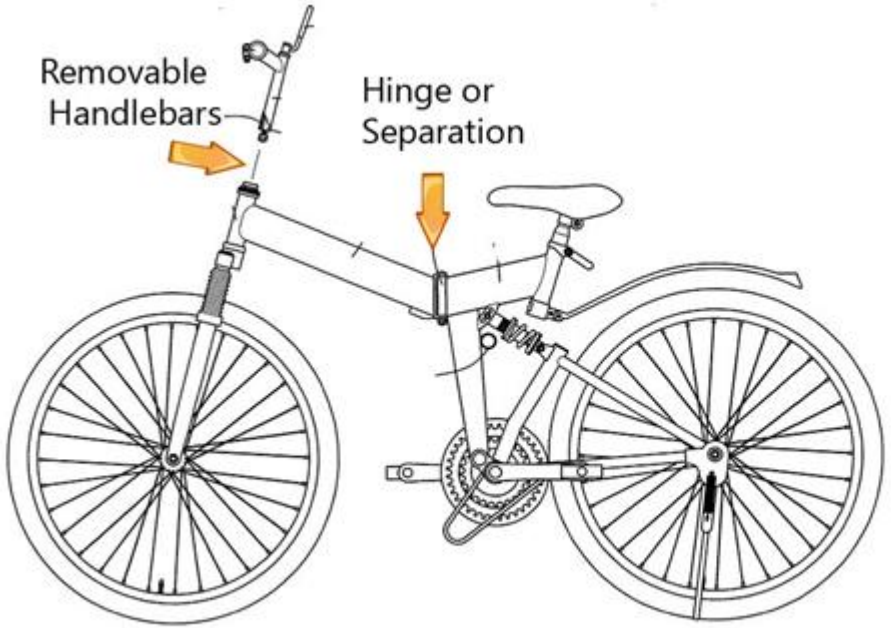
Jonathan Jerome

Portability

- **Collapsible Frame**

  -Frame separation

  -Carrying case for each piece



freepatentsonline.com

Connor Kroneberger

Portability

- **Rear wheel stand**

  -Rotates to top of rear wheel for ease of travel

  -Fewer components

  -Bicycle can be ridden to new location

bikecad.ca

Connor Kroneberger

Relative Weight

Design Option	Assembly Time (sec)	Weight (lb)	Range of Adjustability (inches)	Cost ($)	RPM	Maintenance (hours)	Total
Assembly Time (sec)	-	0	0	1	0	0	1
Weight (lb)	1	-	0	1	0	1	3
Range of Adjustability (inches)	1	1	-	1	0	1	4
Cost ($)	0	0	0	-	0	1	1
RPM	1	1	1	1	-	1	5
Maintenance (hours)	1	0	0	0	0	-	1

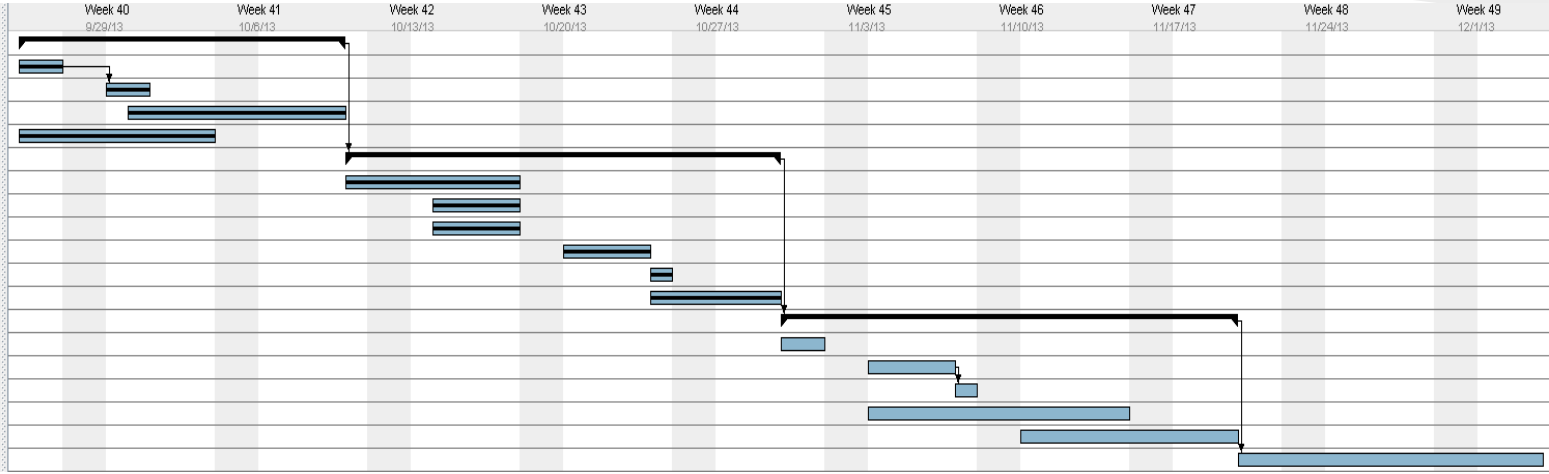
Rob Rosenberg

Decision Matrix

Scale: 1-unfavorable 5-favorable	Assembly time (sec)	Weight (lb)	Range of Adjustability (inches)	Cost ($)	RPM	Maintenance (hours)	Total
Collapsible	5	2	1	1	1	2	23
Rear Wheel Stand	5	2	1	3	1	2	25
Upright Frame	5	1	5	4	3	1	48
Recumbent Frame	2	2	5	2	1	2	37
Geared	1	1	3	4	5	3	48
Single Speed	1	1	2	1	5	1	39
Battery	1	1	1	4	1	1	18
Capacitor	1	4	1	4	1	1	27
Relative Weight	1	3	4	1	5	1	

Project Timeframe

Name	Begin d..	End date
Project Needs, Specifications, Plan	9/26/13	10/10/13
Project Needs Generation	9/26/13	9/28/13
Objectives/Specification Gener...	9/30/13	10/1/13
QFD Analysis	10/1/13	10/10/13
Semester Project Timelin Plan...	9/26/13	10/4/13
Concept Generation and Selection	10/11/13	10/30/13
Gearing Concept Generation	10/11/13	10/18/13
Adjustability Concept Generation	10/15/13	10/18/13
Power Storage Concept Gener...	10/15/13	10/18/13
Portability Concept Generation	10/21/13	10/24/13
Update QFD/Decision Matrix	10/25/13	10/25/13
Concept Selection	10/25/13	10/30/13
Engineering Analysis	10/31/13	11/20/13
Preliminary Analysis Meetings	10/31/13	11/2/13
Portability Design	11/4/13	11/7/13
Portability Analysis	11/8/13	11/8/13
Power/Gear Analysis	11/4/13	11/15/13
Adjustability Analysis	11/11/13	11/20/13
Project Proposal	11/21/13	12/4/13



Rob Rosenberg

Conclusion

- Discussion of project and design concepts
- Concept selection
    - -Upright Frame
    - -Geared
    - -Rear wheel stand
    - -Capacitor
- Progress with respect to projected timeline

Rob Rosenberg

References

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Rob Rosenberg

Questions?