

WuhaGize (WaterTime)

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“Given the relevance of the time-saving benefit to water supply policy and the fact that the benefit is usually uppermost in the mind of the consumer, it is remarkable how few data have been collected on the amounts of time spent collecting water” Cairncross and Valdmanis, Disease Control Priorities in Developing Countries, 2006.

Purpose

To support water usage studies in resource poor environments by providing low-cost, low power sensors to measure movement.



Image credit: Professor Joe Cook, University of Washington

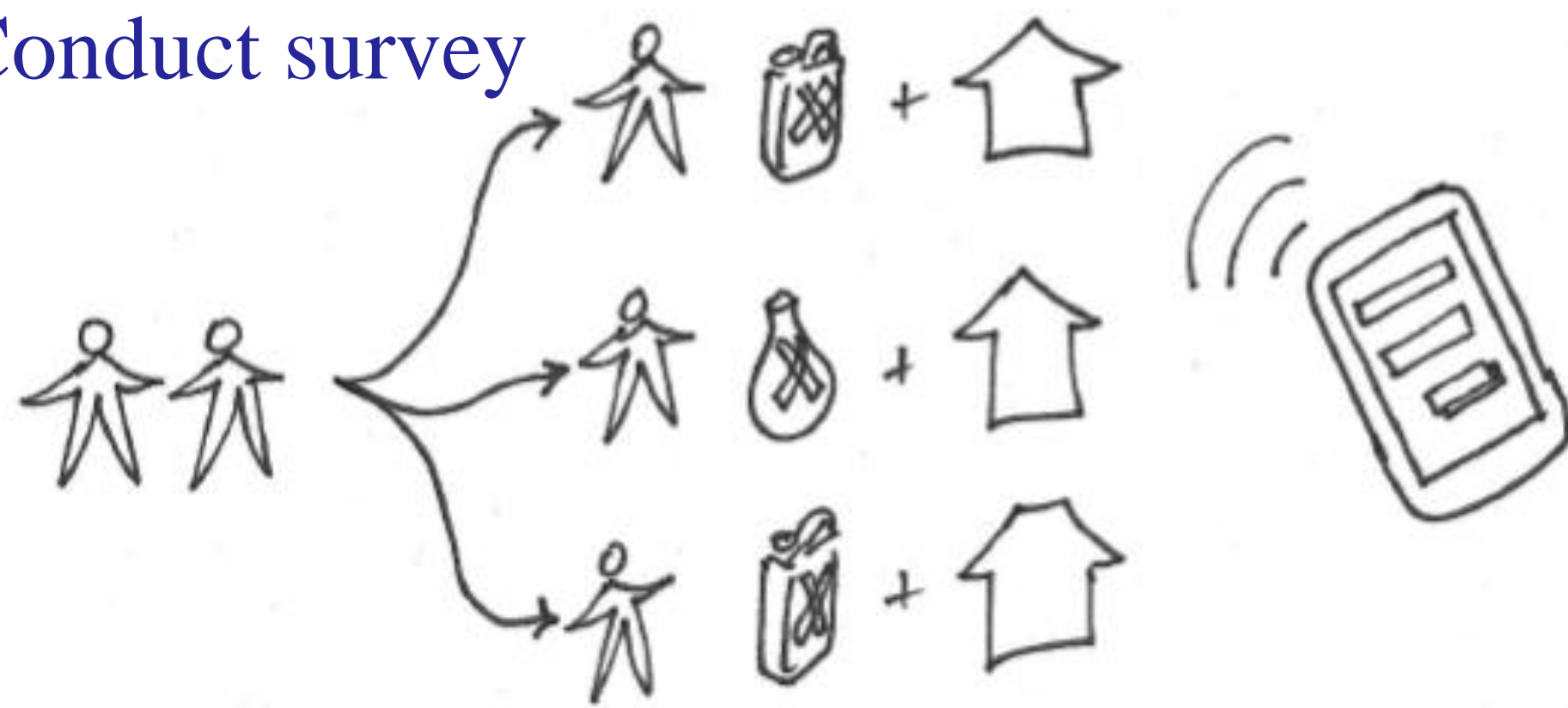
System Components

- Motion detecting sensor
- Android app to manage sensors and collect data
- Python program to sync phone data to computer

System Use: Three Phases

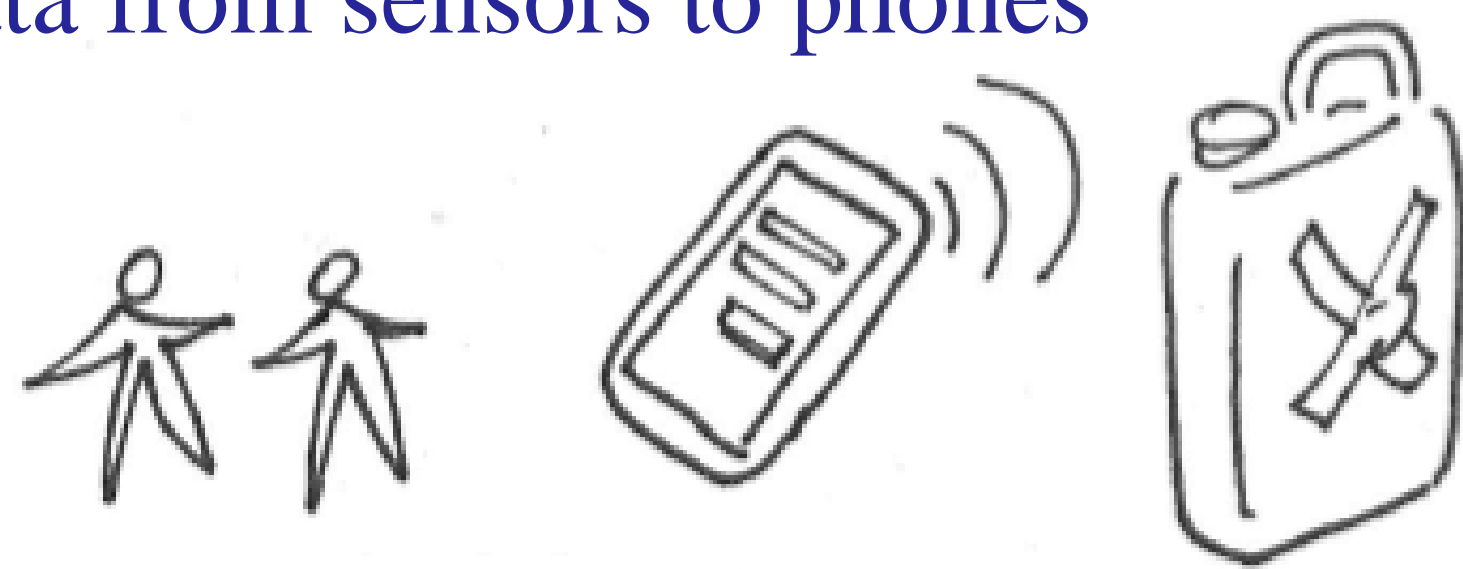
1) Deploy

- Assign sensors
- Conduct survey



2) Collect

- Pull data from sensors to phones



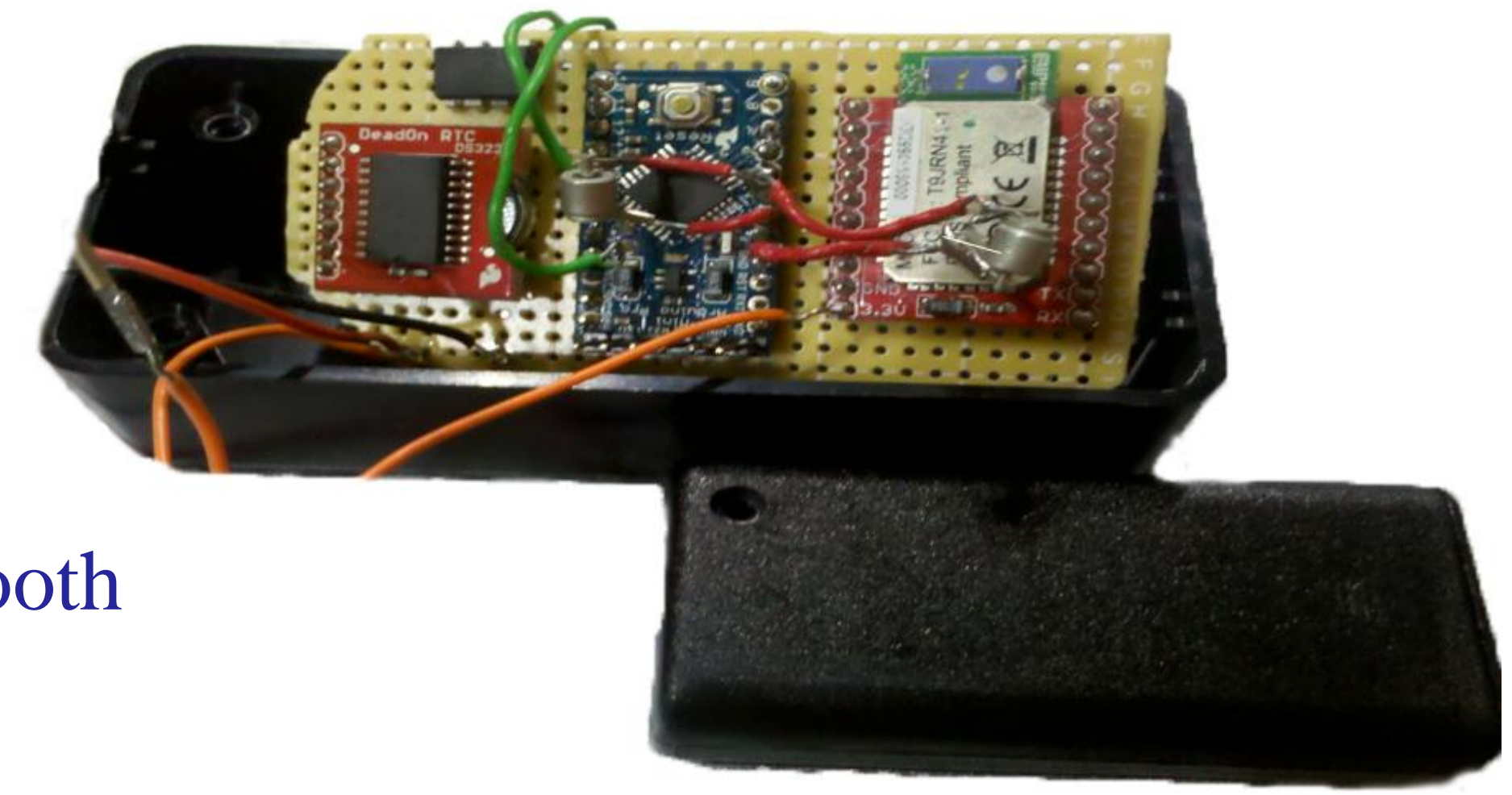
3) Sync

- Pull data from phones to computer



Hardware Design

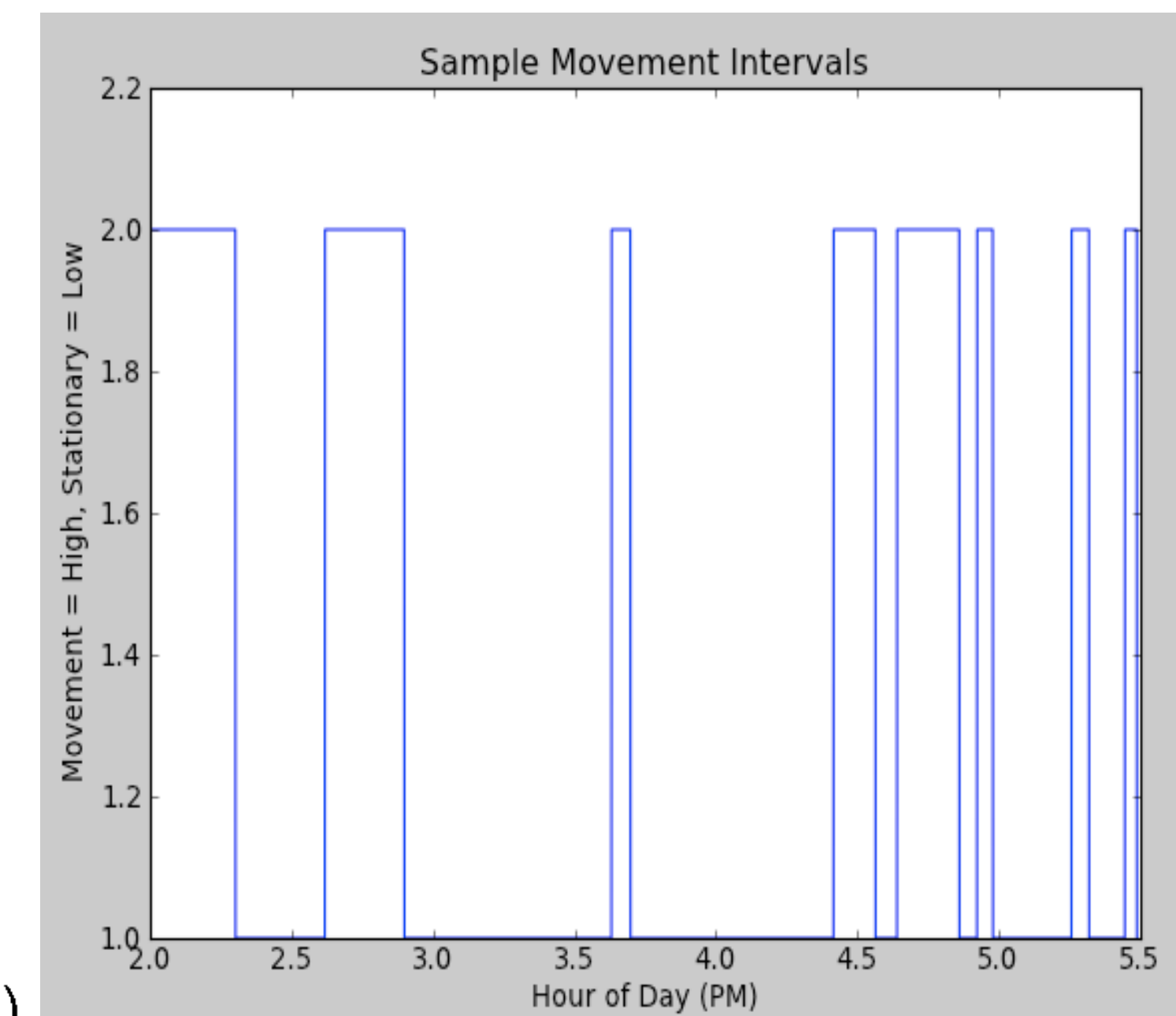
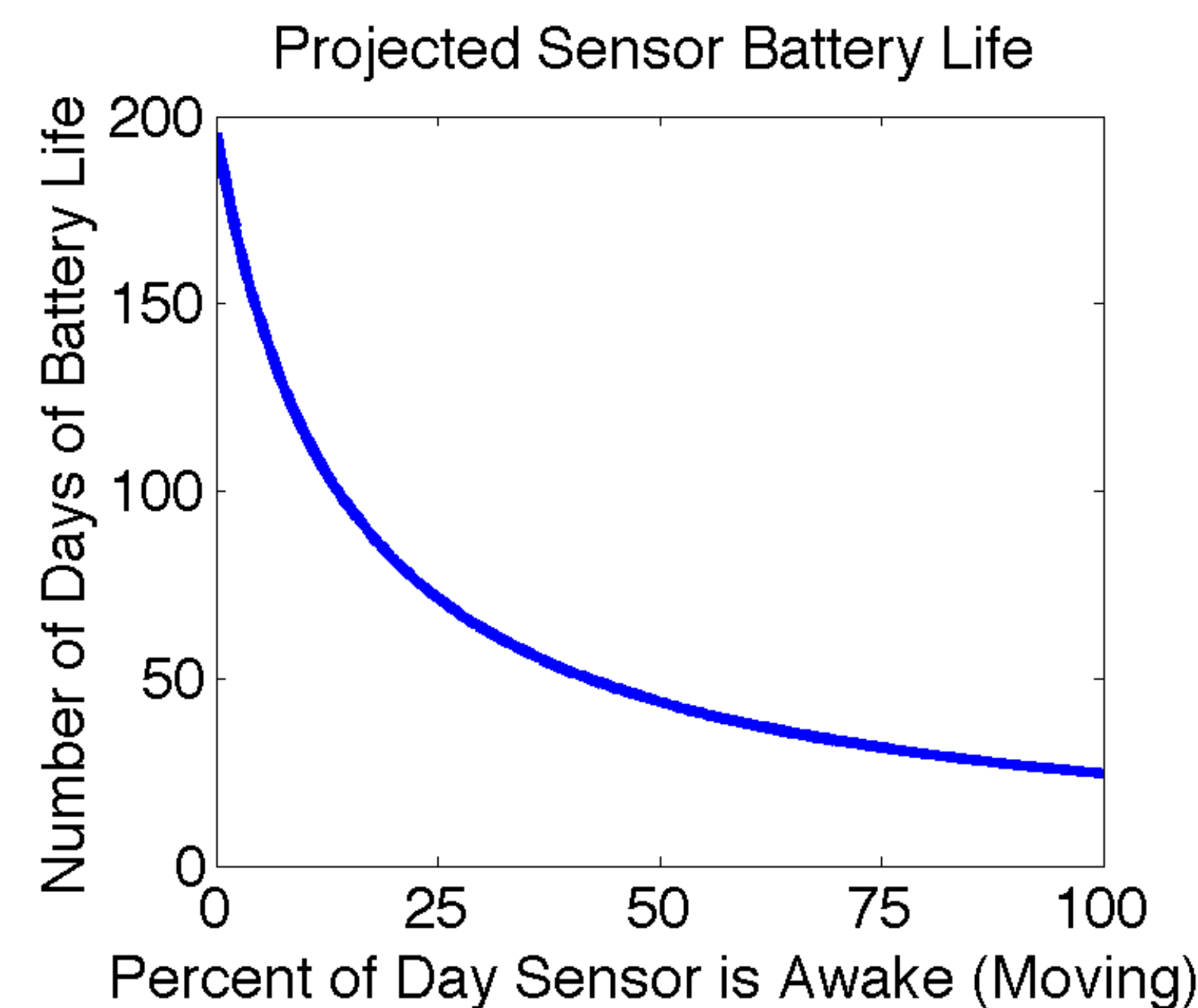
- Arduino Pro Mini
- Real-time clock
- EEPROM
- Bluetooth
- Two AA Battery Pack
- Switch to power Bluetooth
- 2 Mercury Switches



Optimizations

- Reduce noisy data: Motion detection algorithm on sensor (minimum movement time and max. idle time of two minutes)
- Reduce power usage: Low power sleep modes used when sensor is not moving

Results



If the sensor moves 25% of the day and if researchers collect data via Bluetooth once a week the sensor is projected to last over two months on two AA batteries, as shown on the graph on the left. The histogram on the right shows movement intervals detected by the sensor during a week long period.

Conclusion

Successes:

- Battery Life
- Data Quality
- Size/Weight
- Cost (projected)

Areas for Improvement:

- Extensibility

Future Work:

- Send prototypes to Ethiopia to be tested
- Create custom PCBs
- Bring down cost for full deployment

Acknowledgements

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