“There when you need it, gone when you don’t”

Image by plus png: http://pluspng.com/battery-charging-png-922.html

Identifying a Problem

- For years, phone batteries have lasted for an average of 24-48h.
- Instead of increasing energy density of the batteries, phone manufacturers have opted to focus on charging technology (e.g. battery packs)
- Most consumers purchase these portable battery packs to make up the gaps in charge

Initial Idea

- Device fit inside a phone to induce drip charge
- Device would be powered by linear induction or another method
- Device either piggybacked or separately connected to battery

Problems with Initial Idea

- Lack of resources to miniaturize
- What battery could even fit in that space?
- Thoughts on solid state lithium ceramic batteries
- Supercapacitors`

How can I use supercapacitors in a different way?

Emergency Chargers: Current Technology

- Products like the American Red Cross Fx3 or the pocket socket 2 from adafruit are bulky and not portable to the extent a user would like.
- AMPY, a movable battery pack promised power while movement but failed as the amount of work required to charge the battery (inefficient)

Summary of Shortfalls of current approaches

- Need to carry BULKY portable battery charger
- Inefficient System
- Degradation of original Lithium Ion battery in the phone over time due to charge cycles and need to replace battery or phone
- Contribution to E-waste

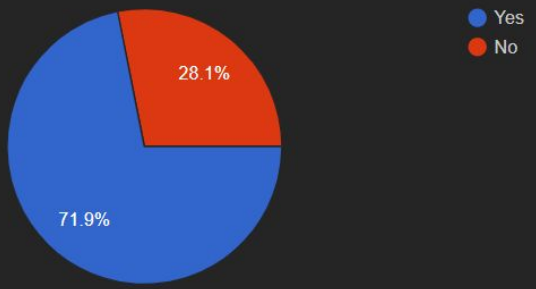
What are the goals of a Nanobattery?

- Portable
    - Loop Attachment, pocketability, there when you need it, gone when you don’t
- Kinetic Charge
    - Charge with movement, either shaking or winding
- Emergency Charge
    - Should be able to charge 1% to make an emergency phone call or text

Preliminary Analysis: Public Survey

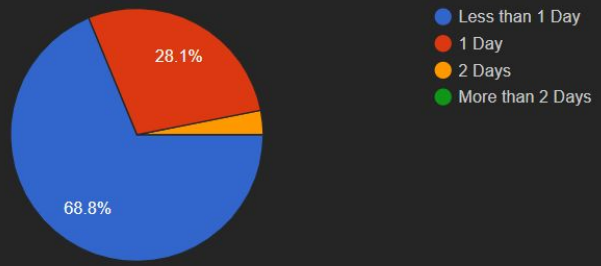
Do you own a battery bank or portable rechargeable battery?

32 responses



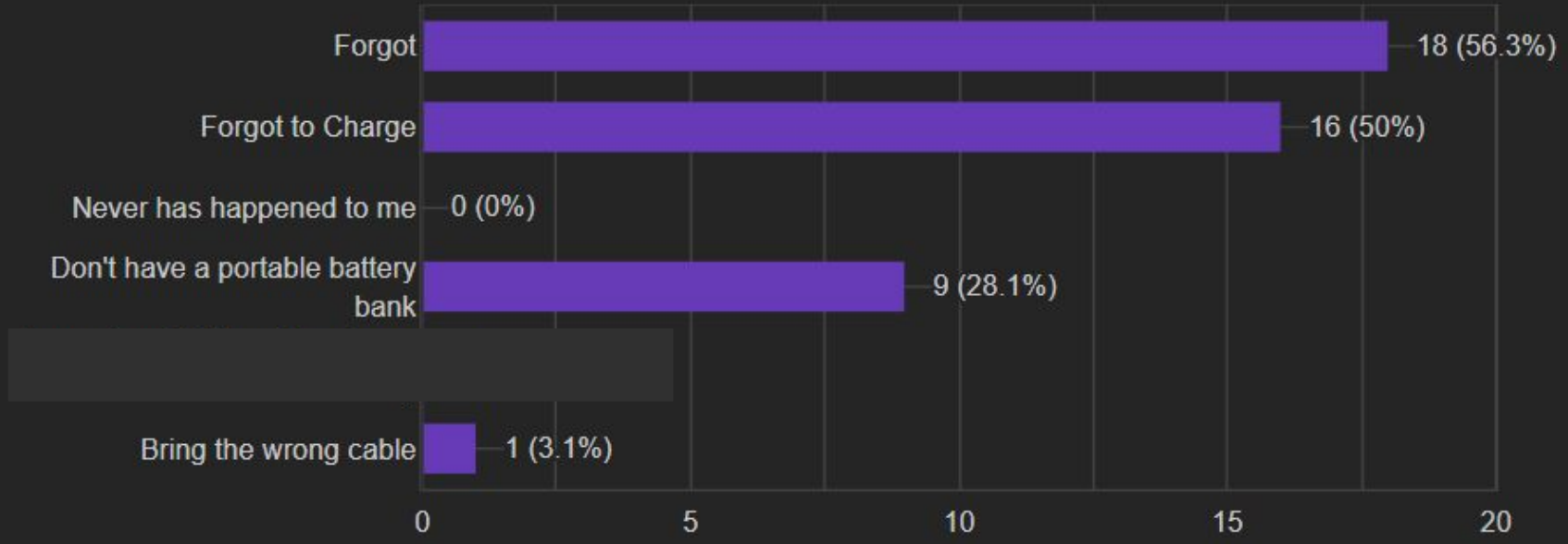
On Average how long does your battery last? (in days)

32 responses



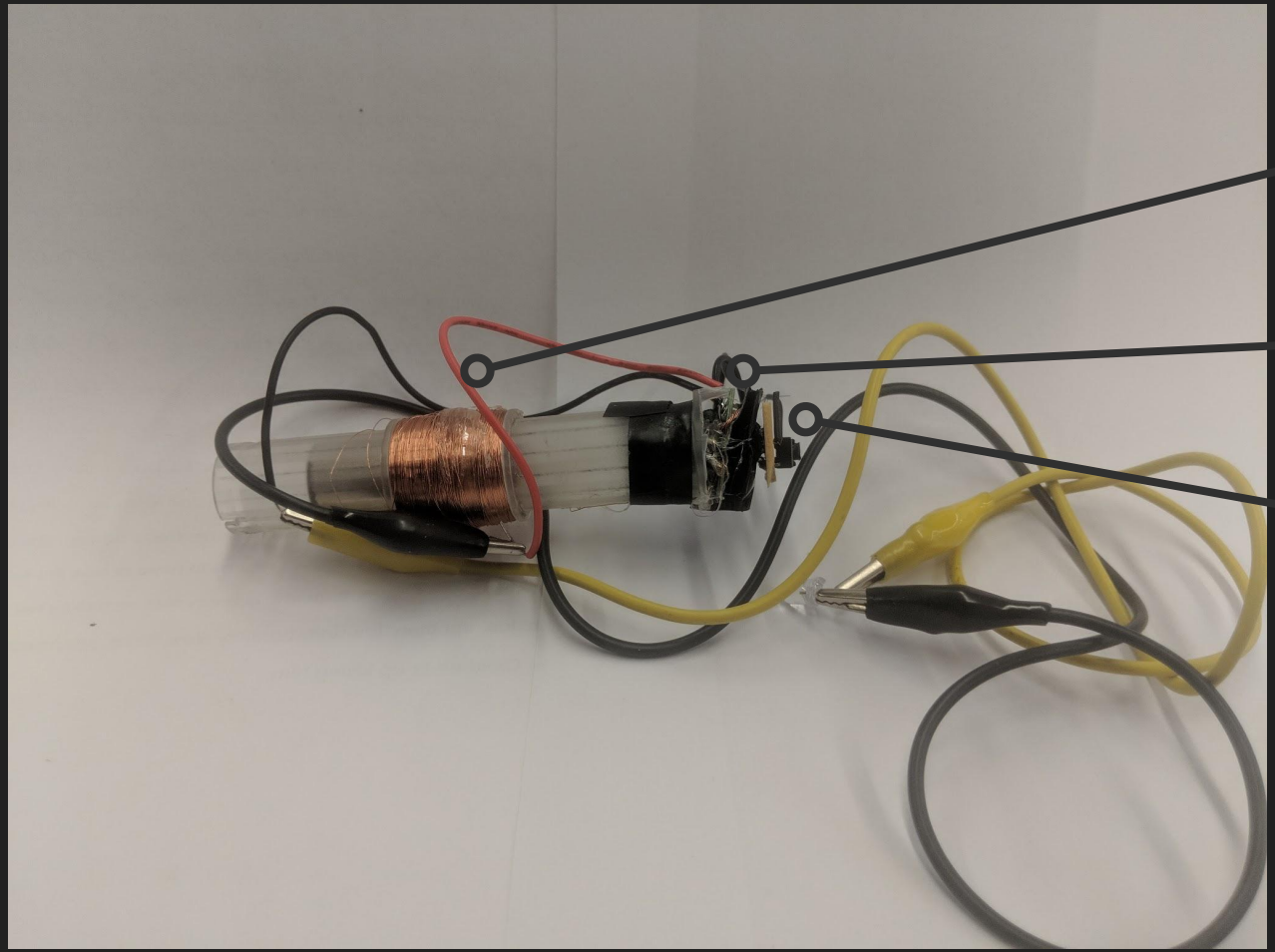
If you have a portable battery bank, have you ever needed it and realized you either forgot to charge or bring it?

32 responses



Prototypes

Version 1.1



Faraday Flashlight

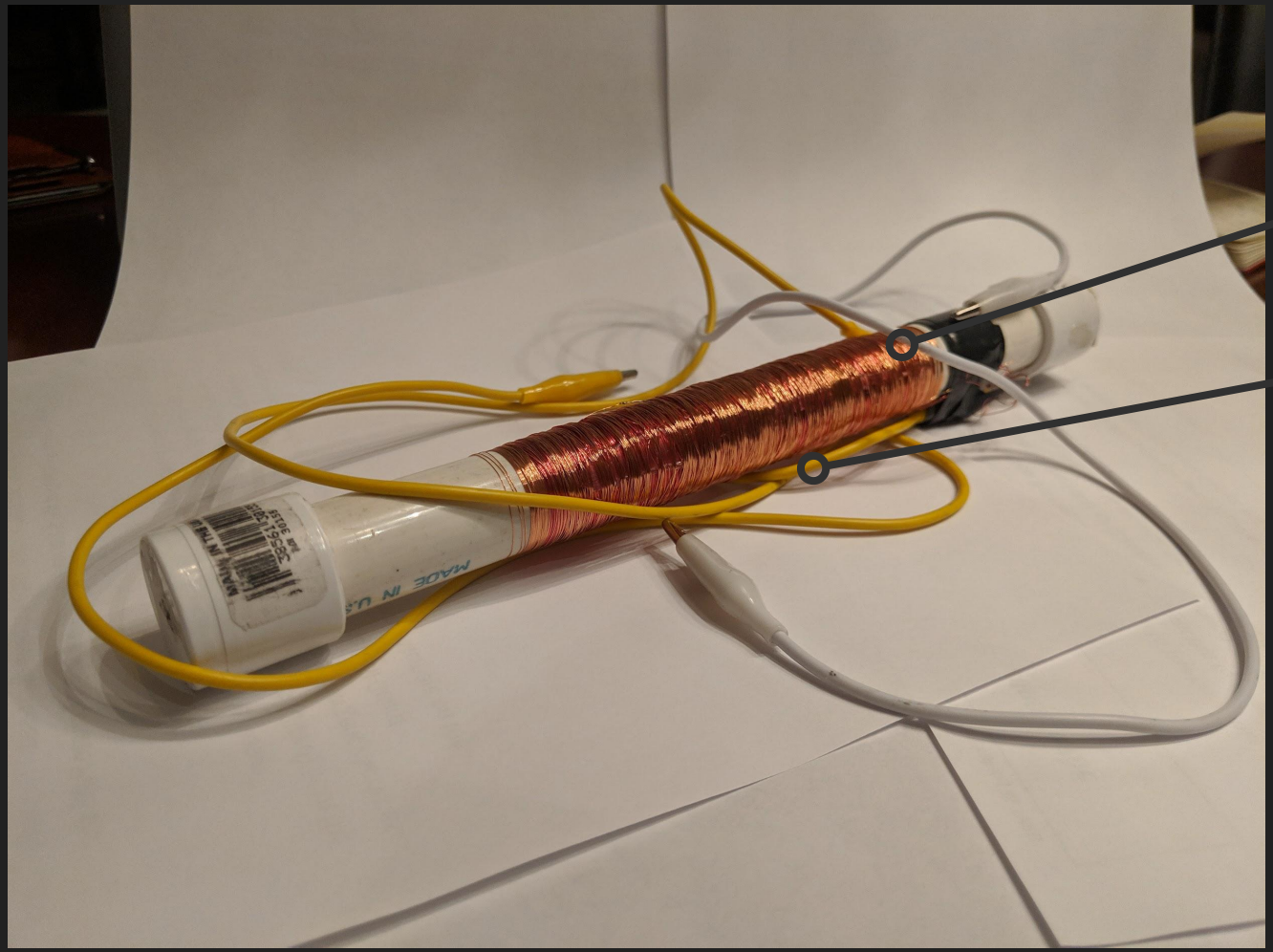
Electromagnetic coil

Rectifier and Capacitor Circuit

Switch

Problems

- Not enough current to power boost converter



PVC Shaker

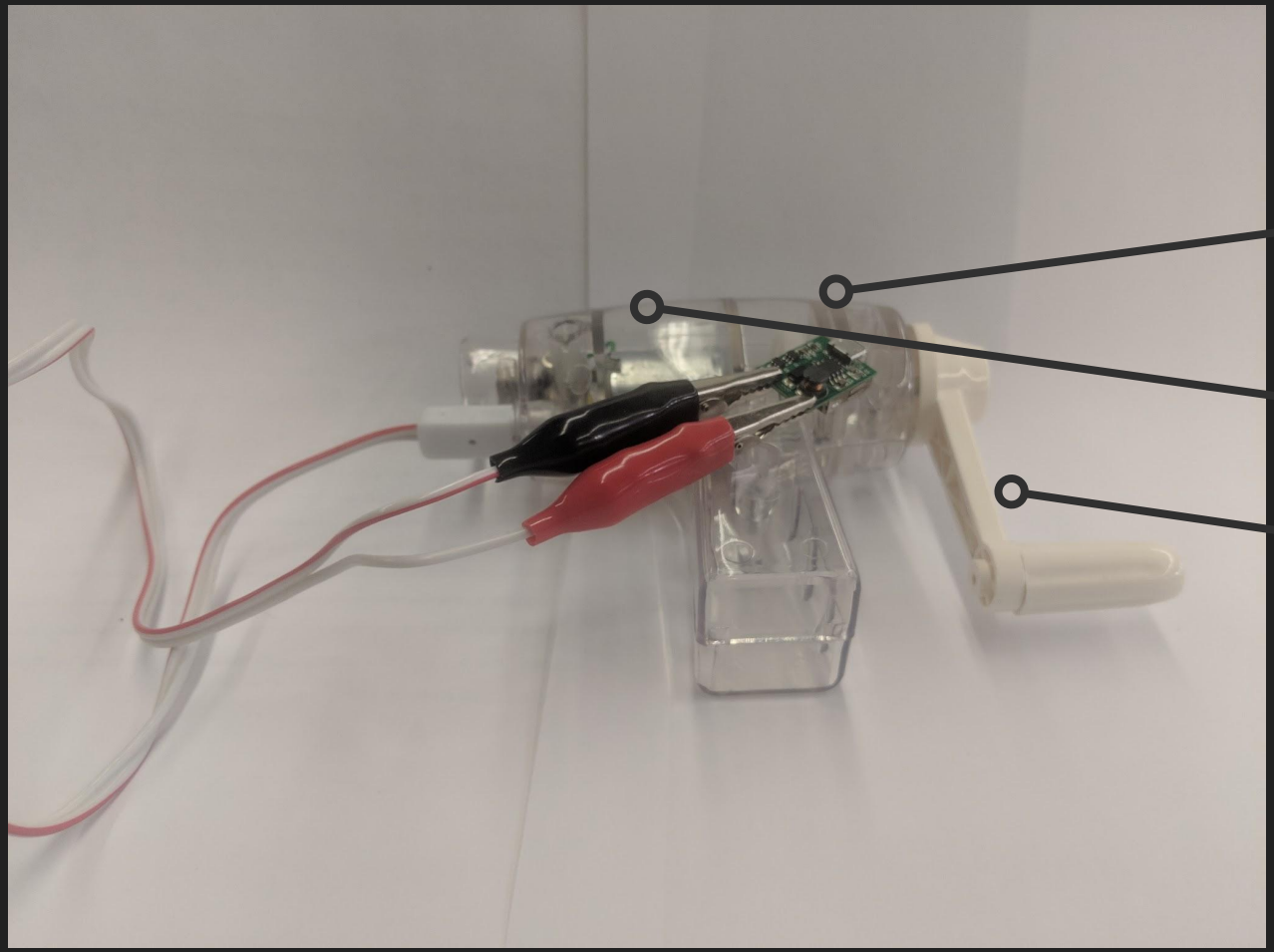
Tube with High strength Neodymium magnets

2 Types of copper enamel wire dual wound

Problems

- Doesn’t create enough voltage and is bulky

Version 1.2

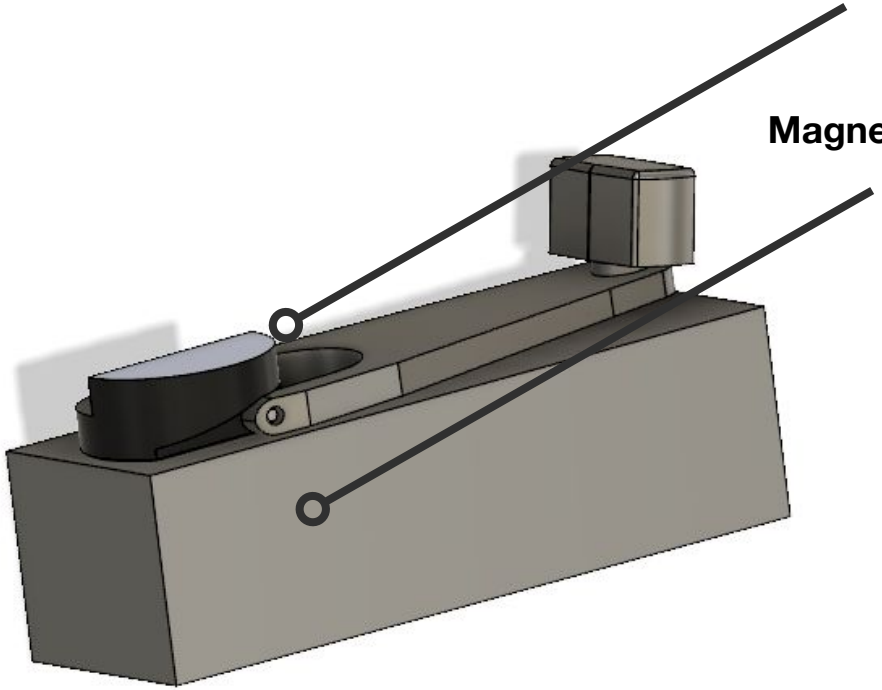


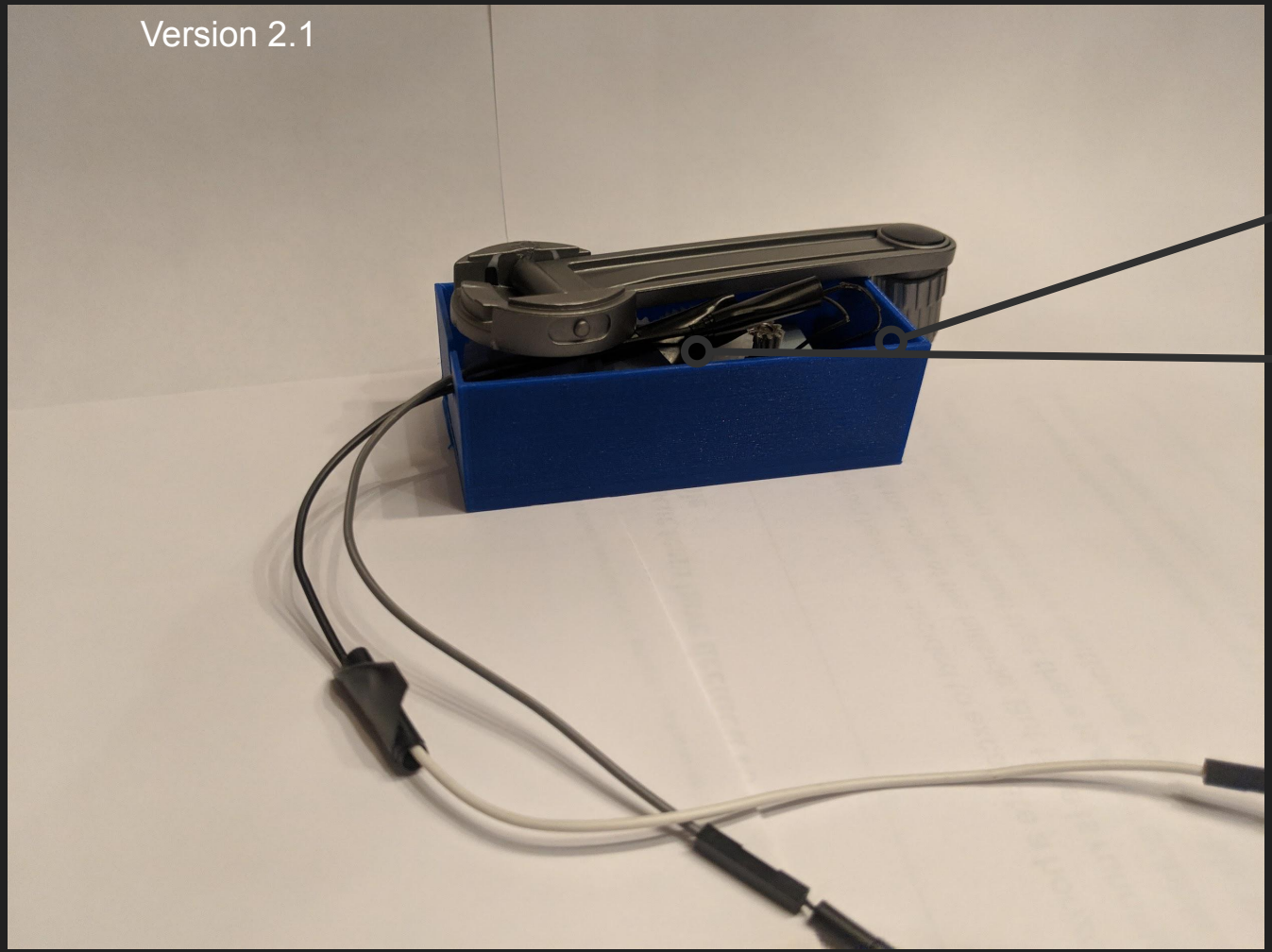
Pre-Built Hand Crank

Problems

- Too large
- Loud

CAD Idea





3D Printed Box

Foldable Crank

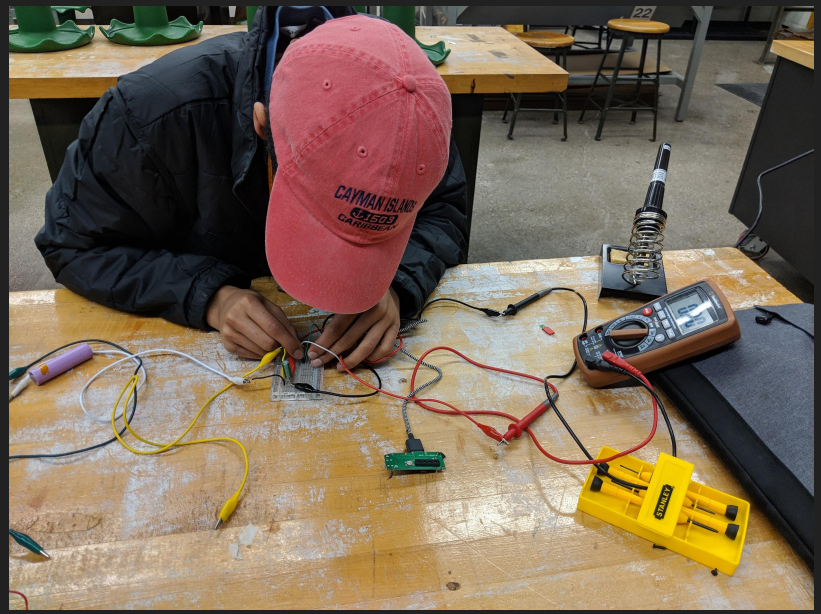
Brushless,
Geared Motor

Problems

- Heat Dissipation with capacitors underneath

Problems in the Process

- Access: Higher voltage supercapacitors and lithium ceramic batteries are expensive/not readily available.
- Time



Materials List (latest prototype)

- 3D Printed Materials (Blue)
- Box
- Foldable Crank mount
- Full Bridge Rectifier
- LED
- Boost Converter
- Misc Jumper Wires
- Super capacitors (4.7v 1.5uf) x3

Market Potential

- Billions of users now possess smartphones and with this comes the need for charging devices that address the concerns mentioned earlier.
- This means that anyone with a portable cellular device can use a Nanobattery