



Power Bank

Joshua Chang, Ananiya Deneke, Eva Clark
Faculty Mentor: Dr. Puteri Megat Hamari
ECET Department, Minnesota State University, Mankato



BACKGROUND

In a society that is increasing dependent on cellphones, having your phone die when you don't have access to an outlet can be a major inconvenience.

The market is currently flooded with a great variety of power banks promising to solve this problem. Instructions to make simple DIY power banks that involve a single battery, a resistor, and a voltage regulator exist, as do premade power banks that can charge multiple devices at a time.

However, many of the power banks affordable to the average person are prone to damage when dropped. While rugged models do exist, they tend to cost significantly more.

PROPOSED SOLUTION

Our solution to this problem was to design and build a safe, inexpensive power bank that's easy to assemble and capable of surviving a 3ft fall. A conceptual illustration of our design is shown below (Fig. 1).

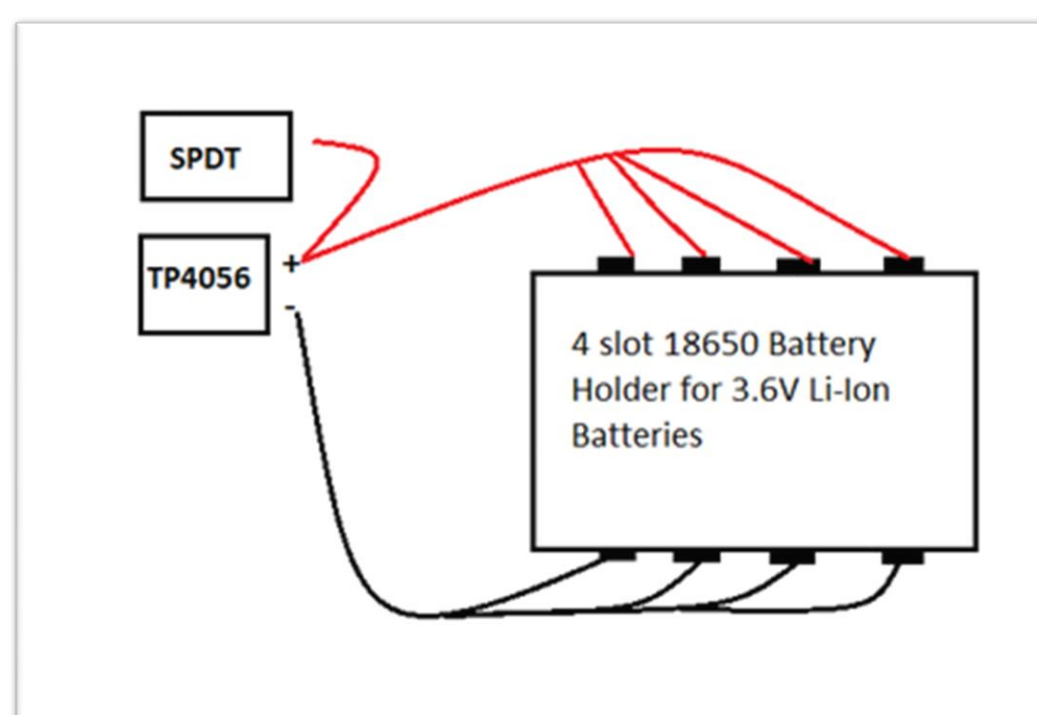


Figure 1

SYSTEM DESIGN



Figure 4

Enclosure

An enclosure made of lightweight ABS plastic was chosen for high impact resistance. USB and switch slots were drilled into it.

Charging Module

TP4056 USB charging module was selected for compatibility with lithium-ion batteries.



Figure 3

Figure 2

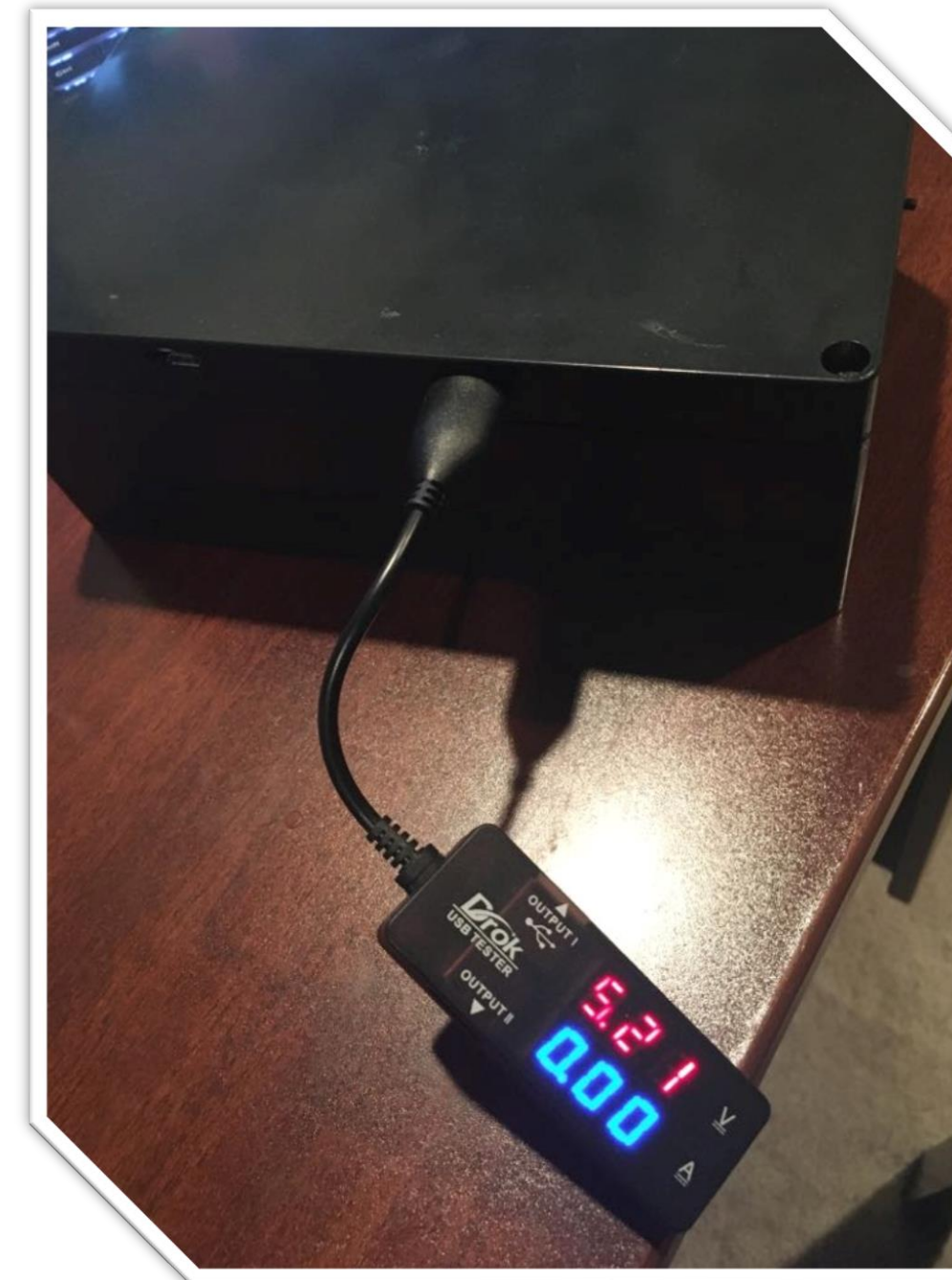
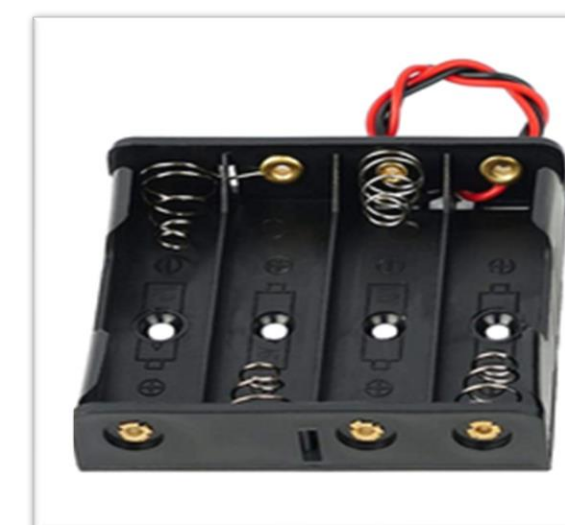


Figure 5



Battery Holder

A battery holder with in-parallel wires was used for ease of assembly.

On/Off Switch

SPDT switch for ease of use.



Figure 6

Batteries

Rechargeable 3.6V Lithium-Ion batteries were used for superior charging speed.



Figure 7

FUTURE DIRECTION

- Investigate custom enclosure options.
- Explore 3D printing in regards to creating a more durable, aesthetically pleasing case.
- Integrate more batteries into the power bank.
- Consider adding solar charging panels and waterproofing.

ACKNOWLEDGEMENTS

We would like to thank our Junior Design professor for helping us throughout this course.

CONTACT INFORMATION

Feel free to contact us at joshua.chang@mnsu.edu, ananiya.deneke@mnsu.edu and eva.clark@mnsu.edu with any questions or comments.