Larger Capacity Battery for the Winplus AC56388 Portable Power Bank

International Research Conglomerate

Abigail L. Ureña

Table of Contents

Purpose

The purpose of this proposal is to request funding from Winplus Company Limited. This funding will go towards developing a portable power bank with a larger capacity. This larger capacity battery will have a faster charging time and will be part of the new model of the Winplus AC56388 Portable Power Bank and Car Jump Starter.

Introduction

The Winplus AC56388 Portable Power Bank and Car Jump Starter has a multitude of functions that would benefit from having a larger battery capacity. The consumer sentiment for this product has been outstanding. Improving the battery capacity of this product, could greatly improve its functionality, convenience, and versatility.

Proposal

The International Research Conglomerate has developed a solution to this short battery life of the battery currently on the Winplus AC56388 Portable Power Bank and Car Jump Starter duo. Implementing the newly developed battery will relieve some of the issues with this battery pack.

International Research Conglomerate

The International Research Conglomerate, is a multinational world renowned research and development conglomerate.
The IRC has lead a myriad of research and development proposals comparable to this proposal.

International Research Conglomerate
1 W Rockefeller St
New York, NY 10005

The Researching Team

This project will be developed by our Research and Development team in one of our facilities located in Hong Kong. This development is headed by Abigail L. Ureña, the president of this department, four fellow engineers and two interns.

Abigail L. Ureña, Chemical Engineering
President of Research & Development

Dafne Caruana-Galizia, Chemical Engineering
Researcher

Minerva Mirabal Reyes, Electrical Engineering
Researcher

Chimamanda Ngozi Adichie, Material Engineering
Researcher

Gaëlle Enganamouit, Electrical Engineering
Researcher

Camille Valentini, Material Engineering
Intern

Phillipa Soo, Chemical Engineering
Intern

Winplus AC56388 Portable Power Bank & Car Jump Starter

The Winplus AC56388 Portable Power Bank and Car Jump Starter is a powerful jump starter that easily starts 12V vehicles, charges small electronic devices, and provides portable LED powered lighting. It has a capacity of up to 8000mAh.

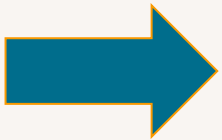
Proposed Developments

The International Research Conglomerate's Research and Development team plan to develop a lithium-ion battery with a larger capacity. The current battery in the power pack is 8000mAh, this team is proposing to develop a 12,000-15,000 mAh battery of 12V.

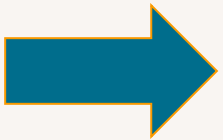
A battery of larger capacity will significantly improve multiple of the functions of the power pack, including a faster charging time, and a longer lasting battery.

Proposed Tasks

Task 1: Identifying the Current Battery systems



Task 2: Adding more cells and Evolving the Current Charging Board

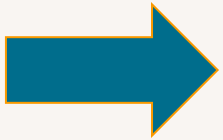


Task 3: Analyzing the development

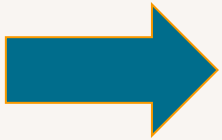
Task 1: Identifying Current Battery Systems

During this task, the Research & Development team from the International Research Conglomerate will dismantle and research the lithium-ion batteries from the current battery pack. The team will use their previous knowledge from developing batteries to create a battery of 12,000-15,000 mAh. The cell designs and combinations of battery packs differ greatly. To establish a base understanding, these researchers will focus on the main cell designs and then on the materials, processing, and manufacturing.

1.Disassemble the Current Battery



2. Test the naturally occurring electrolytes

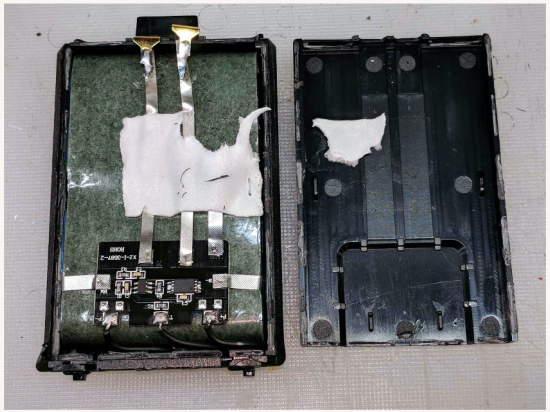


3. Developing & Calculating the Cost

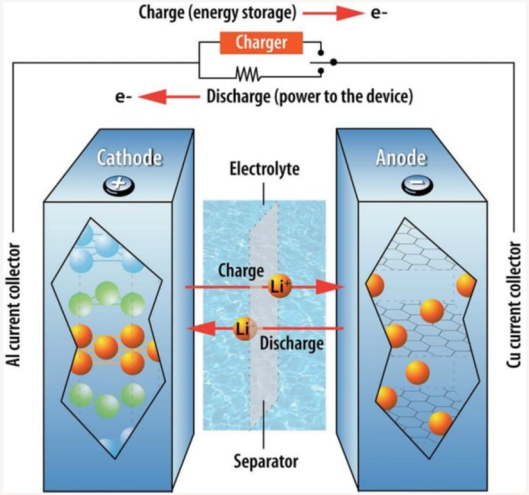
Task 1.1: Disassembling the current battery

Disassembling the current battery from the battery pack will allow the researchers to see what improvements could be made to the battery without improving the capacity or charging capabilities.

This will also allow the researchers to make any improvements on the materials used for the battery.

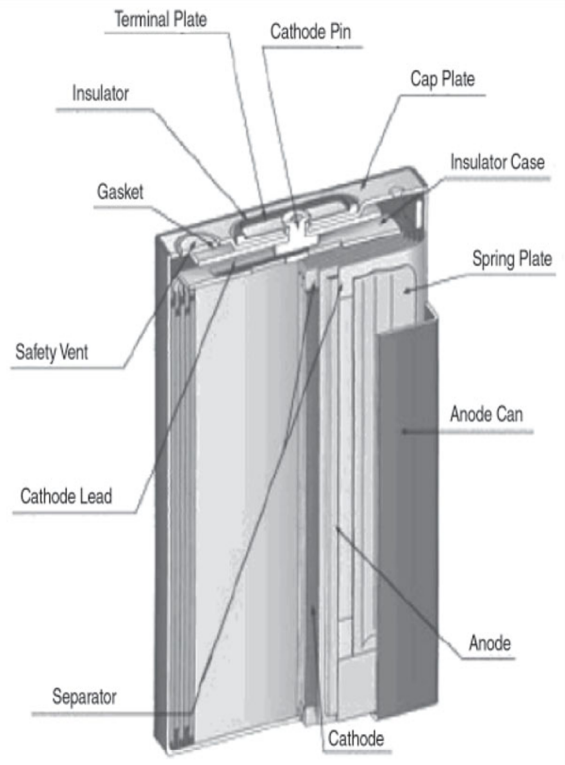


Task 1.2: Test the naturally occurring electrolytes



- A safe and long-lasting battery needs a robust electrolyte that can withstand existing voltage and high temperatures and that has a long shelf life while offering a high mobility for lithium ions. Liquid electrolytes are mostly organic, solvent based electrolytes, such as lithium-ion.
- Understanding the use of organic solvents and electrolytes in batteries is extremely beneficial. This is one of the most important considerations regarding their flammability.
- The battery separator will separate the two electrodes physically from each other, avoiding a short circuit. In the case of a liquid electrolyte, the separator is a foam material that is soaked with the electrolyte and holds it in place.
- Efforts will be made in materials processing and assembling to expand performance and to oversee unavoidable volume change have been driving toward composite materials with small scale and nanoscale particles.

Task 1.3: Developing & Calculating the Cost of the New Battery

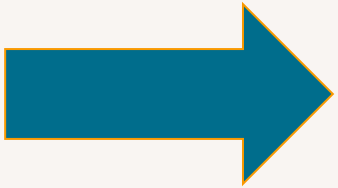


Battery cells will be assembled as follows: the electrolytes will be formed from pastes of active material powders, binders, solvents, and additives and are fed to coating machines to be spread on current collector foils, such as aluminum for the cathode side and copper for the anode side. Subsequent calendaring for homogeneous thickness and particle size is followed by slitting to the correct width. The other needed insulators, seals, and safety devices are then attached and connected. Then, the cells will be charged the first time and tested.

The raw material costs for this battery, will be based on the prices from the previous battery.

Task 2: Adding More Cells and Evolving the Current Charging Board

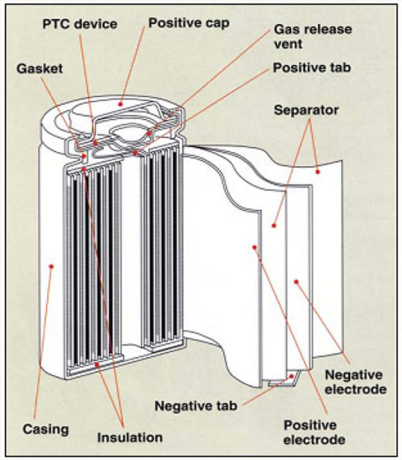
1.Adding more cells

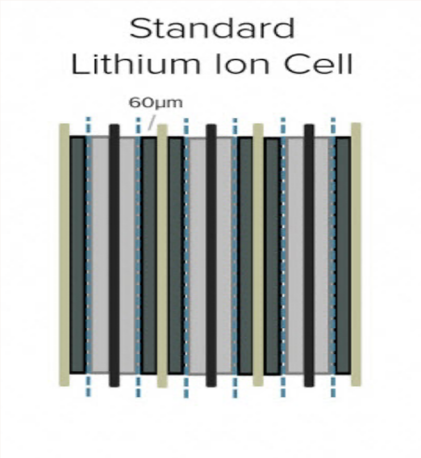


2. Changing the Charging Board

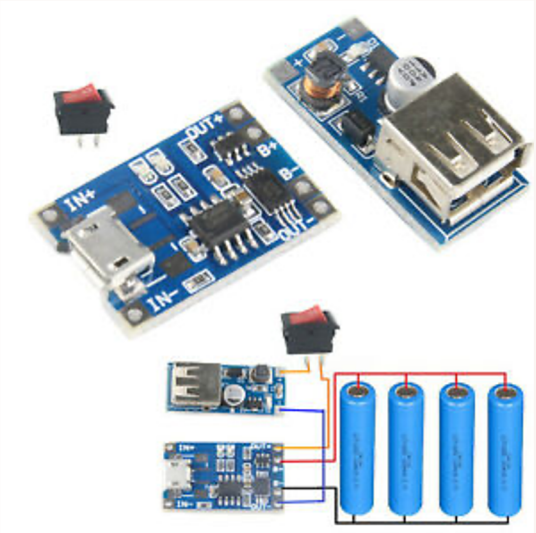
Task 2.1: Adding More Cells

By combining multiple battery cells this will allow for the battery pack to have a larger capacity. Having a larger capacity, will allow the battery to have more power to be used to jump start a vehicle or charge devices.





Task 2.2: Changing the Charging Board



When the researchers change the charging board, and implement a newly developed charging board, the battery will be able to charge faster.

The Winplus AC56388 Portable Power Bank takes 4-5 hours to fully charge. When the research and development team implement a new charging board to the new battery, the charging time can be reduced to about 3-4 hours.

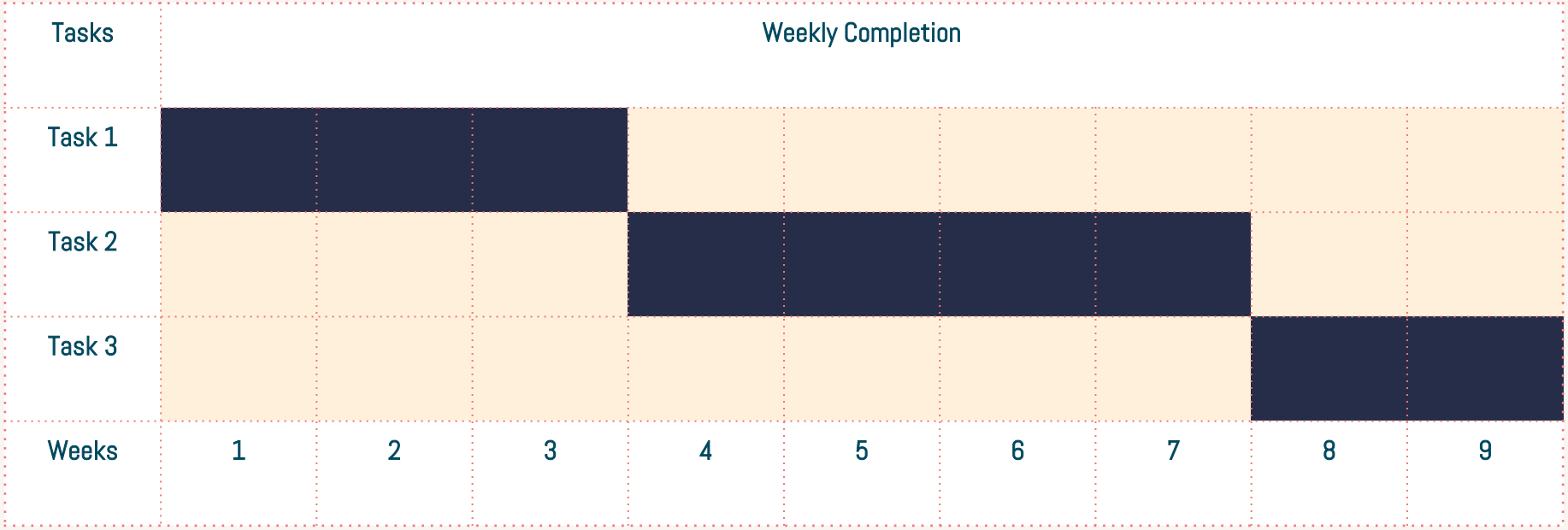
Task 3: Analyzing the Development

The final task will consist of the researchers writing the final report of all of their developments and improvements. Upon the successful development of a battery with a larger capacity and quicker charging times, a report will be developed. This report will be provided to Benson Leung, the Vice President of Winplus Company Limited. The quality of the product will be tested, along with other factors such as ULUS approval, which will allow for its sale in the United States and European countries. The battery will be tested for any defects during operation and to ensure safety and ease for the consumer. After the completion of these tests, all of the research and development, including the new battery will be surrendered to Winplus Company Limited.

Final Report

The entire development will last from June 1st, 2020 to August 7th, 2020. This will last a total of 49 business days, working from 9AM to 5PM (GMT+8 Time Zone) with a 1 hour lunch break. The development will take place at one of the International Research Conglomerate's research labs located in Hong Kong. The report will be handed in, in print and email, on Friday August 7th by 5:30 PM.

Development Schedule



Budget

Item	Cost
Salaries	$5,000 per month x 5
Flights	$2,000 x7
Visas	$130 x7
Housing	$ 200 per week
Cathode	$10-15 For the entire lithium-ion battery
Anode	
Electrolytes	
Separator	
Winplus AC56388 Portable Power Bank and Car Jump Starter	$60 x 2
Total	Approx. $ 75,000

Conclusion

The goal of this proposal is to develop a battery that will be more efficient and have a larger capacity. The research team from the International Research Conglomerate will develop a battery that is much more efficient and effective for the consumer. This battery will go through extreme scrutiny in the laboratories of these world renowned researchers. In order for these developments to take place, funding from Winplus Company Limited is essential.

Definition of Concepts

Ampere hour (Ah) - Ampere hour or amp hour is a unit of electric charge, having dimensions of electric current multiplied by time, equal to the charge transferred by a steady current of one ampere flowing for one hour.

Anode- An anode is an electrode through which the conventional current enters into a polarized electrical device. The positively charged electrode by which the electrons leave a device.

Cathode- A cathode is the electrode from which a conventional current leaves a polarized electrical device. The negatively charged electrode by which electrons enter an electrical device.

Electrolyte- Electrolyte serves as a catalyst to make a battery conductive by promoting the movement of ions from the cathode to the anode on charge and in reverse on discharge. The electrolyte of a battery consists of soluble salts, acids or other bases in liquid, gelled and dry formats.

Milliampere hour (mAh)- milliampere hour is one-thousandth of an ampere hour.

Separator- A separator is a permeable membrane placed between a battery's anode and cathode. They are important to batteries because their structure and properties considerably affect the battery performance, including the batteries energy and power densities, cycle life, and safety.

Volts (V)- The volt is the derived unit for electric potential, electric potential difference, and electromotive force.The SI unit of electromotive force, the difference of potential that would drive one ampere of current against one ohm resistance.

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Thank You!

Thank you for viewing my proposal presentation.