

Power storage recycle

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Abstract— It is found that a damaged laptop battery can be reused to make a power bank. So, instead of throwing it away it will be a proper utilization of that damaged battery. So, we studied on internet & came to know there are some cells within the battery which can be re-used again to make a power bank. In our project, we took a dell laptop battery which wasn't working & opened the seal of the 6-cell battery & measured the voltage of each and through a process finally identified the good cells which can be used in our project. Now we got two cells which gave us the requirements to make a power bank. So continuing with them, we kept them in a cool dry place for 3+ days and made a DIY case following a circuit containing 7805 voltage regular, two capacitances of 470 μ F and 100 μ F respectively, one resistance of 220 Ω , one switch, one LED to indicate when the power bank is charging and a 5V output. Finally we placed the two selected cells above in the DIY case to make the power bank and tested it using an USB battery charger doctor and charged an android smart phone using it. This completes our project.

Index Terms - Healthy cell usage, Economical power bank, DIY Circuit making, Power Storage Recycle, Mobile charger.

1 INTRODUCTION

IN this modern way of living most of people have laptops. We also exchange laptop's battery for not getting good backup.

Most of the time laptop battery packs go bad when one or few cells in the pack are dead. There are still a few good cells though. We were curious what can be made by this type of good cells. So, we go through several blogs and forums to get some ideas that we can reuse the healthy cells to make a power bank.

We collected a dell laptop battery of six cells which was completely damaged & could not even give a five minutes battery backup. So it was replaced a year ago.

After getting such an idea we collected these following things to make our project :

1. Old laptop battery
2. Screw driver
3. Wire cutter
4. Nose pliers
5. Dremel
6. Scissors
7. Some safety equipments like sand & gloves to protect from li-ion danger.

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2 PROCEDURE FOR PAPER SUBMISSION

2.1 Review Stage

First we opened the battery by screw driver. We identified a weak point to open the tight seal of the battery. It took quite a lot of effort to do so.

Then we pulled the cells out. Next we saw six cells attached with the charging circuit. Then we separated the charging circuit. After that we separated the cells and removed the tabs.

We measured the cell voltage of each and found each to be 3.8v. Identifying good cells also was a procedure as follows :

1. Initially if the cell voltage is less than 2.5v, it must be thrown away. In our case all were of 3.7-3.8v so none of the batteries got eliminated.
2. All the cells are charged individually. The ones getting hotter during charging are thrown away.
3. The cell voltages are measured individually again disconnecting the charger and are verified whether they are between 4.1 and 4.2v.
4. We waited for 30 minutes and again measured the cell voltages to find out whether they dropped less than 4v. The ones dropped are thrown away. The voltages for others are recorded.
5. The selected cells are stored in a cool, dry place for 3+ days.
6. Again cell voltages are measured. The ones which have fallen more than 0.1v from the recorded voltage are thrown away. The others are selected.

2.2 Final Stage

Now, two cells are not thrown away during the above test. A circuit is made for power bank DIY case. Then these two selected cells are chosen and inserted into the DIY case to make

ISSN 2229-5518
the power bank.

[NOTE : Working with li-ion batteries are very dangerous. We also faced some minor sparks while cutting and separating the circuit from the batteries. So safety precautions must be taken since they can burst too. We kept sand and used gloves while doing this project. We cannot be held responsible for any hazard that may cause while making such a project.]

After making the power bank and charging through it, we have tested the USB output voltage using USB battery charger doctor.

The output voltage obtained is found to be 5.13V which gave an enough good output for average smart phones and tablets too.

2.3 Figures



Damaged laptop battery



Finding the weak point to break the seal



Six li-ion cells

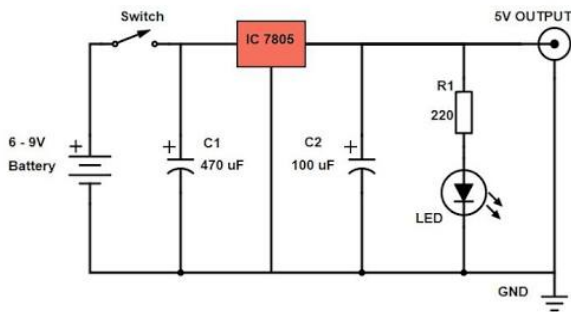


Measuring the cell voltages



Separating the cells

3. CIRCUIT DIAGRAM



Circuit diagram for a power bank DIY case

The above is the circuit diagram of DIY power bank case using a 7805 voltage regular, two capacitances of 470 μF and 100 μF respectively, one resistance of 220 Ω , one switch, one LED to indicate when the power bank is charging and a 5V output. The input current is 1A. The battery source is the batteries used approximately between 6-9 volts.

4. EQUATIONS

One cell of a laptop battery of 4800mah total gives 2400mah each. The calculation is done below:

$$\text{Battery life} = \frac{[(\text{Total battery pack(mah)} * \text{No of cells in pack}) / (\text{No of parallels})] / (\text{No of cells in pack})}{1}$$

The above equation gives us battery life = $[(4800 * 6) / 2] / 6 = 2400 \text{ mah}$

Since two batteries were found healthy, so connecting them in parallel, the power bank we made gave us 4400mah capacity as tested after making the device. The testing is done by USB battery charger doctor which gave the output voltage as 5.13V. After testing the capacity we charged one of our phones successfully.

5. FUTURE WORK

In future we are working with some new ideas that can be developed from unused things. We are also working on how people may recycle their own things without too much technical knowledge.

This may be of some help to those who are planning to save money for their future.

6. HELPFUL HINTS

6.1 Figures and Tables



Making the power bank



Measuring output voltage using USB battery charger doctor

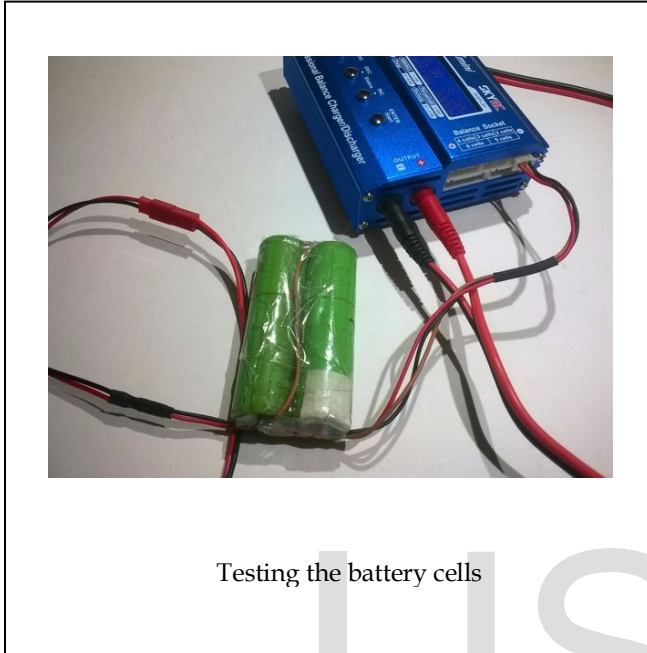
like to thank our department faculties again for helping us while doing the above project.. This work was supported in part by a grant from IJSER.

9. REFERENCES

The following are the links which helped us doing the project:

1. <http://m.instructables.com/id/REUSE-YOUR-OLD-LAPTOP-BATTERY-TO-MAKE-A-POWER-BANK/>
2. http://batteryuniversity.com/learn/article/serial_parallel_battery_configurations

We would also like to thank our EE department faculties in college for their extreme help during this project.



7. CONCLUSION

There are many electronic devices which after even damaged, some part of them be reused to produce something usable. Suppose a smart phone is not working due to its motherboard problems.

In that case the other parts of it like touch pedia, speakers, etc can be reused. Similarly when a laptop battery is not at all giving even five minutes backup & is strictly recommended to replace, some cells of that battery is still usable.

But the battery will only work if all the 6 cells of it (if the battery is a 6-cell battery) are working. The remaining usable cells are used to make a power bank in our project.

It is concluded from above that, in our daily life we throw away many things that can be recycled or utilized for further use. The benefit in that case is those things are easily available from a person who thinks it is as garbage occupying some space at home.

It is also observable that making a useful thing from an unused device is economical..

8. ACKNOWLEDGMENT

The authors Shrimoyee Poddar, Mohuya dutta, Nantu Maiti and Pradip Dutta wish to thank our college Camellia Institute of Technology, our department EE for giving us such an opportunity to work with and made our project. We would also