

## International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 3, March 2017

# The Portable Charger to Charge Any Electronic Gadget with Safety-Power Cube

K.Uday Kumar<sup>1</sup>, T.Chiranjeevi<sup>2</sup>, Tauqeer Fathima<sup>3</sup>, K.Sudha Rani<sup>4</sup>, P.Maruthi<sup>5</sup>

Students, Department of Electronics and Communication Engineering, DMS SVH College of Engineering,  
Andhra Pradesh, India. <sup>1,3,4,5</sup>

Assistant Professor, Department of Electronics and Communication Engineering, DMS SVH College of Engineering,  
Andhra Pradesh, India. <sup>2</sup>

**ABSTRACT:** This Paper comes with the solution that changes the way we charge our devices. We named it as P-CUBE because of its shape which is in CUBE shape and store the power to charge different devices. The portable power pack that just fits in our hand. It will stop you from thinking about drying of charge in our gadgets. Whenever you are in need of charge just plug in our Mobiles or Laptops to the P (power)-cube so we can continue our work just without worrying about our phone or laptop charge life. P-cube employees 2 USB JACKS and WIRELESS CHARGE PAD to charge our mobiles, an AC SOCKET power to feed charge to a laptop and a BUG REPELLER CIRCUIT which keeps bugs and mosquitoes away. The P-cube can be charged in two ways by one is by DC POWER SUPPLY and other by a SOLAR PANEL entire circuit inside the P-cube is EMP PROTECTED. Every electronic device requires a different level of power and voltage to charge, their battery and efficiency reaches optimal levels when they are charged using the designated voltage. P-cube manages outflow and inflow to ensure that your device and P-cube are operating safely.

## I. INTRODUCTION

Now we are living in a Hi-tech world surrounded by gadgets which makes our work easier and feel us comfort but the only limitation they cannot store much charge with them so, we cannot run them for the whole day without being charge In between. to solve this problem we developed a gadget and named it as P Cube(power cube) .we named it as P Cube because it stores power in it and it has got shape of cube. It has got five different features. 1. Two USB jacks to charge any mobile phone with fast charging feature.2.wireless charger<sup>[1]</sup> for any mobile phone.3Ultrasonic mosquito repeller<sup>[6]</sup> .4.Variable DC voltage 5-15v .5.Our Cube can charge with Solar panel<sup>[3]</sup> and an Adapter of 5v.

Carrying P-Cube will be a Game changer in today's Hi-tech life. It will stop you to thinking about drying of charge in your gadgets. It allows you to work while travel longer distance without the worrying about charge level of your Gadgets. It will save your time. It is capable of keep away bugs and insects from you because of having a special circuit in it. It is comfortable to charge latest mobiles phones which have got wireless charging feature. Most of the devices we use today will work at voltages between 5-15v so we designed a voltage regulator which ranges up to 15v and added into our P Cube. This P-Cube comes with a one more advantage that is we can make advantage of working outdoors. P-Cube comes with a solar panel, that just required day light to build up power in it.

## II. RELATED WORK

We have invented a system with multiple features that supports us to charge whenever we want and gives freedom to travel longer distances. Basically it is a charging storing device to charge multiple devices that we use in our day to day life. It has got two USB jacks to charge any mobile phone. It is equipped to charge latest mobile phones which have got

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wireless charging<sup>[2]</sup> feature. This system comes with a circuit which will generate Ultrasonic sound<sup>[7]</sup> which irritates mosquitoes and makes them to go away. Normally the devices which we are use were operated between 5V to 15V So, in our system we added a DC voltage regulator the output can be ranged between 5V to 20V DC by varying pot and the output voltage can monitor by seeing the display. We have designed with an advantage that our system was able to charge with sun light by using solar panel which is easy to carry<sup>[5]</sup>.

### III. BLOCK DIAGRAM

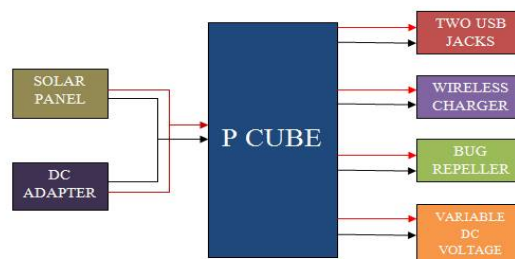


Figure-1: Block Diagram of Power cube

### A: INPUTS TO THE CUBE

#### 1. SOLAR CELLS

Solar panels works on the principle of PHOTO VOLTAIC EFFECT. It is the source of free GREEN ENERGY<sup>[5]</sup> which takes sun light as input and generates power without any EXHAUST. We are using 3 solar panels to charge our cube. The maximum power from each panel is 3W, 11V so the total power from solar cells is 9W, 11V when we connected in parallel. The input given to the cube should be 5V so we need to step down the voltage to 5V from the solar cells. We designed a circuit using LM2596 IC to get 5V.

#### 2. ADAPTER

P-CUBE needs input of 5V, 1A so a normal mobile phone charged or any other 5V wall Adapter can be used to charge it which has got micro USB pin.

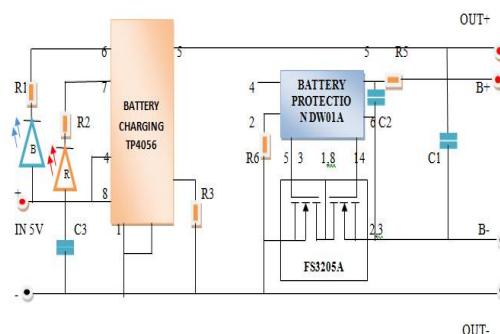


Figure-2: Charging and Protection unit

### B: CHARGING AND PROTECTION UNIT

#### 1. TP4056 :( Li-ion Charging IC)

To charge Lithium ion cells we are using TP4056. It is an 8 pin Dual In line Package IC. Its SOP package and low external component count make the TP4056. Ideally suited for portable applications. Furthermore, the TP4056 can work within USB and wall adapt. No blocking diodes are required due to the internal PMOSFET architecture and have to prevent negative Charge Current Circuit.

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The maximum current to the cells can be controlled by the programming resistor. The maximum current it can deliver of 1000mA. The maximum voltage that it will deliver to the cells is 4.2V With the accuracy of 1.5% the Junction Temperature of the IC can raise up to 145°C. The TP4056 IC can operate at wide range of Temperature ranges between -40°C to 85°C.

The charging cycle of 18650 cells for using TP4056 IC is shown in the form of graph where the current and voltage deliver to the cells is changes with the time.

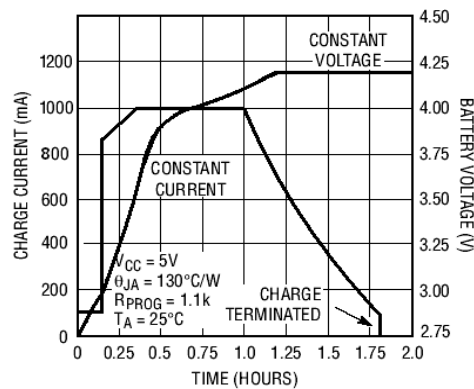


Figure-3: Charge cycle of 18650 by TP4056

### 2. DW01A : (Li-ion discharge and protection IC)

The DW01A IC is used for protection of Li-ion/polymer cells while charging and discharging. Reduction in board size due to miniature package. It is a 6 pin IC with Dual in line Package. It has got two level of detection over current protection. Over charge protection voltage for this IC is 4.3V $\pm$ 50mV.

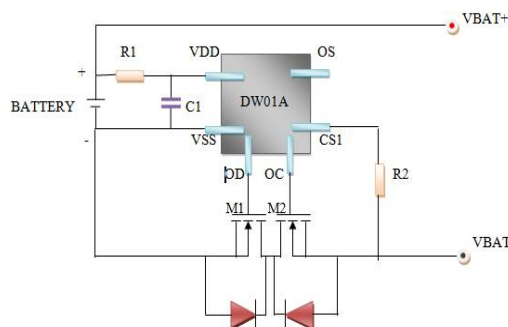


Figure-4: Circuit of DW01A

### 3. LITHIUM ION CELLS

As we have the need of Rechargeable cells, we have chosen the Li-ion 18650's because of their size and power storage capacity that's why they are suitable for this project. The cells we are using are known as 18650 which indicate the dimensions of the cell i.e., 18mm Diameter and 65mm Height.

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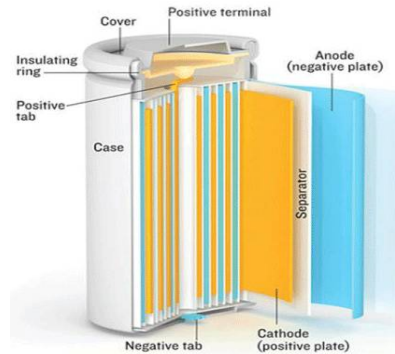


Figure-5: Internal layers of Li-ion cell

The Nominal Capacity of each cell we are using is 2000mAh which have got Nominal Voltage of 3.7V we can safely charge them up to the maximum voltage of 4.25V and the efficient cutoff voltage is 2.5V.

## 4. BOOST CONVERTER

In this project Our aim is to charge Devices with 5V and above the Li-ion cell pack can deliver 4.2V when they are fully charged so, here we find the need of Boost Converter to boost the voltage to 5V and above we are using IC MT3608 as a Boost Converter. It is a 6 pin IC with Dual in line Package. It can boost the voltages between 2-24V DC. It has got fixed switching frequency of 1.2MHz. The output voltage can be adjusted up to 28V. We have chosen this because it has got efficiency of 97%

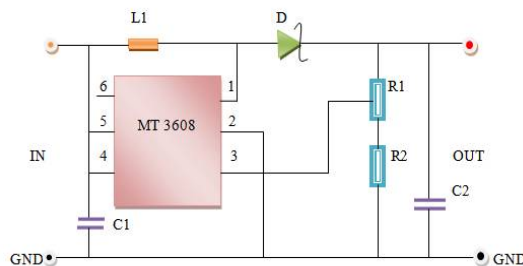


Figure-6: Circuit of Boost Converter

## C: WIRELESS CHARGER

Wireless charging provides a convenient, safe and reliable way to charge the smart phones<sup>[2]</sup>. Without the use of physical connectors and cables, wireless charging provides efficient cost and safety advantages over the wired charging.

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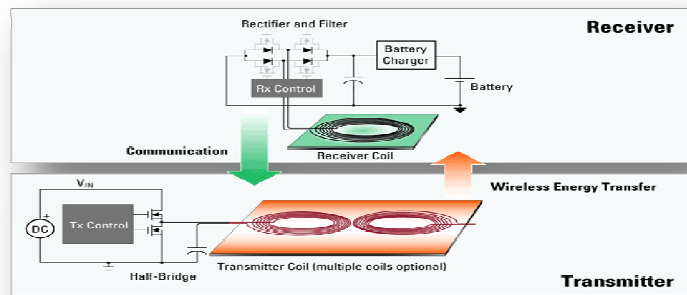


Figure-7: Working of Wireless Charger

From the diagram it is clear that the functioning of wireless charger requires the transmitter and the receiver power sections. The wireless charger uses electromagnetic field to transfer power between the transmitter and the receiver to charge the device.

### 1. TRANSMITTER:

The transmitter section consists of DC source, Oscillator and a transmitter coil<sup>[1]</sup>. The Dc voltage is given to the DC source this acts as input to the oscillator. The oscillator converts DC voltage to high frequency AC power and then it is given to the transmitter coil. Due to which the coil gets energy and generates magnetic field.

### 2. RECEIVER:

The receiver section consists of receiver coil, rectifier and the voltage regulator. When we place the receiver coil near the transmitter coil the magnetic field<sup>[2]</sup> in the transmitter coil is passed to the receiver coil. Then the AC voltage is converted into DC voltage using the rectifier present in the circuit and the voltage regulator regulates the voltage and provides the limited voltage required to charge the device.

### D: BUG REPELLER

The Bug repeller circuit is capable of keeping away the insects from us<sup>[6]</sup> and our surroundings by generating a sound which is unbearable by insects but does not harm or disturb the humans the sound generated is the ultrasonic sound<sup>[7]</sup> whose frequency range is 20KHz to 10MHz. this sound effects the nervous system of the insects so that they fly away. In this we have chosen the 555 timer IC to generate the ultrasonic sound by arranging it in the astable mode. The output signal from the 555 is amplified through a BC547 amplifier. And given to the buzzer.

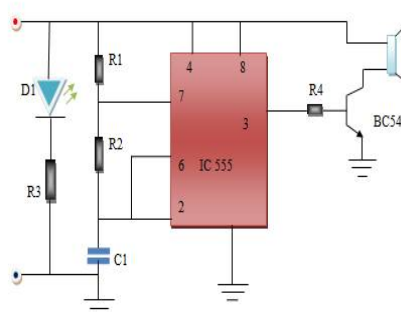


Figure-8: Bug Repeller circuit

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### IV. RESULTS

This figure is to demonstrate that power cube can charge two mobile phones one with USB and the other feature is through wireless charger and at the same time the power cube is charged through the 5V adapter.



Figure: 9

The below figure gives about the other side of the cube which is having the bug repeller and the voltage regulator which ranges between 5-20V varied through a pot which can be monitored through the display. The same display can be used to know the level of voltage in the lithium ion pack that ranges between 2.8-4.2V just with a single click on the switch. And it has a buzzer which generates the sound with ultrasonic frequency to make the insects fly away.



Figure: 10

Now the below figure shows that three solar panels that are connected in parallel all together generates the power of 9W of power with 11 volts. Which is converted to 5V through a circuit and connected to the mobile phone and an LED lamp we can also charge the power cube by just replacing the mobile.



Figure: 11

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## V. CONCLUSION

This paper introduces a new gadget which erases the limitations of charging the different devices. We achieved this by using different components and IC's and includes the features like fast charging and discharge protection which assure safety and realilby and advantage of working outdoor with good efficiency.

## REFERENCES

- [1] D.Vinko T. Švedek and M. Herceg "Effects of Power Consumption and Modulation of the Passive RFID Tag on the Transmission Range of Backscattered Signal " in Proc. 51st Int. Syposium ELMAR-2009 Zadar Croatia 2009 pp. 263-266.
- [2] A. Kurs A. Karalis R. Moffatt J. D. Joannopoulos P. Fisher and M. Soljačić "Wireless Power Transfer via Strongly Coupled Magnetic Resonances " SCIENCE vol. 317 July 2007
- [3] Eram, T. a. (2007). Comparison of Photovoltaic Array Maximum Power Point Tracking Techniques. IEEE Transactinos on Energy Conversion , 22 (2), 439-449.
- [4] Saga, T. (2010) Advances in Crystalline Silicon Solar Cell Technology for Industrial Mass Production. NPG Asia Materials, 2, 96-102. <http://dx.doi.org/10.1038/asiamat.2010.82>
- [5] Pulvirenti, F. Milazzo, P. Ursino, R. Charger power switch for mobile phones, Analog and Mixed IC Design, 1997. Proceedings. 1997 2nd IEEE-CAS Region 8 Workshop ,12-13 Sep 1997, Pg 97 - 100.
- [6] Aflitto, N. C. and R. W. Hofstetter. 2014 Use of acoustics to deter bark beetles from entering trees. Pest Management Science (DOI: 10.1002/ps.3720).
- [7] Deepak Kumar, Indubala, 555 Timer Anuragparmar , Issue 12 , ISSN: 2349-6002, Volume 1,2015 IJIRT