Multi-Use Wireless Charger

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Abstract

Wireless charging has been mostly available for small electronic devices such as mobile phones. However, the wireless technology for larger devices such as iPad, tablets, and laptops has not been available in recent years and its development would be useful for many consumers.

The objective of this project is to create a multi-use wireless charger using wireless induction that can be used for charging various devices such as iPads, tablets, laptops, or cellphones. Needless to say, wireless charging eliminates tangling and other mess created by wirings. This product also has a built-in rechargeable backup battery, charged using a 24V 5A 120W power supply or optional solar tracker panel kit that can provide high performance. This allows for seamless on-the-go charging.

Our design will have two supplementary USB ports for extra charging capabilities. The charging module is a DC remote module, and the circuit is simple and practical. The wireless design incorporates two wireless transmitting and receiving coils connected in series. Each wireless inductor (transmitter/receiver) has an input voltage of 24V and produces an output of 12V, 2A at an 8mm distance between the transmitter and receiver. Increasing this distance will decrease the output current at the receiver. We used a DC to DC buck converter step-down module with a wide operating range. The step-down module has an input voltage range of 4.5V to 28V and an output voltage of range of 0.8V to 20V. The step-down module is capable of bringing down the voltage to 18.5V which is the optimal operating voltage for our project. Furthermore, we are using additional step-down modules to step down the voltage for our solar panels and USB ports. Our solar panels produced 28V which is more voltage than needed to charge our batteries. The voltage for charging the batteries is 24V. We are using six 3.7V, 1400mAh Lithium-Ion rechargeable batteries. There is an additional backup 3.7V, 10000mAh Lithium-Ion rechargeable battery.

It’s is well known that the solar panels work best when they are aligned directly toward the sun and for this reason our system is designed to track the sun automatically. Our design is using a dual axis solar tracker. Our tracker is an active tracker which is controlled by a computer program (via an Arduino). Sensors are to find the brightest source of light at all times. The computer program changes the angle of the panel based on the date, time, and physical location.

Our dual axis solar tracker uses four LDR sensors and two servos which provide dual axis control.

After our initial design, we found a product (Wireless Lit Solar Powerbank) that is similar to our design, but it does not use wireless induction as well as lacking a solar tracking feature.