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Solar Based Mobile Phone Charger With Mobile Theft Alert System

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ABSTRACT

In today's environment conscious world, a lot of interest is being taken in alternate forms of energy. Solar power is a renewable source of energy, which has become increasingly popular in modern days. Today 80% of the energy we use comes from fossil fuels and about 1% comes from solar energy. It is estimated that the world's oil reserves will last for 30 to 40 years, whereas solar energy is forever. Solar energy has two big advantages over fossil fuels. The firstis in the fact that it is renewable; it is never going to run out. The second is its effect on the environment. Burning of fossil fuels introduces many harmful pollutants into the atmosphere and contributes to global warming and acid rain. Solar cell directly converts solar energy into electricity. A Solar cell phone battery charger is an electrical device that converts the energy oflight directly into electricity by the photovoltaic effect. It does this by the use of solar panel which is a form of photoelectric cell (in that its electrical characteristics – e.g. current, voltage, or resistance – vary when light is incident upon it) which, when exposed to light, can generate and support an electric current without being attached to any external voltage soure. It incorporates a theft alert system that utilizes sensors to detect unauthorized

1-INTRODUCTION

A solar-based mobile charger with a theft alert system is an innovative solution designed to meet the growing demand for renewable energy and mobile security. This device harnesses solar energy to charge mobile phones, making it a sustainable alternative to conventional chargers that rely on electricity from the grid. With the increasing reliance on smartphones and the rising interest in eco- friendly technologies, a solar-powered mobile charger offers a convenient, portable, and environmentally responsible way to ensure devices remain powered, especially in remote locations or during outdoor activities where access to electricity may be limited.

In addition to its energy efficiency, this solar charger is equipped with a theft alert system, addressing the concern of device security in public or shared spaces. The theft alert system employs sensors or alarms that activate when the charger or connected mobile device is tampered with or moved without authorization. This feature enhances the functionality of the charger by providing users with peace of mind, knowing their device is protected while it is charging in outdoor or public settings. The combination of solar energy and theft prevention makes this charger a practical solution for modern, mobile lifestyles.

access or movement of the device. Upon detection of suspicious activity, the system triggers analert, notifying the user via mobile

application or SMS, thereby enhancing the security of mobile devices against theft.

2-LITERATURE SURVEY

P.A. Jadhav et al. (2016): Designed a solar-powered mobile charger with a theft alert mechanism using a microcontroller to monitor charging and detect tampering.

V. Karuppasamy & S. Saravanan (2019): Developed a solar mobile charger with GPS tracking and GSM technology to notify users of unauthorized access.

A. Verma et al. (2021): Proposed an IoT-enabled solar charger that employs motion sensors for theft detection, sending SMS alerts upon movement detection

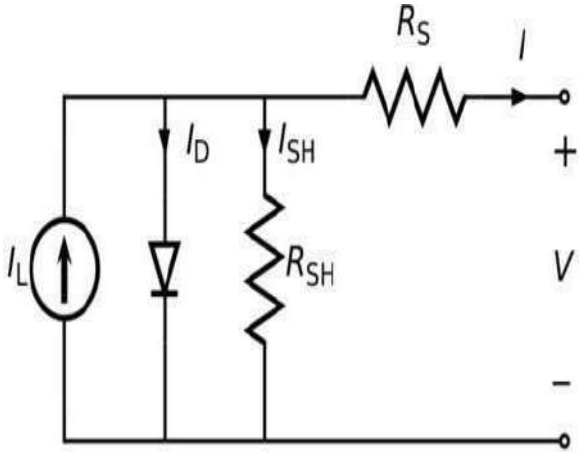
P. Sharma & R. Singh (2022): Introduced a wireless solar charger with an anti-theft alert system that triggers an alarm and notifies users via Bluetooth if unauthorized removal occurs.

S.K. Mohanty et al. (2023): Focused on a renewable energy-based charging system that utilizes sensors and machine learning for intelligent theft protection, alerting users through an app

3-SOLAR POWER GENERATION

A solar or photovoltaic cell converts solar energy into electricity through the photovoltaic effect. While "solar cell" typically refers to devices capturing sunlight, "photovoltaic cell" applies to any light source. Cells are assembled into solar panels or photovoltaic arrays, contributing to solar energy technology. Efficiencies vary from 6% for amorphous silicon cells to over 40% in advanced lab setups, with commercially available multicrystalline silicon cells reaching 14-19%. Solar cells are also integrated into everyday electronics like phone chargers, bike lights, and camping lanterns for sustainable power.

Figure 2.2 The schematic symbol of a solar cell



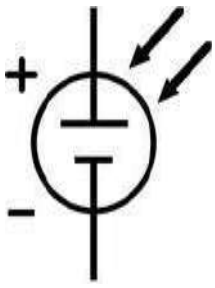
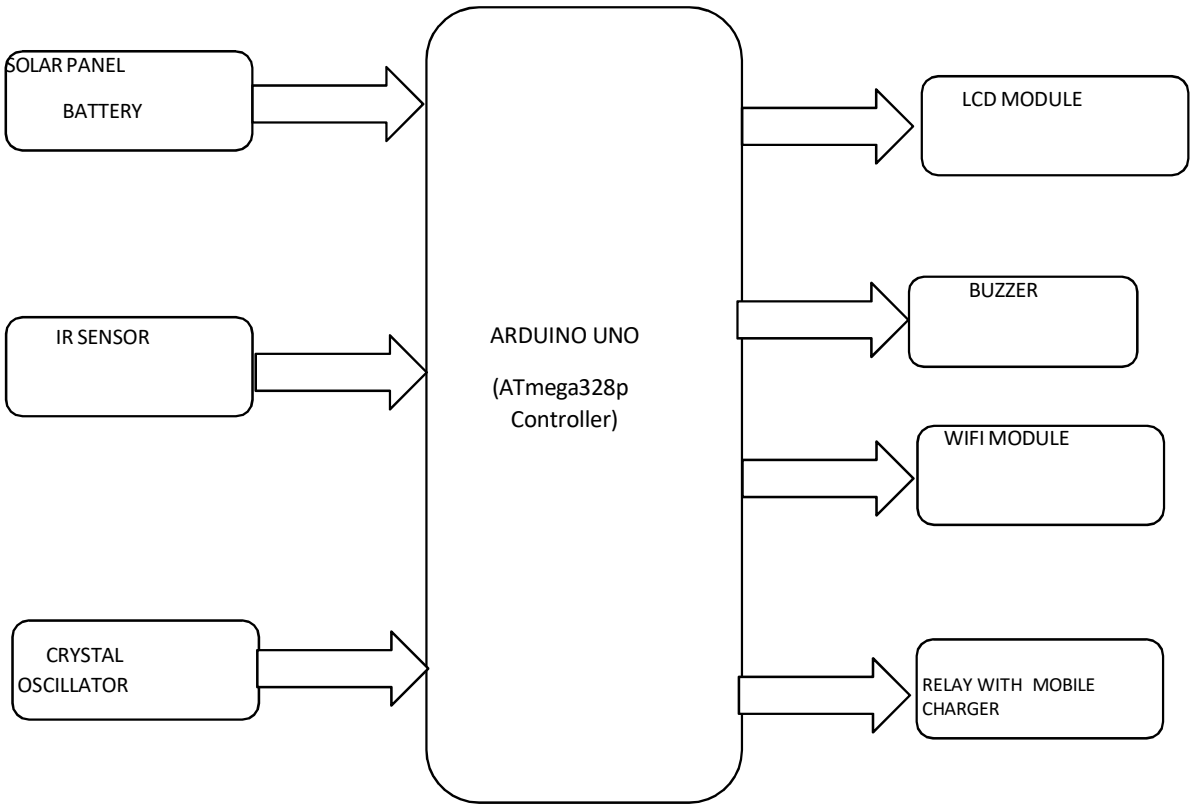


Figure2.1. Equivalent circuit of a solar cell

In a solar panel, photons from sunlight are absorbed by semiconducting materials like silicon, freeing electrons and generating electricity as they move through the material. The solar cell's structure ensures electrons flow in one direction, while positive charges, called holes, move in the opposite direction. An array of solar panels works together to convert this solar energy into usable direct current (DC) electricity.

4-BLOCK DIAGRAM



Regulated Power Supply

The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V. The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies.

Transformers

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step- down transformer to reduce the dangerously high mains voltage (230V in India) to a safer low voltage. The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by alternating magnetic field created in the soft-iron core of the transformer. Transformers waste very little power so the power outis (almost) equal to the power in. Note that as voltage is stepped down current is stepped up. The transformer will step down the power supply voltage (0-230V) to (0- 6V) level. Then the secondary of the potential transformer

will be connected to the bridge rectifier, which is constructed with the help of PN junction diodes.

Battery power supply

The advantages of using bridge rectifier are it will give peak voltage output as DC.

Figure 3.3 9V Battery

A battery is a portable, reliable power supply made up of electrochemical cells connected to achieve the desired voltage. Commonly used dry-cell batteries, like the carbon-zinc type, generate 1.5V by converting zinc to zinc salt and reducing magnesium dioxide at the carbon electrode. Lead-acid batteries are rechargeable, using lead and lead dioxide electrodes in sulfuric acid to produce a voltage of 2.06-2.14V per cell, typically found in car batteries. Nickel-cadmium batteries, also rechargeable, are sealed and maintain constant voltage with a long service life, making them ideal for high-current applications.

Figure 3.4 Battery of 1.5V

5-SOFTWARE DESCRIPTION

This project is implemented using following software's:

- Express PCB – for designing circuit.
- Arduino IDE compiler - for compilation part.
- Proteus 7 (Embedded C) – for simulation part.

The Interface

When a project is first started you will be greeted with a yellow outline. This yellow outline is the dimension of the PCB. Typically after positioning of parts and traces, move them to their final position and then crop the PCB to the correct size. However, in designing a board with a certain size constraint, crop the PCB to the correct size before starting.

Figure 4.1 Tool bar of interface.

The select tool: It is fairly obvious what this does. It allows you to move and manipulate parts. When this tool is selected the top toolbar will show buttons to move traces to the top / bottom copper layer, and rotate buttons.

6-RESULTS

The developed system successfully combines solar energy-based mobile charging with a theft alert feature. The solar panel efficiently powers the system while the theft alert mechanism detects unauthorized access through sensors and alerts the user via SMS. This integration of renewable energy and security improves the usability and safety of mobile devices.

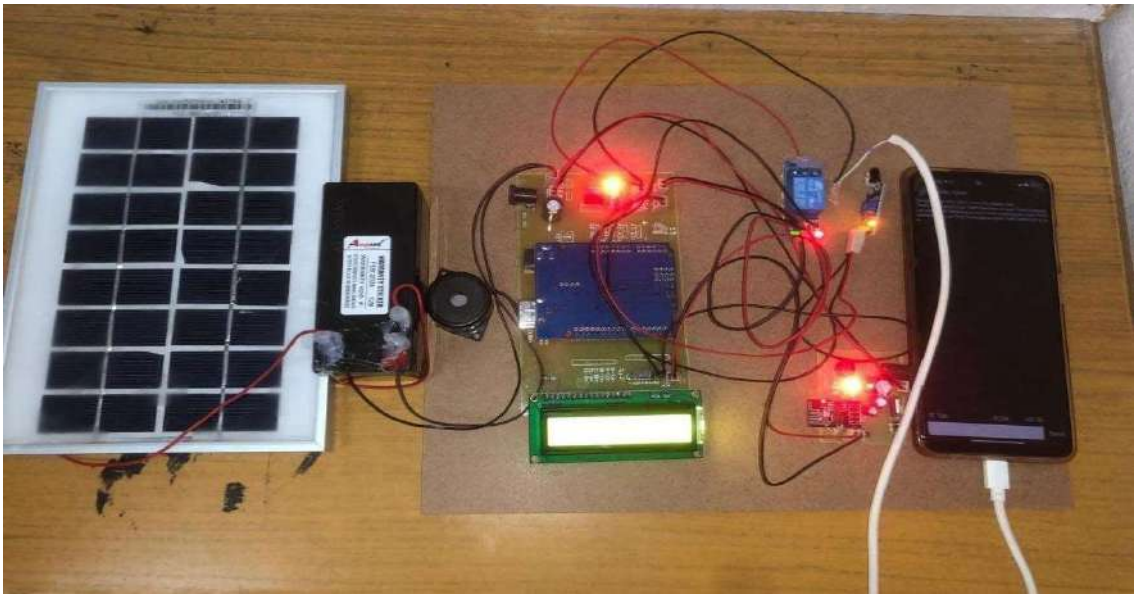


Figure 5.1 Solar based mobile charger with theft alert system

Figure 5.2 System status indicating " IR:ON"

Figure 5.3 System status indicating " IR:OFF"

Figure 5.4 Unauthorized access detected

7-CONCLUSION AND CONCLUSION

Conclusion

The project " SOLAR BASED MOBILE CHARGER WITH THEFT ALERT SYSTEM" has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. The project presents an innovative solution for mobile charging and security by integrating solar energy with a mobile theft alert system. The use ofsolar panels ensures a renewable and eco-friendly energy source, making the system ideal for outdoor activities or remote locations with limited access to traditional power outlets. The theft alert system, which utilizes IR sensors and a WiFi module, provides real-time monitoring and alerts users via SMS in case of unauthorized access or suspicious movement of the device.

Future scope

The future of solar-based mobile chargers with theft alert systems is promising. Advancements in solar efficiency will allow faster charging, while IoT integration will enable real-time monitoring and theft alerts via mobile apps. Portability will improve with miniaturized designs, making the chargers more convenient and compatible with various devices. Enhanced theft prevention features like GPS tracking and instant notifications will increase security. Additionally, these chargers could be used in public outdoor spaces, offering eco-friendly and secure charging solutions.

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