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SOLAR-BASED-COOL-CAP

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ABSTRACT: The Solar Cooling Fan Caps are developed for summer travelers, fishermen, mountain climbers, golfers, sport meeters, outdoor workers, and youngsters. They prevent sunstroke and cool the body and are fantastic presents. Solar cell on front of hat. sun cells convert sun energy into electricity that powers fans. Its fanning adjusts automatically to sunlight. Wear these hats in summer for a refreshing breeze. The Solar Fan Cap provides a cool summer environment. Our solar Fan Caps' unique design entertains youngsters of all ages. This project uses a 3V solar panel and a rechargeable battery. It has an ON/OFF switch for user control.

This idea is unusual since the cap senses sunlight intensity and turns on the cooling fan without human intervention. A temperature sensor measures atmospheric heat. Adjusting a preset sets the temperature at which the cooling fan turns on.

INTRODUCTION

Solar panels, which consist of arrays of photovoltaic cells, harness renewable energy from the sun and serve as an ecologically sustainable method for capturing solar energy. The Solar Cooling Fan Caps have been specifically developed to cater to the needs of summer visitors, those engaged in activities such as fishing, mountain climbing, golfing, participating in sports events, outdoor workers, and children. The use of sun hats is beneficial in mitigating the risk of sunstroke and reducing ambient temperature, making them an excellent choice for gifting purposes. Located in the anterior region of the cap, there exists a solar cell. Solar cells have the capability to convert solar energy into electrical power, so enabling the activation of a fan. The rate of its fanning is subject to automated adjustment according on the presence or absence of sunlight. By donning these hats in the midst of the sweltering summer season, individuals may experience the pleasant sensation of a refreshing, mild, and acceptable airflow. The Solar Fan Cap provides a refreshing and comfortable environment to enhance your summer endeavors. The innovative design of solar Fan Caps provides an enjoyable experience for individuals across all age groups, particularly children.

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Vol 14, Issuse.4 Oct 2023

The project utilizes a 3V solar panel and incorporates a rechargeable battery for the purpose of energy storage. A user-controlled operation is facilitated by the inclusion of an ON/OFF switch. The distinguishing characteristic of this project is in its ability to detect the intensity of sunlight and then activate the cooling fan without any intervention from the user. The battery charger circuit has been specifically designed to facilitate the charging of a battery by using the alternating current (AC) supply often found in households. This design is intended to be used during emergency situations. The circuit in question employs a power source that provides a regulated output of 5 volts and a maximum current of 500 milliamperes. The 7805 three-terminal voltage regulator is used for the purpose of voltage control. The bridge-type full-wave rectifier is used for the purpose of rectifying the alternating current (AC) output obtained from the secondary winding of a step-down transformer with a voltage ratio of 230/12V.

1. LITERATURE SURVEY

In the context of wearable technology, solar-powered apparel is a novel product that is still in its early stages of development (Macguire, 2011). All electronics that may be worn on the body as an accessory or as a component of fabric for clothes are collectively referred to as wearable technology. The notion of wearable computers, which were really portable rather than wearable devices in the 1980s, served as the inspiration for the concept of smart clothes. Collaboration with experts in the fields of electrical engineering, apparel, and textiles quickly expanded in the late 1990s. (Rantanen Alfthan, Impio Karinsalo, Malmivaara, Matala & Vanhala, 2000) created prototypes with an emphasis on consumer-oriented design, and smart clothing is now being developed for daily use (G. Cho & Cho, 2007).

According to Suh (2010), wearable technology researchers are now primarily interested in solar-powered caps that may provide wearable energy sources from solar cells that are renewable. Due to growing concerns over reliance on coal and oil, among other energy sources (such as wind and waves). Because it can produce electricity directly with the use of solar cells, the sun has the highest potential (Mather & Wilson, 2006). Because a solar cell generates electricity directly from sunlight, it is also referred to as a photovoltaic cell, which stands for "light electricity"; the terms "photo" and "voltaic," which come from the last name of an electrical engineer, Alessandro Volta, respectively, denote electricity (Cho, 2010, p. 250). Solar-powered apparel produces electricity by means of a solar cell, which serves as a backup energy source. Therefore, incorporating photovoltaic materials into clothes opens up a world of possibilities for technology-based design and can power portable electrical gadgets.

Researchers and business alike have come to favor solar-powered caps because of their practicality and positive environmental qualities. because it generates electricity using a solar cell as a substitute energy source. According to current experts, solar energy is "the first long-term energy source for human beings" and one of the most potentially significant energy sources (Jeon & Cho, 2010, p. 251). Flexible and light solar power sources can be integrated into clothing without burdening the wearer, as the main issue with wearable electronics is their reliance on conventional power supplies (such as batteries), which are typically physically heavy and have a short lifespan (Jeon & Cho, 2010). As a result, the majority of solar-powered apparel has a universal plug for handheld electronics like MP3 players and

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Vol 14, Issuse.4 Oct 2023

cell phones, which eventually addresses the ongoing issue of running out of battery life. Particularly, the use of mobile phones has become a crucial component of digital activity for users of all ages.

The number of mobile phone users climbed from 5.4 billion in 2010 to 6.8 billion in 2012. Users have often complained about their phones' short battery lives (International Telecommunication Union, 2013). to provide better customer service. Multidisciplinary researchers from the fields of computer science, engineering, and design have actively worked on product development, textile development, and commercialization opportunities (Jeon & Cho. 2010: Schubert & Werner, 2006: Zou, Wang, Chu, Lv, & Fan, 2010).

2. BLOCK DIAGRAM

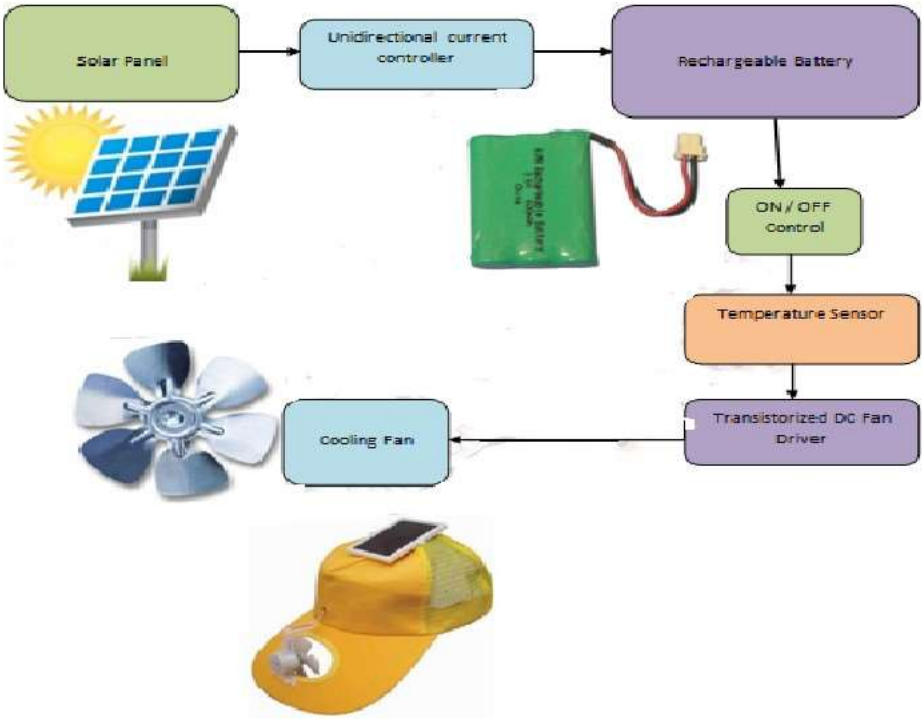

Figure 3.1: Block Diagram

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN2454-9940
www.ijsem.org
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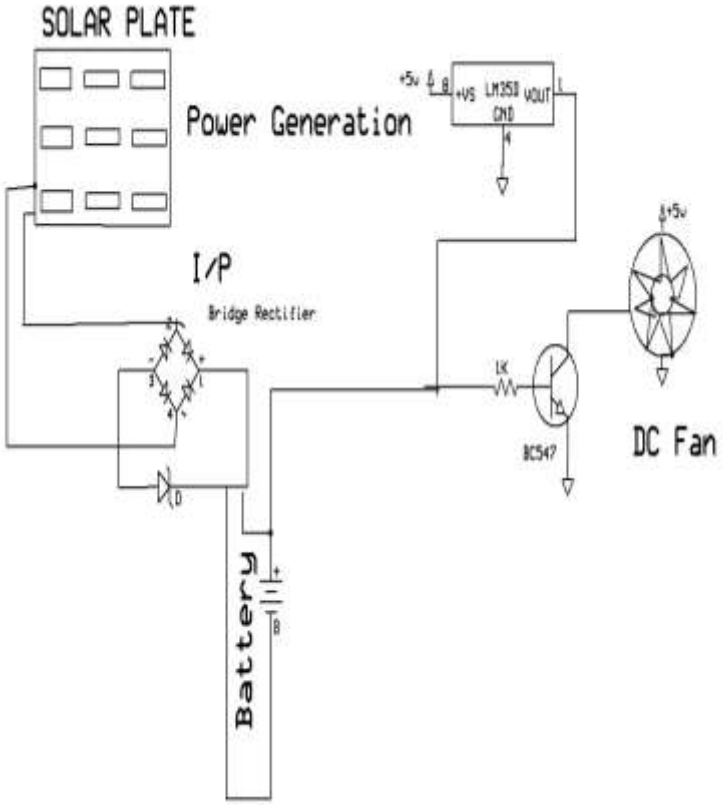

Figure 3.2: Schematic Diagram

A 3V solar panel and a rechargeable battery are used in this project to store energy. There is an ON/OFF switch for user-controlled operation. This project is unusual in that the cooling fan is turned on automatically by the cap, which senses the temperature of the sun and doesn't need human input. To measure the intensity of the atmosphere's heat, a temperature sensor is used. By modifying a preset, the user may select the temperature at which he wishes to turn on the cooling fan. In an emergency, a battery charger circuit is intended to utilize a household AC supply to charge the battery. A regulated 5V, 500mA power supply is used in this circuit. Voltage control is accomplished using the 7805 three terminal voltage regulator. A bridge type full wave rectifier is used to rectify the ac output of the step down transformer's secondary (230/12V).

3. TESTING AND RESULTS

HARDWARE MODULE

A 3V solar panel and a rechargeable battery are used in this project to store energy. There is an ON/OFF switch for user-controlled operation. This project is unusual in that the cooling fan is turned on automatically by the cap, which senses the temperature of the sun and doesn't need human input.

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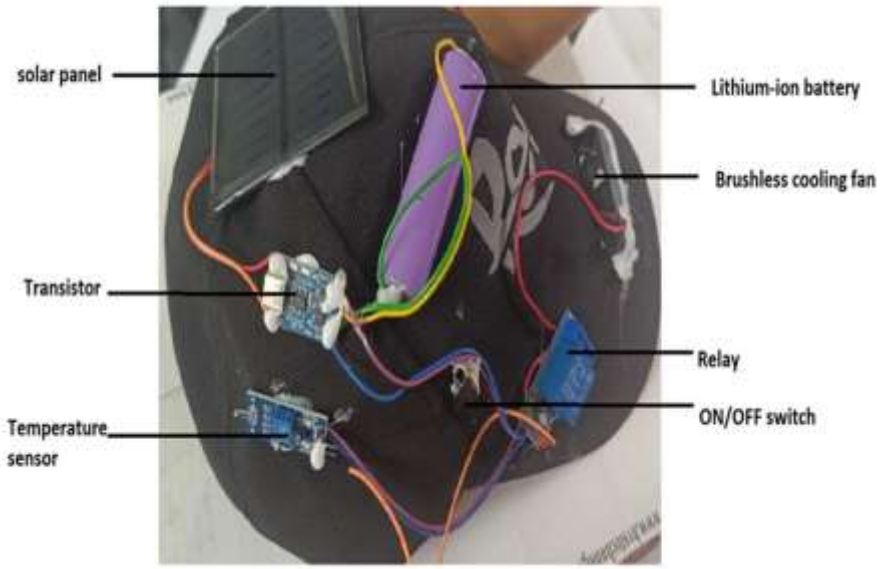
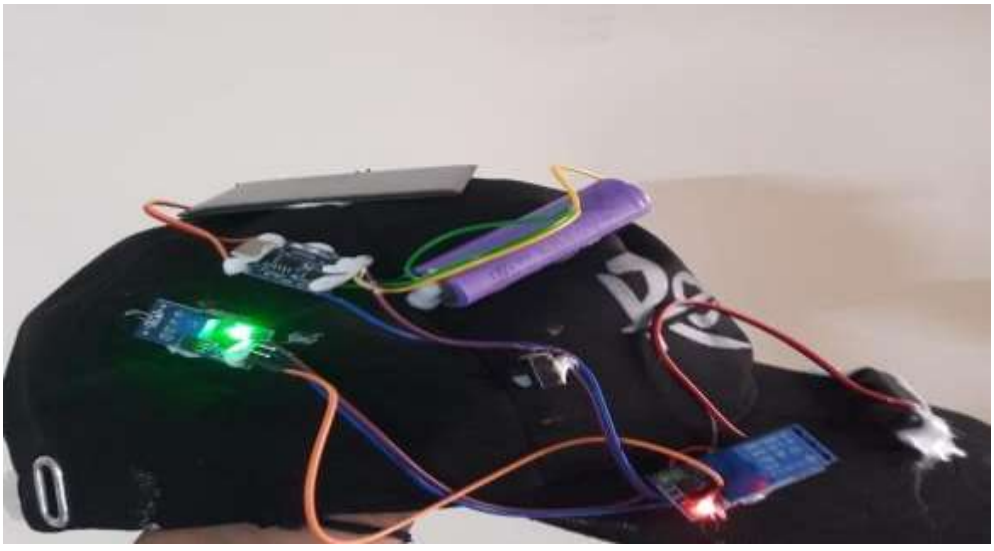


Figure 4.1: Hardware module

TESTING

Case 1: When ON/OFF switch is turned on

When ON/OFF switch is turned on then cooling fan starts rotating , depending upon the intensity of sunlight by using temperature sensor.



ISSN2454-9940
www.ijsem.org
Vol 14, Issuse.4 Oct 2023

Figure 4.2: ON/OFF switch is turned on

Figure 4.3: ON/OFF switch is turned on then cooling fan starts rotating

When the switch is turned on, it triggers the start of the cooling fan. However, the fan's operation isn't solely based on the switch; it's intricately connected to the system's temperature sensor.

Case 2: When ON/OFF switch is turned off

When ON/OFF switch is turned off then rotating cooling fan stops it’s rotation.

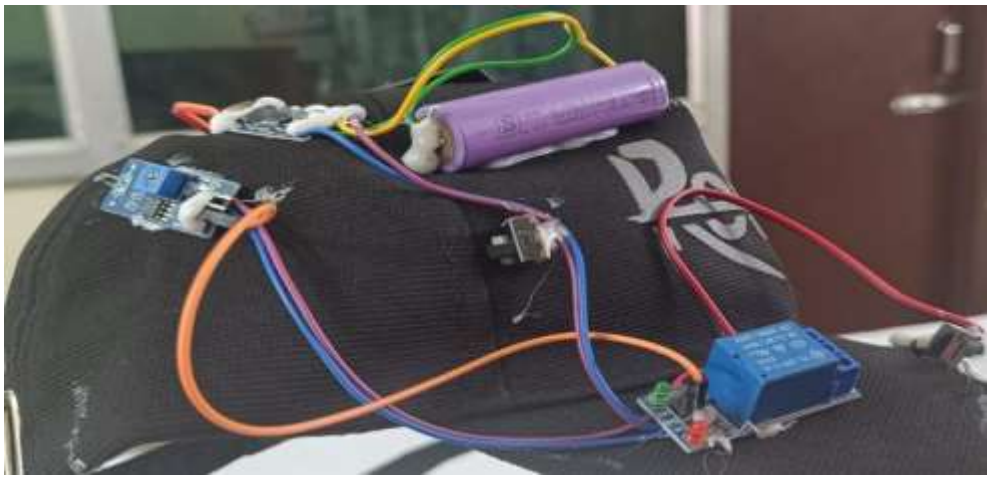


Figure 4.4: ON/OFF switch is turned off

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www.ijsem.org
Vol 14, Issuse.4 Oct 2023

Figure 4.5: When ON/OFF switch is turned off ,fan stops it's rotation

The sensor plays a crucial role in assessing the ambient temperature, which can be influenced by the intensity of sunlight. Upon the switch activation, the temperature sensor becomes active. It measures the surrounding temperature, potentially registering fluctuations caused by varying sunlight intensity.

Table 1: Temperature vs speed of fan

Temperature (˚C)	Speed of cooling fan(RPM)
24	355.3
36	532.95
42	990.9

Table 2: Distance vs speed of fan

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Vol 14, Issuse.4 Oct 2023

Distance Between Temperature sensor(in cm)	Speed of cooling fan (RPM)
1.7	990.9
2.5	355.3

As the temperature is increasing then the speed of cooling fan is increasing. Particularly in this type, one has to keep the cap on the head and the cap not only provides shade to the head, but also the fan arrangement also makes the person feel cool and sweet to the face.

CONCLUSION

Solar-Based Cool Cap is an intriguing project that keeps you cool and eco-friendly. A clever headgear utilizes solar energy to keep you cool in the summer. We conclude that this research has significant potential to improve our lives in many crucial ways. Traditional air conditioners take a lot of power and warm the globe.

The Solar-Based Cool Cap cools you using solar energy. This decreases pollutants and power usage, which benefits the environment. A significant step toward helping Earth. Solar-Based Cool Cap works well, which is its finest feature. People in various areas claimed it made them feel colder in our tests. They saved money on their energy expenses by using traditional air conditioners less.

This implies the Solar Based Cool Cap might modify our cooling habits and save money. This fashionable hat benefits society and the economy. It might make cooling cheaper for low-income or non-air-conditioned persons. It also lowers high-electricity expenses. It may make society fairer and save money.

However, the Solar-Based Cool Cap has flaws. Initial costs may be higher. As more people use it, the price should drop. It cools, but it's just one part of the climate change struggle. We must also use renewable energy and create energy-efficient buildings to make a difference. The Solar-Based unique Cap Project is a unique concept that utilizes the sun to cool you and benefit the environment.

It improves our life and reduces climate change. This technology can make our lives easier and improve the globe with greater development and use.

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