



UNIVERSITI
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i-JaMCSIIX 2022

International Jasin Multimedia & Computer Science Invention and Innovation Exhibition

EXTENDED ABSTRACT BOOK

Publication Date: 31 October 2022

ISBN: 978-967-15337-0-3

In Partnership:



Tadulako University

<https://jamcsiix.wixsite.com/2022>

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Extended abstract

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ISBN: 978-967-15337-0-3

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Universiti Teknologi MARA Cawangan Melaka Kampus Jasin

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Contents

No.	Registration ID	Project Title	Page
1	JM006	Hiding Information Digitally Under Picture (HIDUP) Using Image Steganography	1
2	JM009	Learning Shapes and Colours using JomLearn & Play Application for Children	5
3	JM010	A Novel Quality Grading Determination using Boxplot Analysis and Stepwise Regression for Agarwood Oil Significant Compounds.	9
4	JM011	A Novelty Classification Model for Varied Agarwood Oil Quality Using The K-Nearest Neighbor Algorithm	13
5	JM012	The Development of Web-Based Student Leadership Program Management System for 'Unit Kepimpinan Pelajar'	16
6	JM020	Jom Solat-iVAK: An Interactive Android Mobile Application in Learning Wudhu and Salah for Children with Learning Disabilities	20
7	JM024	Gold Price Forecasting by Using ARIMA	24
8	JM025	Recycle Now: Learning the 3R of Waste Management Through Game-Based Learning	28
9	JM031	Go Travel Application	32
10	JM032	SmartPark	36
11	JM033	iKEN 3D Environment Mobile Application	40
12	JM034	Click Car Services	44
13	JM035	Smart Vector Backpack	47
14	JM036	MY Ole-Ole Application	51
15	JM040	SH Jacket	55
16	JM041	FemaleSafe2Go	59
17	JM042	Avalyn	63
18	JM043	MyConvenient Travel Application	67
19	JM044	Visnis Apps	71
20	JM045	Cyclo Application	74
21	JM046	i-seeuWatch	78

22	JM047	ArenaSport Application	82
23	JM048	Melastomaceae species : A New Potential of Antioxidant Agent	86
24	JM049	Travesy	90
25	JM051	Borneo Food Hunter App	94
26	JM052	NIXON PACK	98
27	JM053	Ecoin Sustainable Smartwatch	102
28	JM054	SpaceBook	105
29	JM061	Nafas Face Mask	109
30	JM062	Handy Scrubby	113
31	JM064	POMCUT (PORTABLE MULTI-COOKING UTENSIL)	116
32	JM065	4 in 1 Tumbler	120
33	JM072	Understanding Social Media Influence In Reviving The Trishaw Or "Beca" As A Popular Tourism Attraction In Melaka.	124
34	JM074	First Aid Stick	127

SH JACKET

Mohd Iqmal Yusrizan Raimay¹, Fatin Nazira Abu Bakar Sidik², Muna Lassandra King anak Robert Tira³, Trinyavenie Trinitas Kilat⁴, Siti Hajar Md. Shahar⁵

^{1,2,3,4,5} Faculty of Hotel and Tourism Management, Universiti Teknologi MARA, Cawangan Sabah, Kampus Kota Kinabalu

mohdiqmal0206@gmail.com, fnazira007@gmail.com, munaking98@gmail.com, trinyavenie@gmail.com, siti_hajar@uitm.edu.my

Abstract— Going through tropical rainforest will be challenging for hikers when the devices that were brought along lose their power. Unlike any other kind of forest, the landscape of rainforest is surrounded by rugged terrain and clusters of tall trees that at some point limit sunlight from reaching the ground. The SH Jacket, also known as the Safe Hike Jacket, is a one-of-a-kind piece of clothing designed specifically for hikers in tropical climates. Hikers are individuals who hike for fun or as a sport, either alone or in groups. The use of polyester is to provide comfort to hikers during hiking activities as it is waterproof. The solar panel is made of durable fabric and is IPX4-certified, meaning it can withstand water splashes from any direction for up to five minutes. The solar panel battery contains enough power to fully charge the 1,500 mAh device up to four times. One important feature of solar panels is that they are a renewable energy source that is completely accessible as long as it gets sunlight energy to regenerate and generate electricity. The solar panels are sewn onto the SH Jacket shoulders. Once the solar panel is sewn, it will be in a long-stretched state and ready to be used to charge your device. Keep it plugged in for one hour to get it recharged. When done, just unplug the wire and keep it in the pocket on the front. Finally, this is the best hiking clothing for power backup for your device.

Keywords—jacket, safety, hiking, hikers, outerwear

I. INTRODUCTION

A jacket is an upper body garment that people who went on a hike usually wear. The climate in Malaysia is always humid and surrounded by many dense rainforests, and due to that, anyone who goes hiking in the rainforest will expose themselves to many risks, including outpower source. Therefore, this innovation is a project called SH Jacket where it can provide the hikers with the electricity from the solar energy which has the same power as the usual portable power-bank so that they can charge the things they need without any problem. Moreover, a hiker tends to carry a rechargeable item and a heavy power-bank with them during the hike. However, some hikers are not prepared enough and have nowhere to charge their items whenever they need them, such as a portable USB fan or even a rechargeable torchlight. Due to that, this innovation comes up with three objectives for the hiker's convenience, which is firstly, to provide solar energy into electricity through a jacket. Secondly, to provide a suitable and waterproof jacket suitable for rainforest hikers, and lastly, to create awareness about the importance of solar energy during hiking. The benefits of the SH Jacket are that it can provide electricity through the rechargeable solar panel being attached to the shoulder of the jacket. Plus, this innovative jacket project is suitable for Malaysia's climate as it has breathable and waterproof material.

II. MATERIALS

A. SH Jacket Fabric Material

The SH Jacket is designed for rainforest hikers in the tropical climate. The SH Jacket will need to be created with a waterproof and durable material. Hence, polyester will be used as the main fabric material for SH Jacket. Polyester is commonly used for hiking jackets and camping tents since the fabric is of synthetic material which can withstand rough weather, either rain or shine. As mentioned in [1] polyester materials are known for blocking away moisture to keep the user dry. Therefore, the usage of this material will protect the hiker from the humid and dry temperature. Figure 1 shows the SH Jacket front and back view.

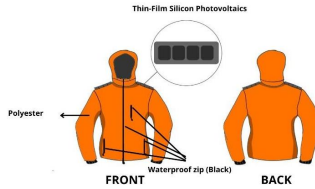


Fig. 1. The SH Jacket front and back view

B. Solar Panel Material

The main feature of SH Jacket is the solar panels. The solar panels are made of thin-film silicon which are flexible and would not break easily when bent. Since hiking is a vigorous activity, the hiker will need lots of movement upon hiking along the rainforest. The placement of solar panels on top of the shoulders may cause it to break and fall easily. Hence, using thin-film silicon as solar panels will be most suitable. According to [2] the usage of flexible solar panels are commonly used for the fashion industry including the backpack and hats. To be more specific, the most suitable silicon solar panels would be the amorphous Silicon (a-Si). Since this jacket is developed for rainforest hikers, using a-Si it can capture lights even in small amounts. The solar panels will be using the photovoltaic system to ensure that the solar energy can be converted into electricity.

III. METHODS

A. Design Methodology

a) Research Planning

Based on Figure 2, the SH Jacket is created through several processes in terms of innovation to facilitate activities and solve the problems of hikers, which is the main objective of SH Jacket.

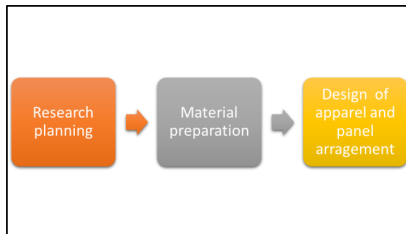


Fig. 2. Process in the making of SH Jacket

The main process in the creation of SH Jacket is research planning. At this stage, innovators give some suggestions for product innovation ideas that innovators want to implement. SH Jacket is the idea selected for this invention project and subsequently developed in the next process. At this stage as well, innovators conducted several studies by using secondary data. Innovators use website sources and journal articles as secondary data to develop ideas and make comparisons between existing products and new products, namely SH Jacket. After obtaining information, innovators meet with advisors for consultation and improvement purposes. The final process in this section is to make improvements both in terms of report writing and SH Jacket design.

b) Material Preparation

After obtaining data and information related to this innovative product, the innovator then proceeds to prepare the material that needs to be used in the design of the SH Jacket. To achieve the objectives of this design, the materials required must be of good quality as well as user-friendly. Among the important materials in the creation of SH Jacket are polyester jacket material, solar panel, inverter, battery, battery controller, and device.

c) Design of Jacket and Panel Arrangement

After the materials needed to create the SH Jacket were identified, the innovator then proceeded to do a 2D design sketch by using Adobe Photoshop application to give the user of the jacket an overview and a better understanding regarding the SH Jacket as a product. Next, the innovator also sketched the layout of the solar panels and how to use the jacket.

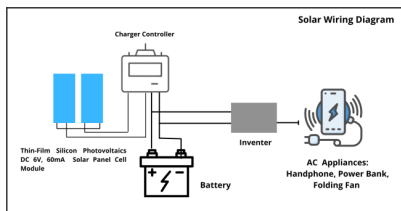


Fig. 3. Panel solar wiring diagram

B. Installation of Solar Panel

Based on Figure 3, there are five installation steps that the innovator needs to carry out before the final product. The solar panels need to be activated first in order to help the hikers to store electricity coming from the sunlight so they can use it to charge their devices when they need it.

In the first step, the innovator needs to connect the positive and negative wires from the solar panel to the positive and negative solar terminals on the charger controller.

In the second step, the innovator needs to connect the positive and negative battery terminals on the charger controller to the positive and negative of the solar battery.

In the third step, the innovator needs to connect the positive and negative inverter terminals on the charger controller to the positive and negative terminals of the solar inverter.

In the fourth step, the innovator needs to press the ON button on the solar charger controller, then press the ON button on the inverter. At this stage, all the components connected to the solar panel are ready to be used to absorb the energy from the sunlight and store the energy in the battery.

The fifth step, which is the final step, is that the jacket is ready to be used by the hikers as they only need to wear the jacket while hiking and let the solar panel do its work by charging the user's device.

IV. RESULTS AND FINDINGS

In terms of endless potential energy sources, solar energy is the most promising one. Hence, many solar products and jackets have been introduced to the market, especially in Japan [3]. The SH Jacket is a jacket designed specifically for hikers in the rainforest climate. The solar panels on the shoulder are the most essential design criteria because, although the rainforest is surrounded by dense trees and less sunlight can flow through, the Thin Film silicon photovoltaics used can capture the energy at low intensity. This innovation focuses on the quality, which is meant to provide comfort for hikers in tropical climates owing to the breathable and waterproof material. Furthermore, according to [3] the problem with electronics is the need to rely on conventional power supplies like powerbanks, which are typically physically heavy and have limitations. The SH Jacket is equipped with cables to charge the items that they need with ease. Thus, it became a solution to the problem of encountering limited battery life.

V. CONCLUSIONS

In conclusion, the SH Jacket is one of the product innovations that is in demand among users who are active in sports, especially hikers. This demand is supported by the fact that the global solar charged jacket market is expected to grow and increase due to its lightweight and durable functionality [4]. The report also noted that the global solar charged jacket market is expected to record a strong CAGR throughout the forecast period, which is 2020–2028. Therefore, SH Jacket is not difficult to promote for business purposes because it already has a demand and target market in the sports jacket market.

ACKNOWLEDGEMENT

We would like to express our appreciation to all those involved both directly and indirectly in the success of this project. We would also like to express our deepest appreciation and millions of thanks to the International Jasin Multimedia and Computer Science Invention and Innovation Exhibition for giving us the opportunity to innovate and gain knowledge throughout the process of completing this assignment. In addition, we would also like to thank our advisor, Madam Siti Hajar Binti Md. Sahar, for her guidance and support throughout this assignment. Not to be forgotten also are the lecturers, family, and friends who always give positive encouragement, suggestions, and support throughout the end of this project and until it is completed.

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