

SMART JACKET PROTOTYPE FOR ONLINE OJEK DRIVERS BASED ON THE INTERNET OF THINGS (IOT) IN SURABAYA CITY

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Abstract— The research aims to design an automatic cooling jacket based on the Internet of Things (smart jacket) that can be used when riding motorbikes, including online motorcycle taxis. The methods used in this research include user needs analysis, system design, prototypes, and fan speed performance testing. In the user needs analysis stage, a survey was conducted among motorcyclists to identify problems faced when riding in hot weather conditions. Next, a system design consisting of a temperature sensor and an IoT communication module was carried out. After designing the system, an automatic cooling jacket prototype was developed. This prototype is equipped with a temperature sensor that will detect the rider's body temperature level, and an IoT communication module to allow users to control the jacket via an application on a smartphone. The results of this research show that an IoT-based automatic cooling jacket can effectively reduce the body temperature of motorcyclists when riding in hot weather. In speed performance testing, this jacket succeeded in reducing the rider's body temperature efficiently. This research is expected to contribute to the development of wearable technology that can increase comfort and safety for motorcyclists. Apart from that, this research can also be the basis for developing IoT-based automatic cooling jacket products that can be mass-produced and sold on the market.

Keywords—jacket, fan cooling, IOT, motorbike, temperature sensor

I. INTRODUCTION

Year by year the number of urban weather temperatures makes motorcycles have shortcomings including heat, humidity, security and comfort, deirration for online motorcycle taxis. In this development, internet of things (IoT) technology has brought significant changes in various aspects of human life, including in the transportation and logistics sectors. One innovation that has the potential to have a big impact is the development of a smart jacket prototype for online motorcycle taxi drivers in the city of Surabaya. And in fact, online motorcycle taxi drivers, especially in Surabaya, have complaints such as losing jackets that are placed on bicycles or on chairs, therefore the GPS feature was created. In this case, there needs to be a design that has a solution to improve the comfort of motorcyclists and maintain a stable body temperature while riding a

motorcycle. With IoT technology (Internet Of Things) research. and. design, implementing an automatic cooling jacket based on IoT. This jacket will be able to detect temperature, humidity and GPS for online motorcycle taxi drivers, when the air temperature is high, and the presence of the jacket, the jacket will automatically activate the cooling system and do not forget to provide a GPS feature to facilitate the location of the jacket when online motorcycle taxi drivers forget to put it. The prototype of this IoT-based cooling jacket device allows drivers to feel better comfort and safety when online motorcycle taxis ride motorbikes in any condition.

II. RESEARCH METHODS

The following are related components :

A. Cooling Jacket

In this study, the focus is on jackets where the jacket functions as a safety and comfort for the rider, therefore the jacket is added with features to make it more efficient in carrying out activities anywhere and anytime and reducing unwanted ones.

B. Temperature

Temperature is a method of measuring the level of heat and cold between objects and the environment. In measuring weather temperature, the units commonly used are degrees Celsius (°C) or degrees Fahrenheit (°F). In addition, weather temperature can also be measured using Kelvin (K). Weather temperature can also change seasonally, when summer then the temperature will increase as well as cold temperatures will cause cold temperatures.

C. DHT11

Spindle Kit Sensor DHT11 is a sensor that functions to check temperature and humidity objects which have analog voltage output and can also be further processed using a microcontroller. This sensor is classified as a resistive element that is almost the same as a temperature measuring device, namely NTC. The advantages of this DHT11 compared to other sensors

are in terms of the quality of accurate data reading which has speed in sensing temperature and humidity objects. And the data may not be easily read or is called interfered. The DHT11 sensor also has a calibration feature that has accurate temperature and humidity reading values.

D. Battery VTC 4

VTC 4 battery is a type of battery that is often used by vapers. VTC4 battery also has advantages, namely power capacity and functional safety. With a capacity of 2100 mAh and a voltage of 3.7 volts, which is able to provide sufficient power and is durable in its function. For the design itself, it is very elegant and sturdy. The battery is designed for use in the electronic world.

E. NodeMCU ESP12 (ESP8266)

Functionally, this module is almost similar to the Arduino module platform, only specifically "connected to the internet. While this Prototype uses NodeMCU version 1.0. which is a development of version 0.9 in the new type, namely 1.0 ESP8266 is used, namely the ESP-12E type which is considered very stable from the ESP-12 itself. For the size of the board itself, it uses a fairly small module so that it is more efficient when making a project prototype on a breadboard.

F. Drive Motor BTS 7960

Motor Driver BTS7960 is an electronic device that functions to control DC (Direct Current) motors using high current. Motor Driver can operate DC motors with high efficiency, not to mention applications such as robotics, and automatic equipment in industry.

G. Type C Step Up Boost 18650 Charger Battery Lipo

Battery Charger is a component that functions to charge a constant voltage, where the voltage will charge a battery so that it reaches the specified voltage or what we call a full charge.

H. Saklar Switch

Switch can function on and off current or electric voltage where when the component can be used to flow electricity from one to another conductor. A separate switch in the world of robots, to activate components that are dead to be alive.

I. Dc-Dc Mp2482 Servo Power

Dc-Dc Servo Power is generally a device that converts energy from Dc to Dc, without having to change the value of the source. Its own function is to change the existing Dc into a voltage to suit the needs of the servo motor.

J. Lithium Battery Dual Gauge Display Module

Lithium Battery Dual Gauge Display Module is a module used to monitor the power level and voltage of lithium batteries. This module consists of two gauge units, each of which functions to measure the voltage and capacity of the battery

K. Aplikasi Blynk

The Blynk application is a platform that allows users to easily create Internet of Things (IoT) based applications. With Blynk, users can control and monitor their IoT devices via their smartphone or tablet

L. SIM 800L

Sim800L is a GSM/GPRS module that is used for cellular communication. Even the possibility of this device for sending and receiving SMS, making voicecalls.

M. GPS NEO 6M

Gps Neo 6m is a gps module based on the u-bloxNeo 6m chipset designed to provide accurate and fast positioning functionality. This module is one of the important components in the satellite system and is used in various applications such as travel.

N. Sim Card GPS

A GPS sim card is a SIM that is equipped with a GPS feature or what we call (Global Positioning System), namely as a device or object location tracker. A GPS sim card has almost the same function as a GPS tracker.

III. RESEARCH RESULT

The following is a flow chart or flow diagram :

A. Flowchart

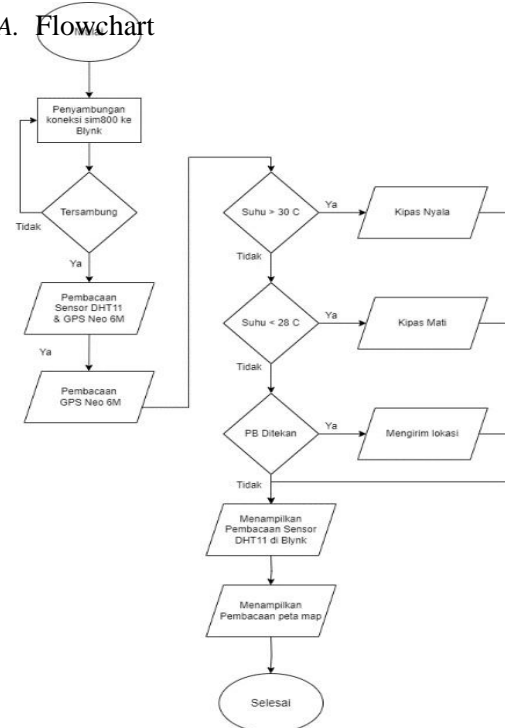


Figure 3. 1 Flowchat

Based on the flowchat above, it can be explained as follows From figure 3.1, it states that the process Where when connecting the 800L sim to Blynk,if connected, the DHT11 sensor will detect temperature, humidity and also GPS. If the temperature exceeds 30 °, the sensor will activate the fan, if the sensor is less than 28 °,the fan turns off, to activate GPS, press the button provided. If it is active, it will send a location notification.

B. Variabel dan Definisi Operasional Variabel

1. Independent Variables

In this study, the independent variables are temperature, humidity and GPS. Where the results shown are the results of using the IoT jacket.

2. Dependent Variables

In this study, the dependent variables are the Display in Blynk, Temperature, GPS showing the results of each online motorcycle taxi activity.

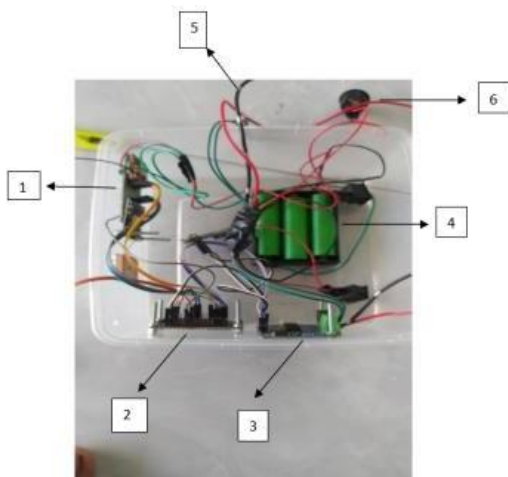
C. Metode Analisis Data

The research was conducted using survey and observation methods. The survey method is used to collect data on which online motorcycle taxis. The observation method which will later follow up on data collection based on the results of the tool objects that have been made aims to see the security and comfort of online motorcycle taxis.

IV. DISCUSSION

The following is a discussion from this research journal :

A. Product Result



Components used:

1. EPS
2. Nodemcu v
3. BTS 7960 Motor Driver

4. Battery
5. Battery indicator
6. Power on off

Data Presentation

1. Temperature Sensor Testing

Data	suhu	Keterangan
V	31°-32°	Sensor read and Fan turns on
W	30°-31°	Sensor read and Fan turns on
X	30°-31°	Sensor read and Fan turns on
Y	Error/bug	Temperature sensor not reading, fan not turning on
Z	31°-33°	Sensor read and Fan turns on

Gambar 4.1 Tool Components

In the image and table results below, the V, W, X, Y, Z data have different values regarding temperature values where the average temperature range is 30° - 33°. But for Y data, it produces a user error or cannot. The conclusion is that each online motorcycle taxi has a different temperature level even though some are the same.

2. Humidity Sensor Testing From the results of the images and tables, it can be concluded that the data V, W, X, Y, Z produce different results due to several factors. A simple factor is the influence of genetics where the more body movement, the body will produce higher humidity. Health conditions where medical is produced from eczema, and diabetes. Body size also greatly affects daily life.

Data	humidity	description
V	62%-61%	sensor read
W	90%-91%	sensor read
X	87%-90%	sensor read
Y	Error/bug	sensor not read
Z	73%-98%	sensor read

Tabel 4. 2 Humidity Sensor Testing

3. GPS Testing

Data	GPS	description
V	400 meter - 0 meter	Read location
W	450 meter - 0 meter	Read location
X	450 meter - 0 meter	Read location
Y	Error/Bug	Unreadable location
Z	500 meter - 0 meter	Read location

Tabel 4. 3 GPS



In the image and table results above, four of the five measured GPS data (V, W, X, Z) read locations with a distance of between 400 meters and 500 meters. One GPS data (Y) shows an error/bug and the location cannot be read due to the device. An error or bug in one data indicates that there is a technical problem that needs to be checked further to ensure that all GPS data can be read correctly.

CONCLUSION AND SUGESTION

The "Smart Jacket Prototype for Online Motorcycle Taxi Drivers Based on the Internet of Things (IoT) in the City of Surabaya" project concludes that this smart jacket offers enhanced security for online motorcycle taxi drivers by allowing for tracking via its GPS feature, which can help locate the jacket if it is lost or misplaced. Additionally, the jacket provides comfort and coolness, ensuring a pleasant wearing experience for drivers. The analysis of movement values along the V, W, X, Y, and Z axes shows that temperature, humidity, and GPS distance significantly influence the humidity and temperature

levels within the jacket, highlighting its responsiveness to environmental conditions.

Based on the results of this study, the researcher suggests further development to produce smart jacket products specifically designed for online motorcycle taxi drivers. Additionally, this project could be used as a learning tool for students in the field of electrical engineering, enriching their practical experience with IoT applications. Finally, maintaining and enhancing the smart jacket will ensure its ongoing utility and benefit for a wider audience.

REFERENCES

- [1] Sujiwa, Akbar, and Widodo Widodo. "Design and Construction of Autonomous Fire Extinguishing Drone with Water Bombing Mechanism Based on GPS Waypoint Navigation." *Voteteknika (Vocational Electronics and Informatics Engineering)* 11.4 (2023).
- [2] Widiaratih, Rikha, et al. "Simple mini wave measuring device prototype using laboratory scale ESP32 Microcontroller." *IOP Conference Series: Earth and Environmental Sciences*. Vol. 1224. Number 1. IOP Publishing, 2023.
- [3] Jiang, Jingyuan. *Microwave Based Multiphase Flow Detection Using Convolutional Neural Network*. Diss. The University of Liverpool (United Kingdom), 2019.
- [4] Fakhri, Zul, Ahmad Daelami, and Atik Charisma. "Air Conditioning Control System Using Thermoelectric and Direct Current Blower Motor." *Jurnal Teknik: Media Pengembangan Ilmu dan Aplikasi Teknik* 21.1 (2022): 84-94.
- [5] Kafi, Muhammad, and Diastian Wijanarko. "NUMERICAL STUDY OF THE EFFECT OF HEATSINK AND FAN TYPES ON MIYAKO DISPENSER COOLING." *Journal of Mechanical Engineering* 11.03 (2023): 83-92.
- [6] Rochman, Sagita, and Mochamad Taufiq Irvan Efendy. "Design of Arduino-Based Horizontal Wind Power Plant for Coastal street lighting." *BEST: Journal of Applied Electricity, Science & Technology* 3.1 (2021): 30-33.
- [7] ROCHMAN, Sagita; MUKODAH, Roib. "AUTOMATIC FISH GRILLER BASED ON TEMPERATURE CONTROLLER." *BEST: Journal of Applied Electricity, Science, & Technology*, 2020, 2.2: 33-36
- [8] Solikin, Akhmad, Winarno Fadjar Bastari, and Achmad Aripin. "Design and Construction of Microcontroller and Android-Based Measuring and Monitoring Instruments." *BEST: Journal of Applied Electrical, Science, & Technology* 5.1 (2023): 21-2.
- [9] Bastari, Winarno Fadjar, Moch Arif Anshori, and Muhammad Risfan Ramadhani. "Design & Construction of Oxygen Saturation Measuring Instruments via Thingspeak Server with Max 30100 Sensor." *BEST: Journal of Applied Electrical, Science, & Technology* 4.2 (2022): 75-80.
- [10] Winarno, Adi, and Nur Faizim. "Design & Construction of Slurry Transfer Control & Monitoring System on ATM 140 Spray Dryer Using Microcontroller with Ultrasonic Sensor." *BEST: Journal of Applied Electrical, Science, & Technology* 4.2 (2022): 57-62.