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Air Purifier Cooling System using Blynk Application

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Abstract

In today's busy world, people are rush do their work. It made their body sweat and uncomfortable to do another work. In addition, with unpredictable weather conditions, it is difficult to control the sweat of body especially when sunny day. With regard to this, have develop an Air Purifier Cooling System using Blynk application to solve a problem related to dirty air and dry weather and to monitor the product easily. The objectives of this system is to develop an electrical cooler product for save current energy by using IoT system, to build air purifier cooler system for on/off automatically when the temperature is high and to control air purifier cooler system by using Blynk application. This system works as an automation system which is consists of fan and air filter. To make the system worked, it is merge with cooling system and IoT system. When the air purifier is turning on, the air is crossing air filter, so dirty air become clean air. Moreover, a fan of cooling system will blow clean air a little bit faster and make the air fulfil the environment. This cooling system also attached to make the environment feel cool and comfortable. An IoT system was included to turn on and turn off the product easily by using Blynk application. It worked through NodeMCU ESP 8266 get the signal from with mobile apps for control purpose. As the result, the product can make user felt comfortable by cool environment and breathe clean air. It also can make user not too sweat even the temperature are around 30°C. Generally, the air purifier using IoT and cooling system was successfully operated. The product will make everyone comfortable and ease. This product can commercialize to the community because it easier to use, give benefit to user and use IR4.0 technologies.

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Key-word: - Air Purifier, Cooling System, Blynk Application

1. Introduction

Nowadays, air pollution is one of the largest problems for many countries in the world. Various types of air pollution were known or suspected dangerous to human health and environment. Mostly air pollution primary is cause from transportation, local burning, industrial process and others. Then, dry weather is one of the common problems that happened to people especially in Malaysia. It is because Malaysia is one of the countries which is at equator. There are many systems air purifier provides to clean the air. Furthermore, people nowadays are so busy with their work, so they want something that can clean the air easily. Other than that, there are many systems air cooler provides to cool the air. Furthermore, people nowadays many works at outside and sweat quickly. So, this system will provide a good product to come out air purifier with a cooling system.

1.2 Problem Statement

Air quality around polytechnic is unhealthy and a bit smelly. Then, Polytechnic Port Dickson are near from beach, which is the weather on beach are too dry and a little bit hot. So, people around Polytechnic Port Dickson need something can make them cool and comfortable. Many of air purifier only can clean air but cannot blow cooler air and in the current market are not provide long distance controller service. So, people in polytechnic want something can do their work easily. Lecturers in polytechnic especially in JKE department always feel sweat because they need to walk from office going to classroom, lab and lecture hall. After finish the class, many lecturers feel uncomfortable because of sweat of shirt and dry weather around polytechnic

1.3 Objectives

- i. To develop an electrical cooler product for save current energy by using IoT system
- ii. To build air purifier cooler system for on/off automatically when the temperature is high
- iii. To control air purifier cooler system by using Blynk application

1.4 Scope

The limitation for this project is this system can be control by one user per machine to prevent from any problems that might occur. Other than that, this application is limited to the specific room. One application can control only one air purifier.

- i. Product dimension (2 feet height, 1.5 feet length and 1.5 feet width)
- ii. Room area (10 feet height,10 feet length,10 feet width)
- iii. Voltage product (12V)
- iv. Suitable Room with no air Cond and fan
- v. Blynk apps must install at mobile phone

1.5 Significance of Project

This project helps user especially lectures to feel comfortable while they sit in the office, classroom and lab. Then, it also helps user to breathe clean air because of the filter in air purifier will clean the dirty air to clean air. After that, it makes user feel cool air because of air cooler system. User can use the project easily because the operations of air purifier is using IOT. That means, it can control by smartphone easily

2. Literature Review

In this chapter will describe about fact finding that had searched. There are a lot of research about cooler system. Will review with the same fact of Air Purifier System by using IOT application. This chapter will elaborate clearly about the previous research. For example, Air Purification by Using IOT, Air Cooler by Using IOT. Research from IoT Technology News in Mumbai, Blueair has launched one of kind intelligent, fully connected indoor working air monitoring, control and purification system. The new air cleaning system is potentially capable of detecting and combating airborne germ, chemical, smoke and other particle attacks. The system connecting Blueair's Sense+, Aware – air quality monitor and Blueair Friend app, allows consumers to fully control the air they breathe on 24/7 basis. Blueair's 'Home Air Defence System' enables homeowners and businesses to benefit from indoor allergens free air, chemicals and even outdoor pollution that has seeped inside. Blueair's new air purifying technology harnesses Internet of Things (IoT) technology to connect designer-contemporary Sense+ air purifier with the sleek- looking Aware air monitor and Blueair Friend app to intelligently monitor, control and clean homes and workplaces of airborne hazards (Bengt Rittri, 2016).

Designed to be the most ingenious smart indoor air purifier on the planet, Sense+ reimagines Blueair's renowned indoor air purifying expertise with a host of new features and benefits packaged in an exceptional out-of-this-world contemporary design. It uses wireless technology to access the information being harvested by the remote Blueair Aware air quality monitor on the Blueair Friend app, which can either automatically adjust the Sense+ airflow speed or permit manual control. The Blueair Friend app, available for both Apple iOS and Android smart phones and tablets, gathers data on an hourly basis from thousands of gauging stations across India and over one hundred other countries to deliver trustworthy information on local outdoor air quality. Apart from its IoT capabilities, the second-generation Sense+ has been given more air cleaning power to remove all the nasty stuff from rooms at home or at work, including dust, allergens, chemicals, viruses and odours. The improved user interface, controlled by gentle hand swipes above the Sense+ hardened-glass surface top, embraces a Wi-Fi strength-indicator, a Wi-Fi button and a filter change indicator. Blueair is making the invisible 'visible' by harnessing IoT technology to empower consumers to better understand their surrounding air quality, detect dangers and immediately remove allergens, asthma triggers, viruses, bacteria and other airborne pollutants to create a safer haven indoors (Vijay Kannan, 2016).

From others research are from IoT-Based Home Appliance System (Smart Fan) which is use automation has a main objective. Automation has become one of the key interests in the modern-day technology. Everybody tends to use automated devices in his or her daily activities due to several reasons ranging from safety to ease of handling. Initially, the automation systems were limited to industries as it required significant investments, but with the development of the technology, automation has become available to everyone. Home automation systems are very popular in the world these days. Many types of research have been carried out into this area, and some commercial products are also available, but the room for development is still very high, and the technology advances daily.

Unlike the normal system, the automated home will have additional benefits. As the electric system is automated, it will save electricity by switching off the appliances when they are not required. On the other hand, as the appliances can be remotely controlled, the user can decide what to do even he is not at home. The systems can be developed to a level where the security of the house can be improved. One of the famous home automation solutions is to use a dedicated system connected to an application installed on the user's smartphone. The combination of these two hardware and software allows greater control over home automation and put it all in the user's hand.

Automation has become one of the key areas which world focus at present. People tend to modify things which are often used so that they can be controlled by themselves or remotely by human intervention. With the invention of smartphones everything on earth has become possible with few clicks. In that type of an environment, it is important to have a user-friendly system where the devices in a house can be remotely controlled using a mobile phone. Through this project, the expectation is to make a smart fan which can be controlled via Bluetooth using an android application. Day to day normal room fans does not take the room temperature in to account that have to manually control the speed of the fan according to the temperature. A novel IoT based Fan speed control system has been designed and tested using IoT concepts.

A computer program was developed to control the speed of the fan by using smart phone and is successfully implemented. The fan motor is operated and tested at different speed input value from the smart phone and the experimental results are noted. These results show that the user can switch on the fan, regulate its speed by using the smart phone. The user can operate this fan even he/she is in remote location. By using temperature and humidity sensors the speed control of fan becomes very easy so that it automatically changes its speed when the temperature is changed according to the user's comfort zone. All the values related to temperature, humidity and speed of the motor are also stored in the cloud storage, and the software can display these data for operators to check. The main advantage of this method of control is that the user can control the speed of the fan by giving the set point value via the smart phone. Therefore, the fan motor can be efficiently controlled by using the Wi-Fi directly from anywhere and anytime in this world with proper internet connection (Mehran, 2018).

Compared to this system that will use IoT and cooling system. First of all, IoT system are chosen as a system in product, it is because technology nowadays is using an internet and everything by smartphone. Other than that, IoT system are more secure than Bluetooth system. So, this is reason IoT system are chosen as a system in this product. Other than that, the product will be combine cooling system that will blow cool air surrounding it. This is because Malaysia is one of the countries that have dry climate. Because of that, this product will produce cool air and at the same time it will produce clean air. Why cooling system are chosen in this product, it is because cooling system are cheaper than air conditioner system. Furthermore, cooling system are using less electric power than air conditioner system.

3. Methodology

The project hardware is using Air Filter, Fan, Motor Driver (L298N), Relay, DHT11 sensor and NodeMCU ESP8266 as a main component. Other than that, the product is using plywood as their casing and connect it using screw and nuts. The project software is using Arduino IDE software as a platform to upload the code into NodeMCU ESP 8266 which is main microcontroller of the product. The code is using C++ language. Additionally, the product also used Blynk application software as a controller. Project Design and Overview are 2 feet height, 1.5 width, 1.5 feet length and its rectangle in shape.

3.1 Block Diagram

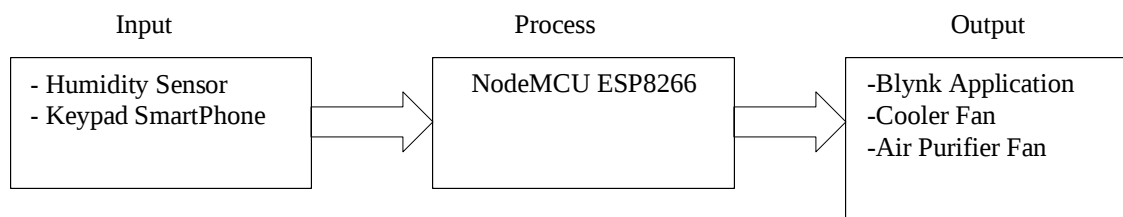


Figure 1 Block Diagram of Air Purifier Cooling System using Blynk Application

The input component for hardware of this product is temperature and humidity sensor (DHT11). The function of this component is to detect temperature and humidity surrounding. Other than that, the product use Blynk application in mobile phone too as the input. The function of it is to control the product by using button in the application. The process of this product use NodeMCU ESP8266 as a microcontroller. NodeMCU ESP8266 will run the code as given and control all components. Furthermore, all components are connected to NodeMCU ESP8266. Next, this product is using relay as other process component. The function of relay an automatic switch to control a high-current circuit with a low-current signal. Lastly, the product is use motor driver (L298N) as voltage control component. Motor Driver will receive 12V from supply and change it to 5V for microcontroller. This product output is use 3 Fan 12V as output component. 2 of the Fan are for cooling fan and 1 fan are for purifying system. All the fan is connected to microcontroller control by mobile phone. After that, the product also use display in mobile phone. The function of display is to show the live value for temperature and humidity by using display Blynk Application.

3.2 Flowchart

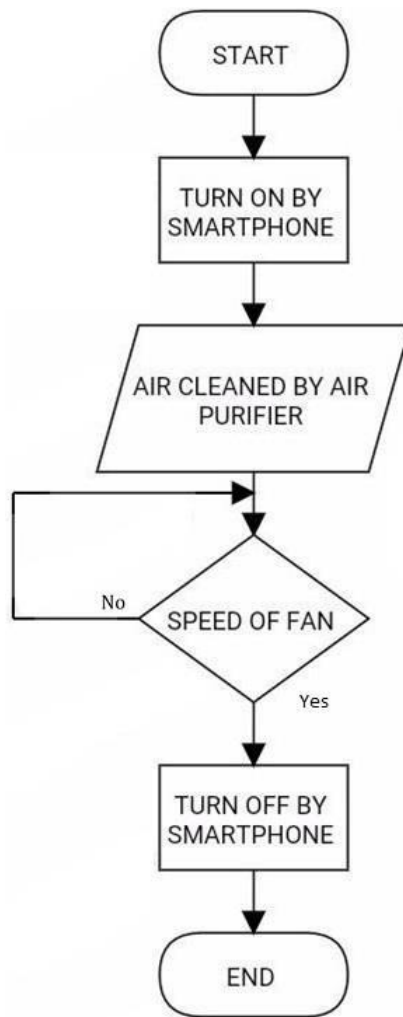


Figure 2 Flowchart of the overall process

User need to install Blynk application in Google Play Store for android or App Store for IOS. After that, user need to put their IP address of ESP 8266 in Blynk application. The product and the smartphone are connected by IoT system. Then, click 'ON' button to switch on the product. When the air purifier is turning on, the air is crossing air filter, so dirty air become clean air. Moreover, a fan of cooling system will blow clean air a little bit faster and make the air fulfil the environment.



Figure 5 Product Prototype (Inside and Back)

3.6 Cost Estimation

Table 2 Cost Estimation

NO	NAME	UNIT	PRICE (RM)
1.	Node MCU	1	20.00
2.	Plywood	8	60.00
3.	Wheels	4	12.00
4.	Battery 12v	1	60.00
5.	Male-male, male-female, female-female jumper wire	5	35.00
6.	Net	1	8.00
7.	Fan	3	120.00
8.	Nuts and screw	5	20.00
9.	Motor Driver	1	15.00
10.	Air Filter	1	30.00
TOTAL			350.00

3.7 Business Plan

The product has high impact to be marketable because this system requires low cost to build and implement in the possible scope. It is suitable to implement in office, lab, and classroom for user. Furthermore, this product's system can connect between the product and mobile phone so the user could control anywhere and anytime as long as the mobile phone stay connected to internet. In fact, this will make the user life easier without the needs of any cost require. On the safety factor, this product has their case protector to avoid any injuries while fan are turning on. In this new and modern technologies, there are a lot of IoT application are used, but controlling to the air purifier cooling system is a new technology will be built. Then, the product's fan is made from plastic. So, the product is more safety compared to other product that using metal fan. This system will effectively function as planned and will solve the problems stated. It will help the user to enjoy the environment in comfort and controlling the product easily.

4. Result and Discussion

This system is successful develop and implement as all planned. This system has done successfully and will help user to make their life easier. This product will be implemented in room, classroom and office. Moreover, this project is created for using Blynk application that can connect between the product and mobile phone so the user could monitor it everywhere and every time as long as the mobile phone and the product stay connected to internet. It will give benefits to user to use the product according to consumer demand. The result for this product is, the product makes all people surround it breathe in fresh air by filter the air using air filter. Furthermore, the product makes every people surround it feel comfortable because of cooling system. The Blynk application show output in user's smartphone either the product is turn on or turn off. The product also has timer adjustable for user to set how long they want to use the product by using real time.

When user tap button for turning on the product, the expectation of the result is all fan are function and blow cold and fresh air. However, when user tap button for turning off the product, the fan stopped. When the product is being consumed, the DHT11 sensor are function to detect humidity and temperature in area such as room. The temperature and humidity are recorded in an hour and make it into chart. By figure the blue color as temperature and red color as humidity for room area (10ft x10ft x 9ft) in Port Dickson, Negeri Sembilan.

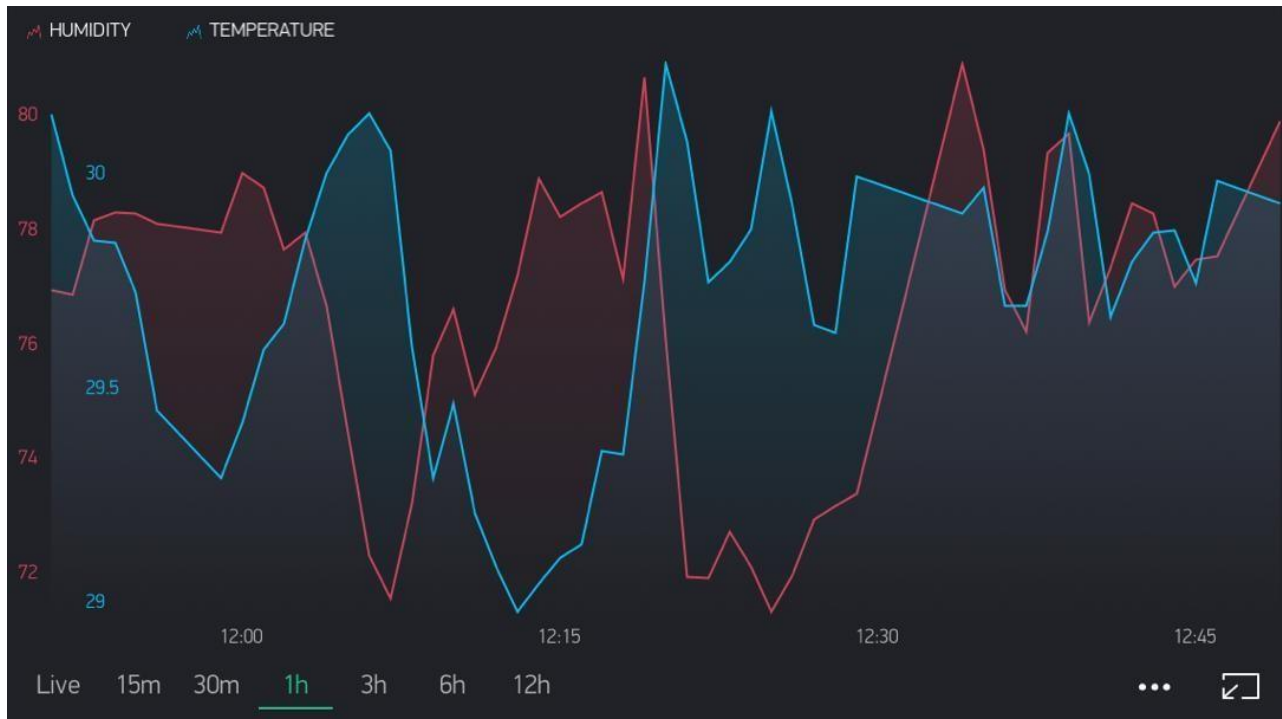


Figure 6 Temperature and Humidity record

The discussion of this project is, as we all know the ideal temperature for room size in Malaysia is 27 degrees Celsius. Because of Port Dickson are near to beach, it causes temperature for normal size in Port Dickson are between 29-31 degrees Celsius. Other than that, this chart shows the humidity graph in Port Dickson. The result shows between 70-82 percent and it is normal humidity air in Malaysia. The result of this product has followed all objectives. All of the function can use completely such as button on/off, button for timer, button on/off for sensor and display for reader temperature and humidity.

5. Conclusion

This project has successfully developed and function. The conclusion is this project able to make an electrical product that can save an electrical energy. This product also wanted to make cold and calm environment to all user especially staff and student in Polytechnic Port Dickson. It also makes people easier to switch on and off all fan by using Blynk Application only. The future research finds some ideas that related to the product. There are many suggestions of upgrading the product such as put a perfume in the product and user can choose perfume they want, put LCD on the product, so user can see the display of humidity and temperature on the product only and make it can move by using controller.

References

- Mehran, (2018) "Internet: Internet Communication and Connection"
Retrieved on Dec 6th from
<file:///D:/IOT/NOTES%20IOT/Chapter%203%20Internet%20Communication%20and%20Connection.pdf>
- Rolin, L. (2004) "Internet: cooling system"
Retrieved on Aug 1st from <https://www.tvtechnology.com/opinions/maintaining-an-iot-cooling-system-266903>
- Vijay, K. (2016) "ProfitFromIOT - Internet: Air Purifier using IOT"
Retrieved on Feb 18th from <https://iot.electronicsforu.com/expert-opinion/air-purification-powered-by-iot/>