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Smart Hanger: Indoor T-Shirt Dryer

Mohd Muzaffar Zahar*, Mohamad Ikram Danial Zainuddin, Nor Adawiyah Abd Raof, Nurul Syafiqah Ismady

Department of Electrical Engineering, Centre for Diploma Studies,
Universiti Tun Hussein Onn (UTHM), Muar, 84600, MALAYSIA

Abstract: The uncertain weather problem had been causing people to have a hard time doing their laundries as daily chores. A lot of people had been going to the dobby because of this unsettled weather with rain and sunshine coming after one another. However, to do this for a long time can cost a lot, energy and money. With the right innovation, it can make living easier for people. The technology needs to be simple to be used, portable and includes fast drying. A technology like a hanger that has cooling, drying and heating settings could easily help the problem of clothes drying as the weather is not consistent and sometimes not even the weather forecast could predict precise upcoming weather. Hanging clothes indoor without the proper techniques can cause unpleasant smell for the clothing since there are no sunlight or heating elements. And also, the trapped air inside the house helps with the bad smell of clothing. Hence, the use of smart hanger is the right way to hang clothes indoor.

Keywords: T-Shirt Dryer, Smart Hanger, Clothes Hanger

1. Introduction

In a very simple and traditional way to dry clothes is hanging them under the sun other than using the hanger or hang them on the string that is basically connected to the walls or any iron pillar. People nowadays are too busy with their works until not have enough time to take care of their own clothes. Whenever everyone talk about time, it's always full of works. So in an emergency situation where the user need that particular clothes, it's always in the laundry bag and to make it dry is hanging them under the sun, keep them near to the fan, or need to go to the self-service laundry which takes lots of time. Another approach by user is buying the personal dryer and puts in house but it's going to use lots of money. Otherwise, the weather in most area in Malaysia is unpredictable and irregular at certain period. [1]. So, with these portable smart hanger projects, it might save our busy time, develop a friendly and low-cost t-shirt dryer device. This project is basically focusing on t-shirt that have been washed by the washing machine because it's only can hold up one to three kilograms of the clothes only. This project includes a design that uses mini fans as the main mechanism for indoor clothes drying system. Coding is used to run and set a command for this project independently and automatically based on the attached sensoring system.
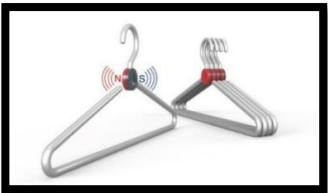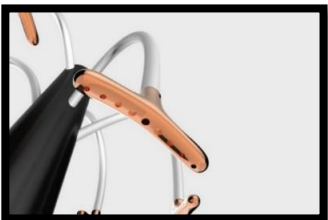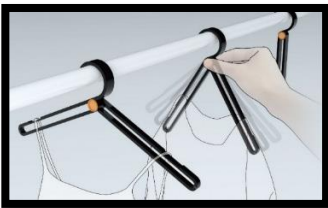
The process of drying clothes consisted of a few stages. Drying a cloth simply means getting rid of the liquid absorbed by the material through a process called evaporation which is when liquid turns into gas. To go through this process, everyone will hang the clothes under the sunlight because the heat makes the evaporation process easier and more efficiently. To hang clothes outside the house, everyone would need an item called clothes line. Clothes line basically are strings or ropes that are tied to the post or even walls sometimes. Although this method is time-consuming, it has been a norm over the centuries. Sunlight and air flow are the two main source of energy used to dry clothes. If it the weather is hot, then the clothes are going to dry quickly. So, does if it is a windy day as the air move or passes through the clothes. Therefore, it really depends on the weather in that region. Malaysia's weather over the year are often quite humid [2]. However, it is never too hot or too cold in Malaysia as it ranges from 20°C to 30°C average. Unless if there is haze attacking, then the weather would be hotter than usual.

If the weather gets bad, the owner needs to dry their clothes by hanging them indoor to avoid all the fuss mentioned earlier. The pros of hanging clothes indoor is that you can maintain the quality of the clothing and avoid rewashing them in case if it was raining and you were not alert with the weather. But the catch to hanging clothes indoor is that it will produce unpleasant smell to the house and the clothes. Those unpleasant smell produced are actually pollens that is spreading in the air. The clothes absorb the pollens and causes the spring allergies to worsen. Spring allergies means sneezing, congestion, runny nose and other bothersome symptoms that could lead to health problems [3]. It could also lead to some serious health conditions, for example, asthma attack. A research has shown that wet clothes can raise moisture level by 30% and this would encourage mold to grow. Those molds are going to release spores that triggers allergies as mentioned earlier. It would be hard to detect molds because they are invisible to naked eyes.

2. Literature Review

This part is going to show some projects that give inspirations on how this project is developed and designed. Several parameters, applied theory and used components are reviewed and considered based on the listed previous project as shown in Table 1.

Table 1: Previous project developed and designed

Type	Picture	Description
Mag hanger		This mag hanger project is made by a magnet. So if user wants to hang clothes altogether, user can connect the hangers to each other based on the poles to make sure it can support each other weight [4].
Multismart hanger		This project is made by the combination of the hangers into one clothesline. At the end of each of hangers, they have a little hole where the air comes from the little trunk in the middle to dry clothes on the hanger.
Press hanger		This press hanger project is made to avoid damage to the shirt's collar while trying to hang them up. It can be used as a pen by clicking on the button in the middle. They have a mini magnet on each hanger where the poles are all in the same position so it can retract which makes clothes are more organized and less messy [5].

3. Methodology

The proposed system consist of ArduinoMega as the main controller and LCD as the output component to user in this system. The controller interface is based on DHT11 feedback [6] to send the current temperature and humidity reading to the main controller. ArduinoMega will process the signal feedback [7] from the sensor to display the temperature reading in LCD and signals the motor or fan to function immediately after switch button pressed. Based on the structure and block diagram of the system in Figure 1, the power connection will supply to two main components that is the fan system and the controller as well as the sensoring element.
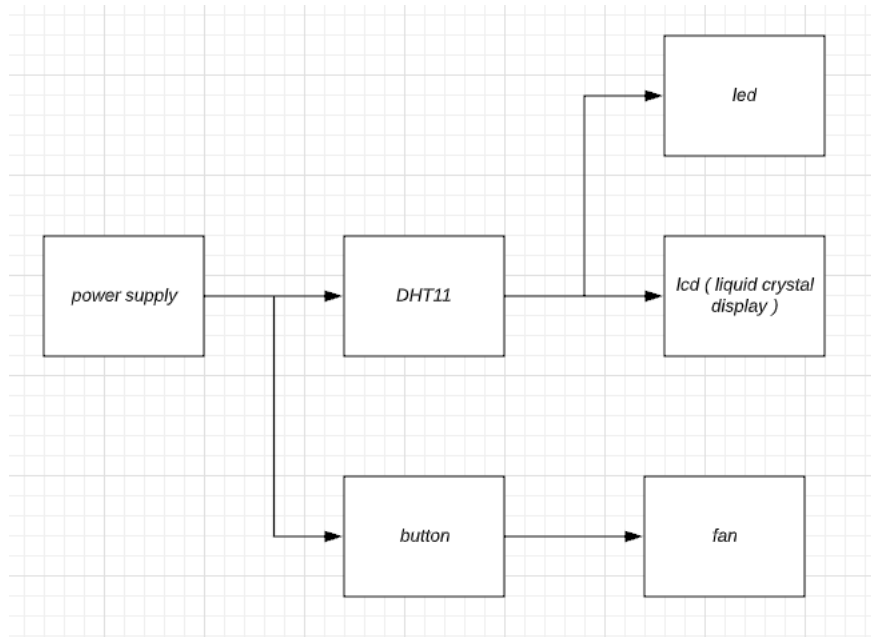

Figure 1: Block diagram of the whole project

Based on the Figure 2, the project start with DHT11 reading the current humidity and temperature. If the humidity is less than and equal to 40%, then LCD will display as it is done. If it over than 40%, then it will display as still wet and back to the DHT11 to read the humidity until it is less than and equal to 40%. The LED will function as the indicator of the product to warn user the current progress of clothes whether in dry or wet condition.
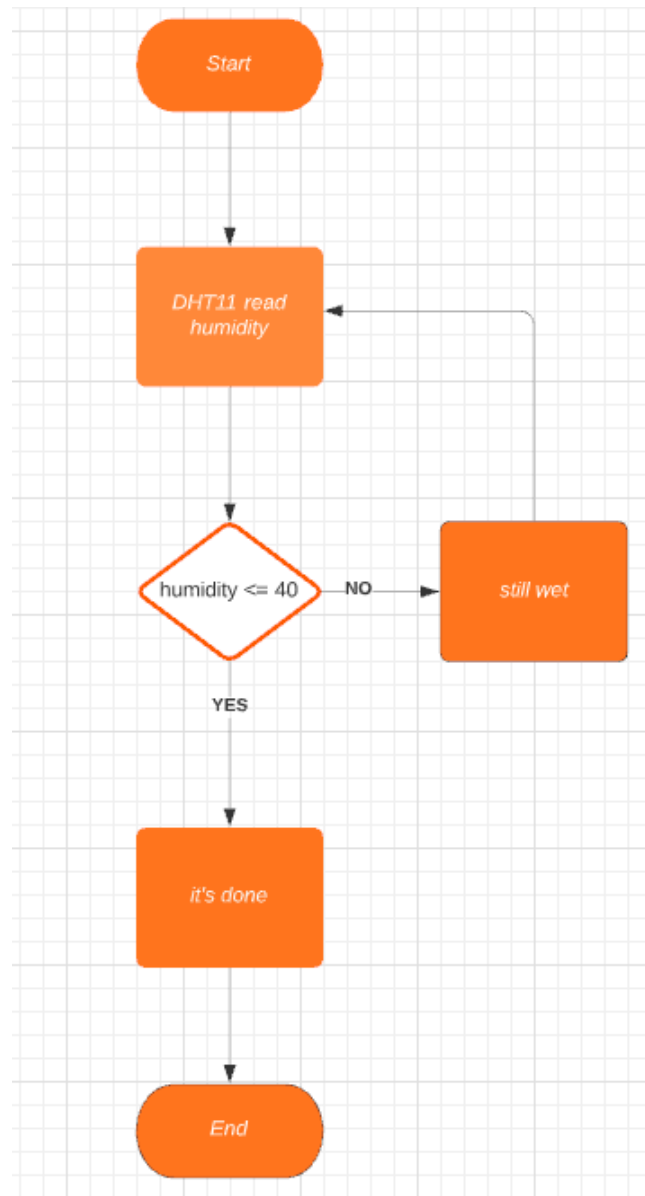
Figure 2: Flowchart of the ArduinoMega

4. Results and Discussion

This project uses LED as its heating element and mini fans to distribute the hot air equally and dry all the parts of the clothes. DHT11 can detect if clothes is still wet or dry then display it on the LCD. So the user can only know by looking at the LCD and the led where it will on when it's wet and off when it's dry. DHT11 sensor is placed at the bottom so that it can detect if the clothes is still wet or have been dried. This is because the upper part of the clothes tends to dries fast, so by placing it at the bottom, we can confirm if the clothes are fully dried or not. After detecting if the clothes are dry or not, it will display the condition on LCD. The owner can know by just looking at the LCD and LED. The LED will turn on when it is still wet and turn off when it has been dried. Figure 3(a) and (b) shows the response of the product in dry and wet condition, respectively. Figure 4 (a) is the design of hardware from the outside while Figure 4 (b) is inside view of the product.
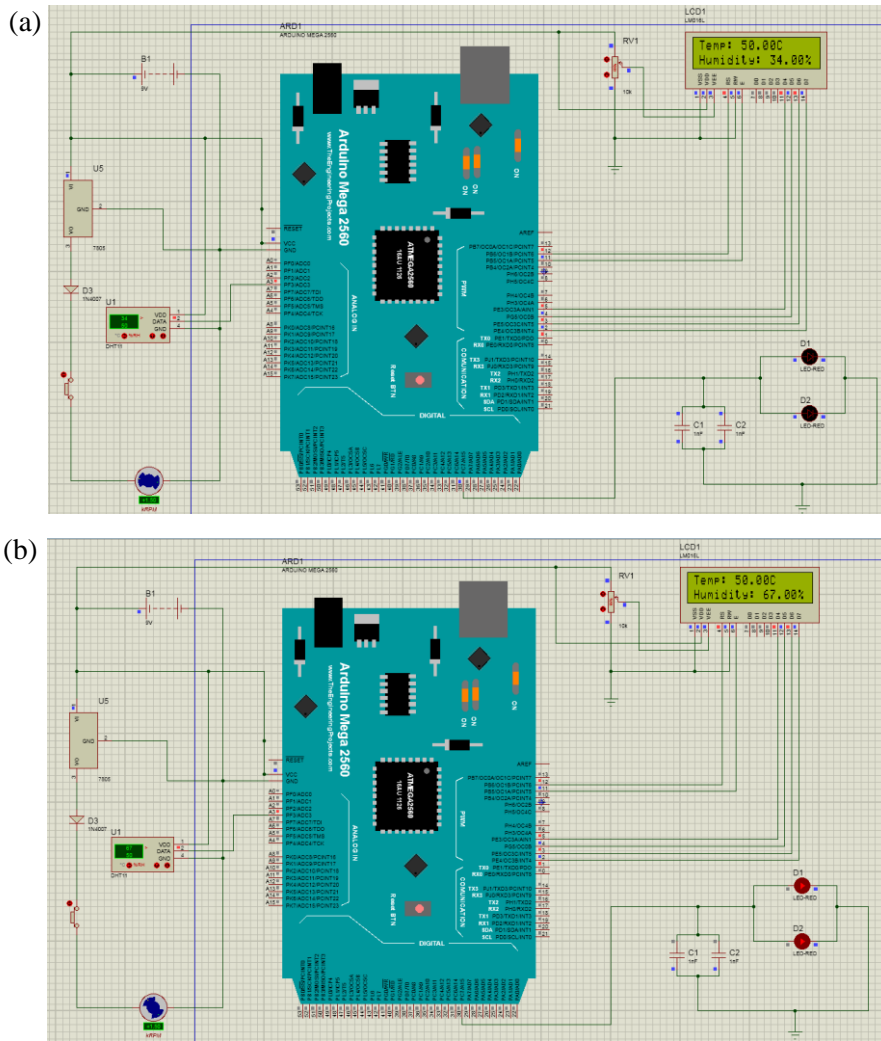
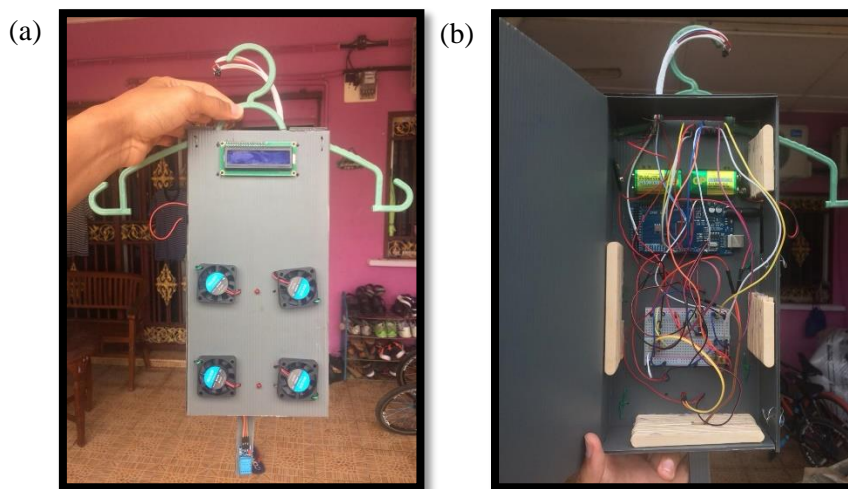**Figure 3: The response of the product in (a) dry and (b) wet condition**

Figure 4: The (a) front and (b) inside view of the project

5. Conclusion

In conclusion, the objectives of this project which is to save time, develop a friendly and low-cost dryer device is achieved where it can be run by uploading the arduino coding to the arduino board for both software and hardware. Users can use it in an emergency situation moreover with the unpredictable weather situation. And we believe this project can help those who can afford to buy a dryer machine which is cheaper than all different types of the dryer that already has been in the market nowadays. Even though this portable smart hanger project is only be able to hold one piece of clothes, in the future it might be able to hold more than one and might available in smaller size and light than this type of modal, so it can be brought to travel if there is very limited space. Thus, once again this project is made by an Arduino board, LCD, fan, LED and those electronics item that can be bought in any electronics shop or online shop which is much cheaper by doing it yourself.

Acknowledgement

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