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Development of Cloth Notification System for Outdoor Clothesline

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Abstract: Hanging the cloth at the outdoor clothesline is considered economical because the uses of natural process to dry the cloth. However, due to busy lifestyle, the user might forget to lift up the dry cloth that might exposes the cloth to rewash, photodegradation and etcetera. Therefore, in this work, an invention of a prototype to remind the user about their drying cloth is proposed. The proposed notification system consists of two (2) parts namely sensing and controlling unit and a notification Apps. The sensing and controlling unit consist of a cloth peg that equipped with humidity sensor to sense the state of clothes. When the state of clothes reaches the dry threshold, an ESP32 microcontroller instructs a text message to be displayed on the user's notification Apps namely the Telegram Apps. Experimental findings on the functionality of the proposed notification system show the proposed notification system is able to receive and display the alert message whenever the dry threshold is reached. These findings demonstrate that the proposed system gives promising result in assisting the user to estimate and plan when to lift up the clothes.

Keywords: Notification System, Clothesline, Humidity, Telegram Apps.

1. Introduction

One of the popular methods in drying clothes is by hanging the cloth at outdoor clothesline. This method uses natural process to dry the cloth. However, the clothes are exposed to the unpredicted weather [1][2] that may cause the clothes need longer time to dry. There are also other approaches to dry the cloth such as indoor drying [3] and technological-based [4]-[6] approach. Even though, these

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approaches help in drying the cloth, due to the user's busy lifestyle [7], there is a need of system to remind the user about their cloth at the outdoor clotheslines.

2. Materials and Methods

The proposed notification system is equipped with a sensing and controlling unit and a notification Apps. The purpose of sensing and controlling unit is to sense the state of clothes and stream the data to the microcontroller. Whilst the notification Apps is to display a text message via user's Telegram Apps.

2.1 Materials

The sensing and controlling unit comprise of a DHT22 sensor and an ESP32 microcontroller. The DHT22 sensor is a digital temperature and humidity sensor that uses for sensing the state of clothes. Whilst the ESP32 microcontroller is used as the control device to receive the reading from the sensor. When the microcontroller detects the reading reaches the dry threshold, it will trigger the notification and send the text message to the user's Telegram Apps via Telegram server. The overall proposed notification system is illustrated in Figure 1.

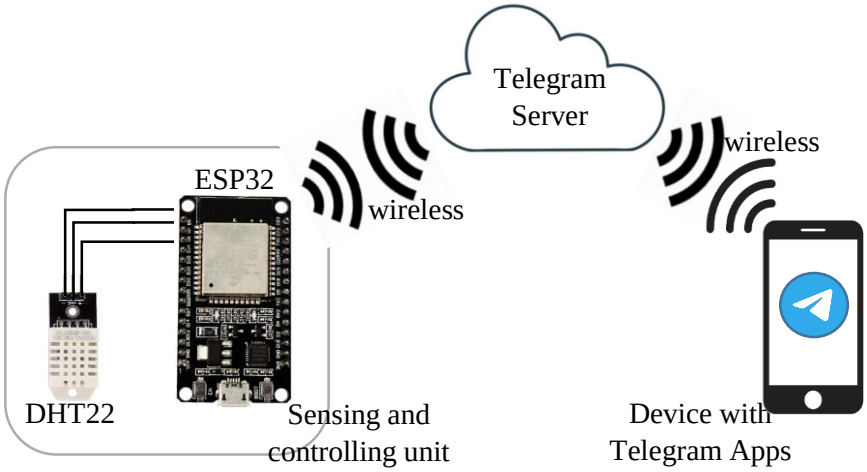

Figure 1: Overall architecture of the proposed notification system

2.2 Methods

Figure 2 shows the schematic diagram of the sensing and controlling unit. The far-left pin of the sensor is the VCC pin that connected to the 3.3V pin of microcontroller. The Data pin of the sensor is connected to the D23 pin of the microcontroller to stream sensor data to the microcontroller. The far-right pin of the sensor is connected to TX pin of the microcontroller for transmitting the data to the Telegram server.

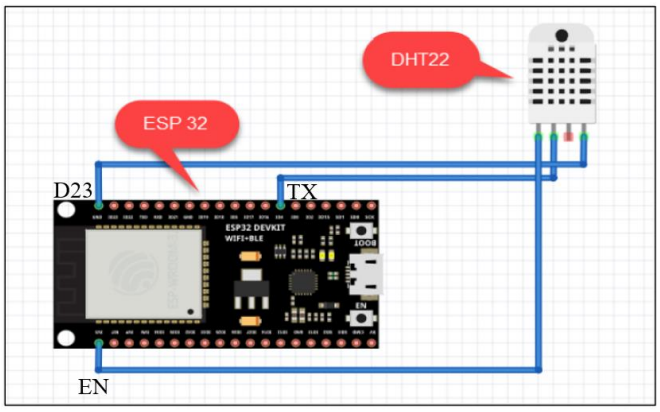

Figure 2: Schematic of the sensing and controlling unit

As illustrated in Figure 3, the sensing and controlling unit obtain humidity data from the sensor and stream the data to the microcontroller. The microcontroller continues read the sensor data, and only triggered for sending the notification when the data achieved the dry threshold of relative humidity at less than 60% [8].

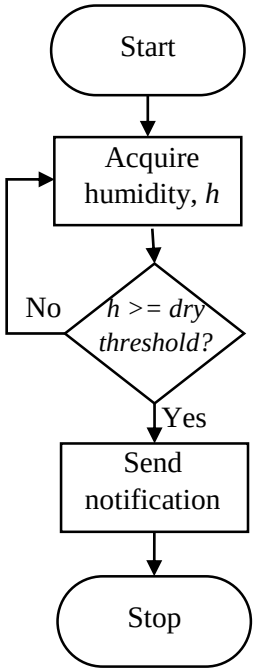

Figure 3: Algorithm of the sensing and controlling unit

In this work, the notification Apps is designed to display the text messages in a banner format on the lock screen and a chat of the Telegram apps. In the chat, humidity data and status of the cloth are displayed.

3. Results and Discussion

Figure 4 shows the overall prototype of the proposed notification system. In Figure 4(a), note that the humidity sensor is mounted on the cloth peg to form a sensing device. The cloth peg is connected to the microcontroller as controlling device using wired in order to stream the sensor data. The whole system is powered using 9V battery. In this work, as shown in Figure 4(b), the notification is displayed on the Telegram apps in the banner format.

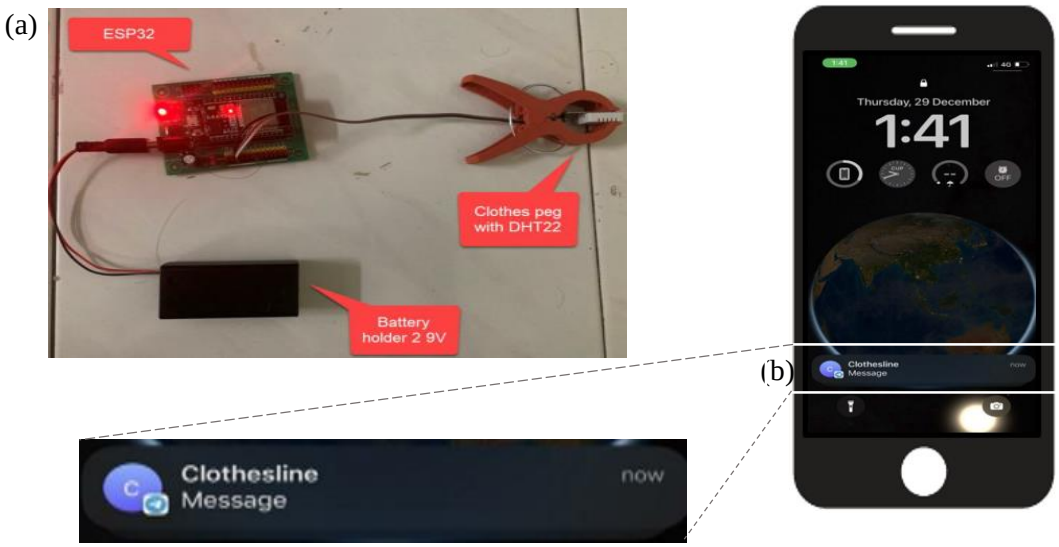

Figure 4: Overall prototype; (a) photograph of the sensing and controlling unit, and (b) the notification apps

In order to evaluate the functionality of overall proposed notification system, an experiment is conducted by using different types of cloth materials. As shown Figure 5, in total four (4) clothes are used; two microfiber-type and two cotton-type clothes for damp and dry conditions. Since the prototype only has one cloth peg as sensing device, therefore, the reading is taking one cloth at a time for 30 seconds as tabulated in Table 1. The reading by the sensing device is taken by clamping the cloth peg to the underarm of cloth since it is belief the area takes longest time to dry.

(a) (b) (c) (d)

Figure 5: Photograph of two (2) microfiber-type clothes in (a) damp and (c) dry and two (2) cotton-type clothes in (b) damp and (d) dry conditions.

Table 1: Humidity reading

No of Reading	Damp Cloth		Dry Cloth	
	Microfiber-type	Cotton-type	Microfiber-type	Cotton-type
1	99.50	99.90	87.30	80.50
2	99.80	99.90	87.40	80.50
3	99.80	99.90	87.50	80.50

The notification message is sent in a text form as a chat in the Telegram apps. Figure 6(a) shows humidity reading for dry microfiber-type cloth. The text message contains humidity data and status of the cloth. In addition, on the lock screen, the apps able to notify the user in a banner format.

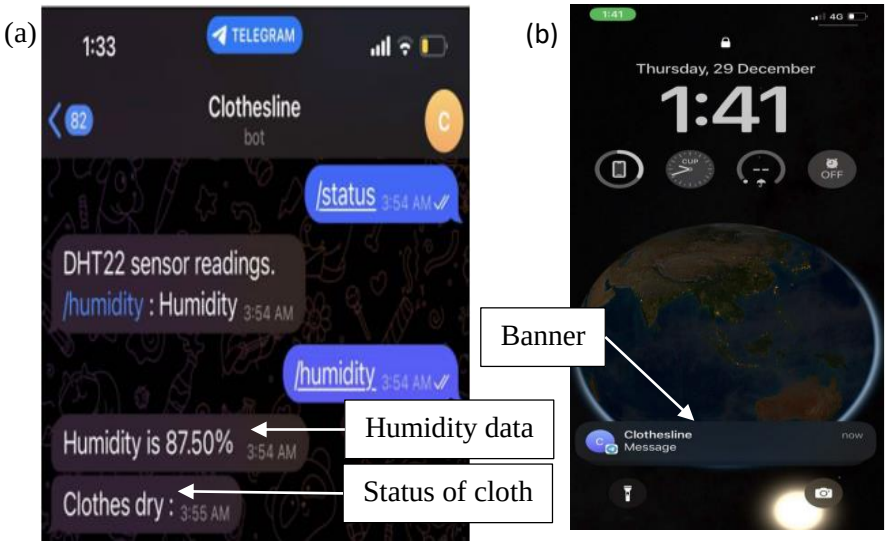

Figure 6: Photograph of the notification on the Telegram Apps in two formats; (a) chat and (b) banner

4. Conclusion

In conclusion, the proposed notification system is designed and developed to alert the user about drying status of their cloth. In this work, the proposed notification system comprises of sensing unit and notification apps via Telegram apps. Once the sensing unit reach the dry threshold, the microcontroller trigger and sent a notification text message to the user's Telegram apps. From the experiments conducted, the findings show the user's Telegram apps able to receive the text message in the chat. Furthermore, the alert is also displayed in the banner format when the screen is locked. The current work shows promising result in assisting the user in estimating and planning to lift up the cloth. In the future, several experiments should be conducted to validate the dryness of the cloth.

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