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Adoption of Internet of Things in Water Drinking Reminder System

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Abstract

Drinking water is essential for human beings to continue surviving. Everyone knows the importance of water, but people tend to forget to drink water when they are busy on doing their work. In addition, with the current pandemic Covid-19, the importance of drinking enough water is vital. There is water drinking reminder application available but might not be effective in recording the right amount of water consumed. A system using Internet of Things (IoT) – water level monitoring system is proposed here. It is a water drinking reminder system which will detect the volume of water consumed. The system will alert the person to drink water if the water level remained the same for a long time by sending a pop-up notification through the phone. Background study has been conducted to better understand the existing water level monitoring systems. Information has been collected through interview and questionnaire, and the system has gone through several testing. Imposing the system will encourage people to drink water regularly and maintain a healthy body.

Keywords

IoT, Drinking Water, Water Drinking Reminder

Introduction

Drinking water is a necessary for daily basis. About 60 percent of the human body is made up of water (McIntosh, 2018). Human beings require water to survive (WHO, 2019). Drinking water brings several advantages. Water is needed to deliver oxygen throughout the body (Tamlin, 2016). Besides, it helps to regulate body temperature. The digestive system will also depend on water to work properly (Shubrook, 2021). The current pandemic of Covid-19 emphasizes on the importance of drinking water to enhance the body's immune system (ASPEN, 2020). Therefore, taking in adequate nutrition and drinking enough water is essential in protecting people from getting the serious illness such as Covid-19 (Seyed Reza & Alireza, 2020).

Based on research, more than 77% of people are not drinking enough water to meet their health needs (Garmin, 2020). There are several reasons for this such as people do not feel thirsty, and people are busy and do not have time for water. (Quench, 2018)

Currently, there are several water drinking reminder applications found in Google Play Store and App Store. It is to remind people to drink water and keep track of water intake.

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However, this kind of application might not be accurate as it does not record the water level in the water bottle, and it will not know whether the person has consumed water.

The proposed system is to integrate the concept of water level monitoring system into the water drinking reminder system. Using water level monitoring system, it will be able to detect the real-time water level (Babu, 2020) to identify the amount of water consumed. The proposed system also reminds the person to drink water if the water level has remained the same for a long time. Using this proposed system, information will be accurate besides encouraging people to drink water.

Methodology

To have better understanding of water level monitoring system, background study has been conducted. The author has read several journals and studied about water level monitoring system to understand how it works and how it can be integrated into water drinking reminder system.

Furthermore, the author has conducted interview session with some target users such as working adult and teenagers to collect data on their opinion and suggestion. The interview has been carried out virtually due to the Covid-19 situation. Through the interview sessions, the author has better understanding on the user requirements beside their concern.

Besides, a set of questionnaires was distributed to collect data from the target users. Through this, the author has collected useful information such as how frequently do people drink water, and how long do people think is regular for a person to drink water again. This allows the author to set the duration for the proposed system in reminding user to drink water.

Based on the collected data through background study, interview and questionnaire, the author has successfully developed a water drinking reminder system that can remind people to drink water based on the water level consumed. A prototype system was developed using Arduino UNO board which integrates with ultrasonic sensor and a Bluetooth serial module which was used to further investigate the reliability of the proposed system.

Results and Discussion

After collecting the information, the author has better understanding and managed to build the system. Target users were determined to investigate further on the requirements of the product to enhance the usage. Feedbacks was gathered and improvement was done in the development of the product. The following shows the system and results.

Figure 1 shows how the author has set up the system prototype. There is an Arduino UNO board that connects the components of the system. An ultrasonic sensor is included to detect the water level. A Bluetooth serial module (HC – 05) is used for the connectivity between the system and the phone.

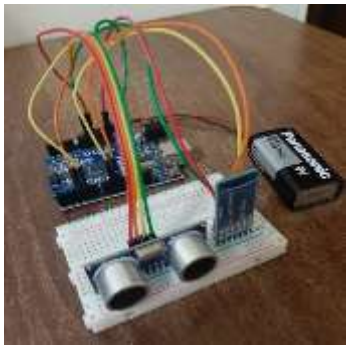


Figure 1 shows the setup of the system prototype.

Figure 2 shows the application (Blynk) that is used to connect with the proposed system. Blynk application is used to display the information from the system. It provides a platform that can connect to the Arduino board through Internet, Bluetooth, or USB (Blynk, 2021). In the application, there are water level display, water level LED and virtual LCD screen. For the water level display, it shows the water level detected in real-time. Water level LED is used to indicate whether the water level is high (green), medium (blue), or low (red). The virtual LCD screen shows the idle time, which is the duration where the water level remained the same.

The system is being set to send reminder to the user if the water level remained the same for a long time. For testing, the system is being set to send reminder if the water level has remained the same for 20 seconds. Figure 3 shows that when the idle time has reached 20 seconds, a reminder is popped out to remind the user to drink water. Based on the result from questionnaire, the idle duration will be set to 1 hour, as most of the people think that it is preferably to drink water every 1 hour.

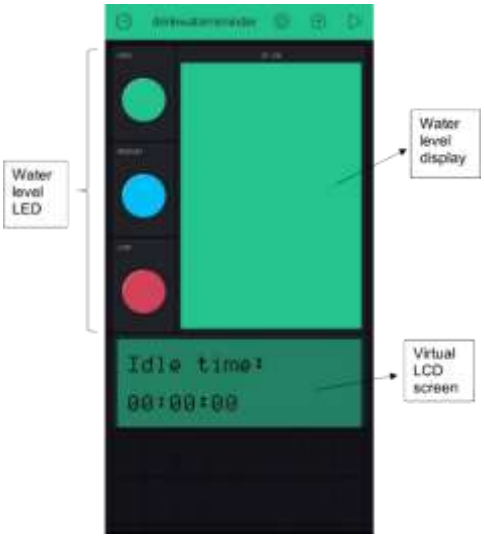


Figure 2 shows the interface on phone.



Figure 3 shows example of reminder alert.

Figure 4 shows the changes in the application when there are changes in the water level. Once the user has consumed water, the idle time will be reset back to 0. It will start the timer from the new water level. This is to prevent the system to keep reminding the user even though the user has consumed water. User may be annoyed if it keeps reminding and may be discouraged to drink water.



Figure 4 shows the idle time is reset.

Refer to Figure 5, it shows the starting of testing. The system can detect the water level. During this testing, the system is being set to send reminder if the water level remains the same for 30 seconds. Figure 6 shows the result when testing the system with water in a bottle. The system can send reminder to user.



Figure 5 shows the beginning of testing.

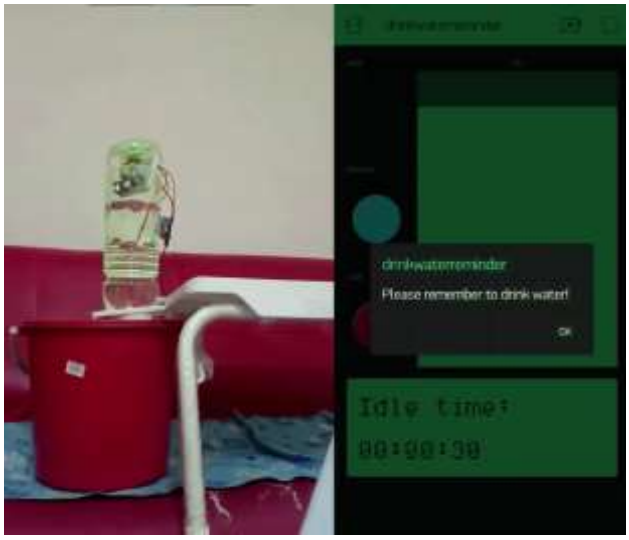


Figure 6 shows the result from the testing.

Improvements can be made in this proposed system. The system will need to be resized to fit into more bottles. For example, some components can be replaced with smaller size to reduce the overall size of the system. Besides, feature such as remind user to refill bottle when the water level is low can be added into the system. Lastly, the system could improve by adding more types of connectivity. For example, adding connection type such as Wi-Fi connection instead of relying on Bluetooth connectivity only to maintain the connection between the system and the phone.

Conclusion

A system using Internet of Things (IoT) for water level monitoring system was successfully developed. It is a water drinking reminder system which will detect the volume of water consumed. The system will alert the person to drink water if the water level remained the same for a long time by sending a pop-up notification through the phone. The proposed system is successfully connected with the Blynk application on phone. When the user has consumed some water, the system will reset back to 0 and start timing again. Imposing the system will encourage and ensure people to drink water regularly and maintain a healthy body.

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