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Smart Garbage Monitoring

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Abstract: This study develops a garbage monitoring based on Internet of Things (IoT) that can be used in the garbage management system in the city. Through this project, it can help to keep the city clean from the rubbish. By using Blynk as an application, this project will monitor the garbage bins and send the notification to the garbage collector about the level of garbage collected in the garbage bins. By receiving the information about the garbage level, the garbage collector will come on time in collecting the rubbish. The objective and purpose in developing smart garbage monitoring system is to save the time between users and the garbage collector.

Abstrak: Studi ini mengembangkan pemantauan sampah berdasarkan Internet of Things (IoT) yang dapat digunakan dalam sistem pengelolaan sampah di kota. Melalui proyek ini, dapat membantu menjaga kebersihan kota dari sampah. Dengan menggunakan Blynk sebagai aplikasi, proyek ini akan memantau tempat sampah dan mengirimkan pemberitahuan kepada pemulung tentang tingkat sampah yang dikumpulkan di tempat sampah. Dengan menerima informasi tentang tingkat sampah, pengumpul sampah akan datang tepat waktu dalam mengumpulkan sampah. Tujuan dan tujuan dalam mengembangkan sistem pemantauan sampah pintar adalah untuk menghemat waktu antara pengguna dan pengumpul sampah.

Keyword: Garbage Monitoring System, IoT, Blynk Application.

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1. Introduction

Internet of Things (IoT) was first coined by Kevin Ashton in the RFID journal 1999, Kevin's vision about IoT was to anable network devices to propagate their information about physical world objects through the web [1]. The definition of Internet of Things varies, in general according to Zainab at al. [2], IoT means that the ability to make everything around us starting from (i.e. Machine, Devices, Mobile phone) even (Cities and roads) are expected to be connected to the internet with an intelligent behavior and taking into account the existance of the kind of autonomy and privacy". Any object in the physical world which can be provided with an IP address to enable data transmission over a network can be made part of IoT system by embedding them with electronic hardware such as sensors, software and networking gear [3] [4] [5].

There has been unprecedented growth in the number of devices being connected to the internet since the past few years. All the devices that connected to the internet are part of the IoT infrastructure which can communicate with each other. For urban lifestyle, cleanliness is needed, thus garbage system is important. In present day, one of the main concerns of our society is waste management. The detection, monitoring and management of waste is one of the primary problems. The traditional way of manually monitoring the wastes bins is a cumbersome process and utilize more human effort, time and cost which can can easly be avoided with our present technology [6]. Garbage Monitoring Based on IoT (Internet of Things) will helps the worker of Garbage Company or garbage collector to easier their works based on the project that I develop for them. This project will send the notification when the garbage bin was full and the garbage collector will come on the time to take those rubbish to the landfill [7]. This project also will keep remind by people surrounding by checking the lcd that put outside the garbage bins that they will know the garbage bins was full or not. Expected Garbage Monitoring Based on IoT (Internet of Things) is able to go further and can be used as well as well as help management manage more information organized and systematic.

This project has its goals and objectives separate. This project development is a very innovative which will help to keep the cities clean [8]. This project will monitor the garbage bins and informs about the level of garbage collected in the garbage bins via notification by blynk application. The garbage collector will recieve the notification and will come to collect the rubbish.

For example, today's community is not taking care to the garbage bin at their place. When the problem occure, a lot of people will complain because the garbage was full and will cause the effect of unpleasant smell on that surrounding place. Therefore, to overcome that problem, the solution I suggest is to develop this garbage monitoring based on IoT (Internet of Things) to keep remind the garbage collector in collecting rubbish in some place and take it to the landfill.

The scope of this system has been reserved for garbage collector to use. This system also for the public because if they want to throw their rubbish, the LCD will display to make sure the garbage is not full [9]. The system is also specially designed for all civil society to keep the city clean from a lot of rubbish at their place and avoid the unpleasant smell.

Garbage Monitoring System by IOT is designed and developed in the hope of meeting the needs of garbage collector to make sure the city is clean away from the rubbish. The objective and purpose in implementing and developing Garbage Monitoring System by IOT are:

1. System Monitors the garbage bins and informs about the level of garbage collected in the garbage bins via notification by Blynk application.
2. Evaluate system functionality of Garbage Monitoring System by IOT.
3. Help develop expanding IOT technology.
4. Facilitate and save time of users and garbage collector.

In developing Garbage Monitoring Based on IoT (Internet of Things) project, the methodology that I utilized is the System Development Life Cycle (SDLC). This method has been used to give

details and clearer picture. So, the implementation of this system is more organized and runs smoothly.

2. Analysis of Requirement and Specifications

Specifications Garbage Monitoring Based on IoT (Internet of Things) has been generated through a statement of the problem has been identified. The problem statement that has been identified here is the community in some place that actually does not care about the condition of the garbage bin at their place. The people that ignore the garbage at their place do not have responsibility about the place and will cause unpleasant smell that everyone will complain it but do not take any action to avoid the garbage full [10]. With the trendy technology now and the the existence of this Garbage Monitoring Based on IoT (Internet of Things) can help solve problems faced by users and the garbage collector to make their work easier than before.

Communication with the user is an observation conducted on 10 sample people are mostly students of the University of Education Sultan Idris (UPSI) and residents around Tanjung Malim. Futhermore, communication among the garbage collector also to help for my project. Through their joint communication, it was found that Garbage Monitoring Based on IoT (Internet of Things) is appropriate and stipulated with the objective, purpose, function, problem statement, scope and module as stated. Most of them think that the Garbage Monitoring Based on IoT (Internet of Things) is has the potential to go further and explore more deeply.

Among the constraints arising before the implementation of Garbage Monitoring Based on IoT (Internet of Things) is the people or community are does not care about their surrounding which is garbage scattered at garbage bins. And the garbage collector will not remind it and also come to collect the garbage maybe once per week [11]. Moreover, the constraint when develop this project is sometime the ultrasonic will not detect the object which is garbage when not in range of the detector. And last, power supply problem at the end of the project. The project needs more power to make it works in smoothly and continuously.

Rational of Garbage Monitoring Based on IoT (Internet of Things) it is expected that the project will be in time coming soon can be improved especially in terms and can be used by relevant parties such community, garbage collector and so on. It is also expected that the implementation of this project can be completed and repaired in the future. Implementation of Garbage Monitoring Based on IoT (Internet of Things) is to facilitate the worker of garbage collector to take their responsibility about the garbage bin and clean the city as well [12].

Garbage Monitoring Based on IoT (Internet of Things) has two modules. Firstly, Garbage Monitoring Based on IoT (Internet of Things) module is to detect the garbage and display it through the LCD which placed outside the garbage bins [13]. This is for the people who want to throw their rubbish and will know the level of the garbage before them throw it. As example, when the garbage bins were full, people will know it and will throw their rubbish to another garbage bin which not full yet. Second module is the internet connection that allow the Blynk application to send the notification to the garbage collector as to remind them about the level of the garbage bin. Without the internet connection, the notification cannot be sent. This is why the internet is very important to make the project work successfully.

3. System Design

Garbage Monitoring Based on IoT (Internet of Things) is designed through the SDLC process method. By this method, information gathering has been done by searching through the google to collect the information that related to my project. In addition, schematic diagram helps to easier conducting the project.

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By implementation process, development and implementation Garbage Monitoring Based on IoT (Internet of Things) was built using coding C++. These codes have been built with using software like Arduino IDE. By testing process, questionnaire was distributed to 10 sample people consisting of UPSI students and surrounding residents Tanjung Malim to test Garbage Monitoring Based on IoT (Internet of Things) and get survey results about this system.

Finally, the process of development. Through this process, Garbage Monitoring Based on IoT (Internet of Things) can be repaired and refurbished after the study results from 10 sample people are obtained.

The rationale for producing and choosing a system design is by looking at the diagrams that have been designed. For schematic diagram, this diagram is one of the simple diagrams and easy to understand for users and appraisers. These diagrams have been used as references and simplify this system with the more organized and running smoothly.

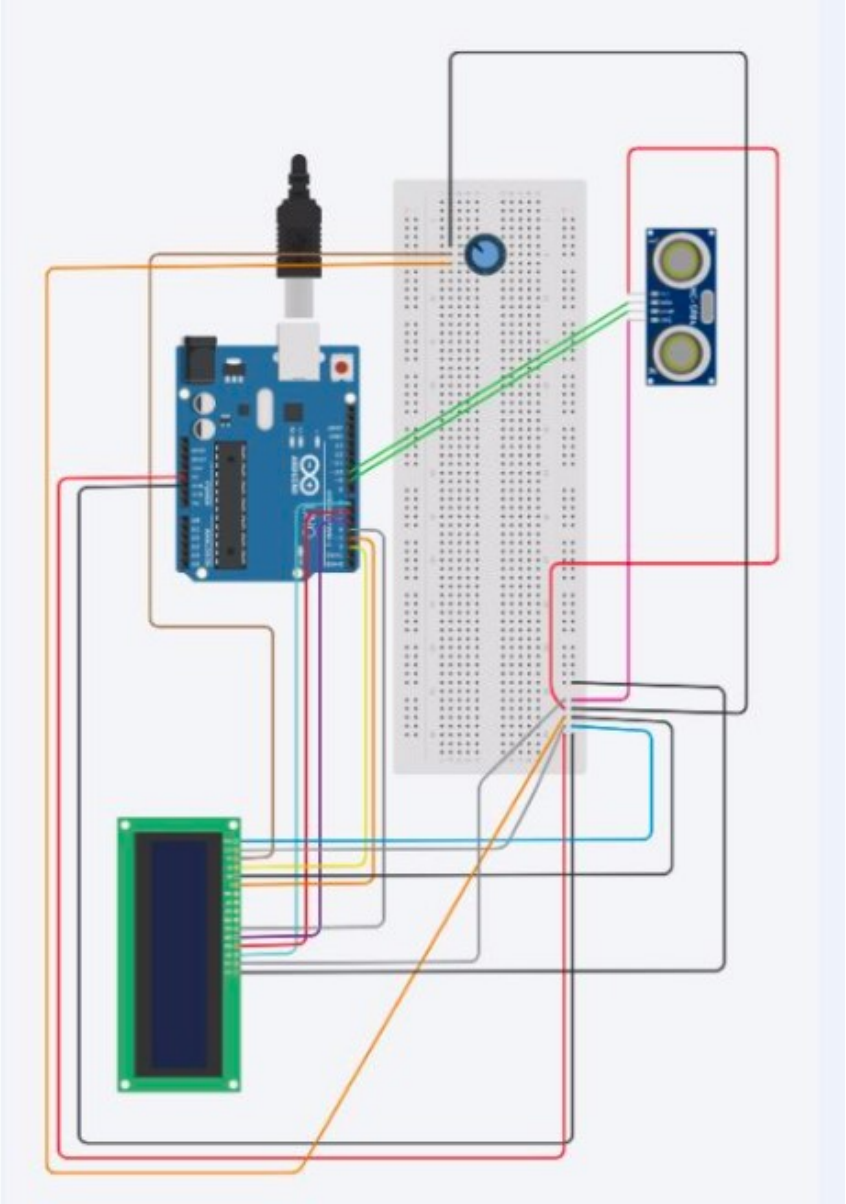

Figure 1. Schematic diagram

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4. Testing

Garbage Monitoring Based on IoT (Internet of Things) has managed to achieve its objectives and the purpose of project implementation. At the beginning, I test the ultrasonic to detect the distance of the object that it can detect. The result of the testing is longest distance it can sense was about 3 meters. Then, I test the LCD to display the current distance that ultrasonic detect and for the first time it did not work because potentiometer was not there. Then, I redo it again and it was successfully work and can display the distance of the current detected object.

The most difficult testing is ESP wifi that took long than expected when I was planned this project. In this case, the ESP that I use at the beginning is 8 pin and it did not work successfully. I did not know how to make it works and then my fellow friend suggested me to change ESP wifi to 12 pins. After I tried the 12 pin it worked successfully and take a while to make it work. I am grateful that the connection to ESP was successful because without ESP in my project it will not be categorise as an IoT (Internet of Things) project.

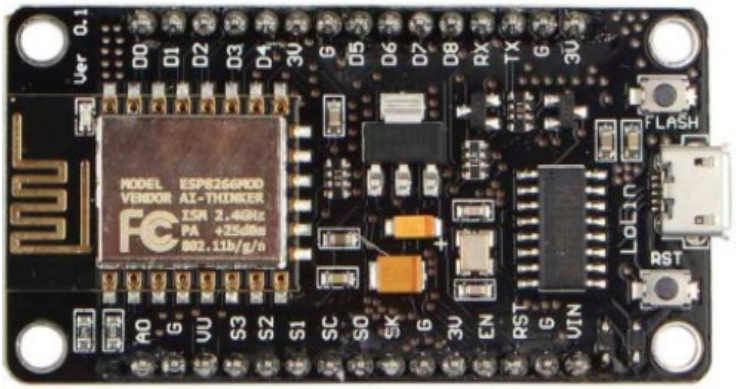

Figure 2. ESP Wifi

When the connection with ESP successful, I use the application called Blynk to connect my project with it. It wants to send the notification to my phone to make its look awesome. By using Blynk, we can receive notification whenever we are. In the beginning, my first attempt was not success and when I tried the second times, it become hard and then it turned out to be success because I made a mistake at the coding.

5. Discussion

Garbage Monitoring Based on IoT (Internet of Things) was development to help the garbage collector to keep their-remind of the garbage bins. It also helps the people to keep the surrounding clean and not throw the rubbish as their want to. To make their surrounding also avoid from the unpleasant smell that was the main purpose of this project.

Based on the analysis and results of the survey, 90% of them agree that the Garbage Monitoring Based on IoT (Internet of Things) should be built at their place. For the garbage collector that 80% of them agree that this should be done earlier than before. It is because it will make their works easier by keep remind them using phone the portable one by sending the notification.

6. Conclusion

Strenghten of Garbage Monitoring Based on IoT (Internet of Things) is the notification that can be sent on the time when the garbage bins were full. This will make the garbage collector keep their-

remind and easier for them to collect the garbage. Nowadays, the era of technology will make all people easier to work like the garbage collector that I make this project for them.

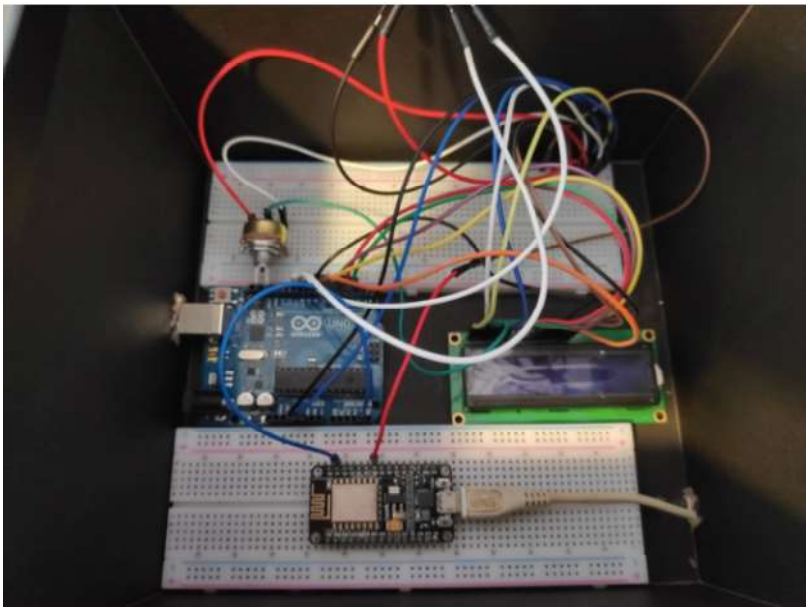

Figure 3. Smart Garbage Monitoring

Weakness of this project is the power supply that not enough and have to change it when battery drain. It cannot be avoided because this project needs the power to keep on the garbage LCD and the sensor. Without power supply, this project is nothing and the surrounding of some place will keep the garbage full of rubbish and unpleasant smell.

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