Design of a Crowd Restriction Based an Internet of Things during the covid-19 pandemic at University PGRI Yogyakarta

R. Hafid Hardyanto [1,*], Marti Widya Sari[1], Rinda Dwi Cahya[1]

[1]*Faculty of science and technology, Universitas PGRI Yogyakarta,*
Jl. IKIP PGRI I Sonosewu No.117 Yogyakarta - 55182, Indonesia

**Corresponding author: hafid@upy.ac.id , widya@upy.ac.id*

ABSTRACT
The Covid-19 pandemic has restricted human activities. In Indonesia, to prevent the transmission of COVID-19, crowd restrictions are carried out. The limitation imposed at UPY is by limiting the number of visitors entering the room at Universitas PGRI Yogyakarta. This article will discuss the system created at PGRI Yogyakarta University to limit the spread of the COVID-19 virus by limiting the number of visitors. This system produces information related to the number of visitors who enter the room at PGRI Yogyakarta university, both the number of daily, daily, and monthly visitors. As a result, this system is able to provide information about the number of visitors, and provide warnings to officers if visitors exceed the room. This system contributes to reducing the transmission of the covid 19 virus at PGRI Yogyakarta University, because the number of visitors can be limited with this system. This system works by: providing information on how many visitors enter UPY, and giving warnings if visitors exceed the specified capacity. Each room is limited to the number of people who enter according to the capacity of the room. The technology applied to limit the number of crowds at UPY uses IoT technology. With IoT technology, stakeholders can view information about visitor and notifications directly via smartphones. The comprehensive implementation of this system will make it easier to get accurate information about the number of visitors during the COVID-19 pandemic.

Keywords: *Microcontroller, Smart room, Smart access, Internet of Things, covid-19.*

1. INTRODUCTION

Covid-19 that hit Indonesia made human activities limited [1]. The existence of restrictions on activities and crowds outside the home is a solution that is applied to inhibit the transmission of the Covid-19 virus [2]. The Covid-19 pandemic has limited human mobility, including activities at PGRI Yogyakarta University. To reduce the transmission of COVID-19, activity restrictions and restrictions on the number of crowds were carried out at PGRI Yogyakarta University. Based on the survey, at PGRI Yogyakarta University there is no system used to help regulate crowd restrictions. The crowd-restriction system is expected to prevent the spread of COVID-19.

In this project, the researcher offers a solution to automatically limit crowds. Limiting the number of crowds is carried out using an internet-based system of Things. IoT technology is a technology that uses the internet as a liaison between users and the system. IoT technology makes it possible to reduce physical contact between people. IoT is a system that can communicate between person to person, machine to machine via the internet [3]. Universitas PGRI Yogyakarta is an educational institution with a low potential for crowd activity. However, to monitor the crowd restriction process at UPY, a system is needed to monitor crowd restriction. The design of this crowd restriction system uses IoT technology. This system consists of hardware and software. Hardware consists of sensors, controllers, and actuators. Software consists of interface

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applications installed on smart phones. This interface application functions as a notification if a visitor exceeds the maximum limit. This system will later provide information on the number of visitors who enter, and provide a warning if there is a crowd inside the building.

2. MATERIAL AND METHODS

2.1. Related Work

Research by [4] which examines automatic crowd prevention devices that are applied in offices. This tool was created to prevent the spread of the virus during this COVID-19 pandemic. This system is built with the main sensor, namely RFID which identifies every employee who enters a room that is frequent crowds. Equipped with a human body temperature sensor Sr 602 and recording every activity in and out of employees in a database. Application developed by [5], generates role of Iot in smart hospital for to serve the special needs of the community during the spread of the pandemic. Various smart devices can utilized which can provide a variety of functions including precise monitoring of high-risk patients, track their biometric measurements and capture real-time data. We learned various blueprints that can sense unexpected events using multiple sensors and reveal facts are accumulated on the LED display. Observation results have shown good agreement with a hypothetical statement. Based on [6], IoT application tools are used to lower the chances of spreading COVID-19 to others with early diagnosis, patient monitoring and protocol defined practice after patient recovery. This research surveys the role of IoT-based technology in COVID-19 and reviews industry IoT-based architectures, platforms, applications and solutions fighting COVID-19 in three key phases, including early diagnosis, quarantine time, and post-recovery.

2.2. Material

In this project the materials used consist of: NodeMCU type microcontroller, infrared module, buzzer, ethernet shield, and 16 x 2 LCD. The node MCU is in charge of system control. The nodeMCU is a control system that regulates input from the sensor and then gives commands to the actuator according to the program. Infrared functions as an input sensor that detects when someone enters the building. Infrared also functions as a sensor that detects people leaving the building. The buzzer functions as an output that provides a notification with a siren sound, and the LCD functions as a monitoring system. Besides, this system also uses an interface to monitor the number of visitors entering the room.

2.3. Research Methode

This research uses the prototyping method [7]. The research phase begins with the needs analysis phase. At this stage the researcher analyzes the needs needed for an IoT-based system at UPY, ranging from hardware requirements (sensors, actuators), and software requirements. The second stage is designing. The design of this system can be seen in Figure 1 below.

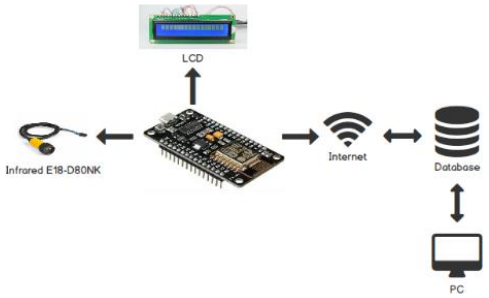


FIGURE 1. Design Crowd Restriction Based an Internet of Things

This system consists of a infrared sensor, which is connected to a microcontroller. The microcontroller is also connected to a 16 x 2 LCD which functions as an interface to the hardware. The hardware system can communicate with users via the internet using the MCU node. The system diagram is shown in Figure 2 below.

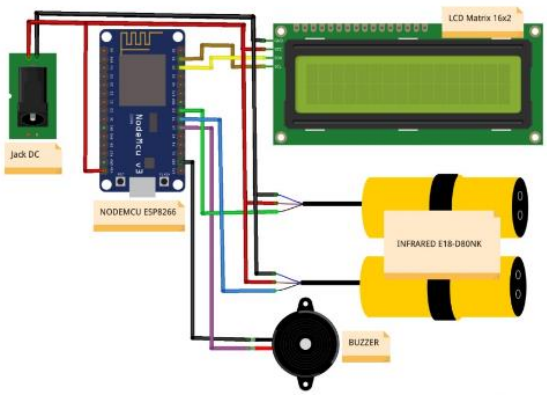


FIGURE 2. Wiring diagram system

The third stage is building the system. At this stage the planned system is made according to the initial design. This system has 2 systems, namely a hardware system consisting of a microcontroller, sensors, actuators, and a software system that becomes the user interface

3. RESULT AND DISCUSSION

3.1. Hardware

The results of making this system on the hardware produce a system consisting of the MCU node as the

controller, the infrared sensor as the sensor, and the buzzer as the output. The results of the tool can be seen in Figure 3 below.

FIGURE 3. Hardware system

The way the system works is: the infrared sensor will detect if someone enters the room, and the information will be processed on the microcontroller. If the visitor has exceeded the limit, the microcontroller will send data that the visitor has exceeded the limit to the user and sound a warning buzzer.

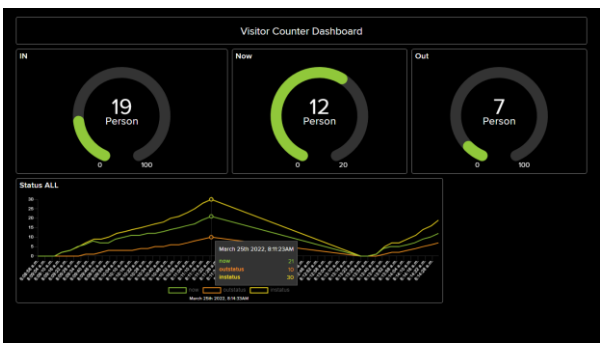
3.2. Software

This system also consists of web-based software. This software serves as a user interface with the system. This interface displays the information required by the user. In this interface the user can view the number of visitors, daily and monthly visitor charts. The display of information can be seen in Figure 4 below.

FIGURE 4. Dashboard System

3.3. Discussion

The system that has been built consists of hardware and software. Hardware consists of NodeMCU type microcontroller, 16 x 2 LCD, infrared sensor. Performance



of the hardware system goes well. The infrared sensor can recognize the user's. The test results show that the maximum distance of people entering the building that can be detected by the system is 80 centimeters, so visitors must bring their bodies closer to the infrared sensor. LCD also works fine. Overall the hardware system runs smoothly.

In addition to hardware, this system also consists of a software interface. The software interface presents the information of people who enter the Building.

4. CONCLUSION

System to work properly. The sensor can detect people entering the room with a maximum distance of 80 cm, this is adjusted to the condition of the door at UPY. The system interface can also display the number of incoming visitors and display daily and monthly reports. Overall the system has been running as needed.

This research can be developed by adding more sensors and actuators such as body temperature sensors, so that visitors' body temperature data can also be recorded in the database.

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