



## Internet of Things Based Automatic Visitor Counter

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### ABSTRACT

In modern times, there are many recreational areas including, Gunung Lampu Tapaktuan Tourism. This destination is very crowded with local and foreign tourists. This study aims to determine the number of visitors, optimize the place, evaluate the area's attractiveness, and know how the tool works using the experimental method. Furthermore, the Internet of Things (IoT) connects physical objects with electronics, software, sensors, and networks that make these objects collect and transmit data. From the results of the trials that have been carried out, every passing visitor is read by an ultrasonic sensor and then sent to the Thingspeak server using the internet network and the registered apikey. The ultrasonic sensor sends data that has been read to the thing peak channel that is connected to the device so that the results of the monitoring are the number of visitors in the form of graphs and tables. The results of testing the tool for seven days contained a total of 1,596 manual data, 1,582 people were detected, and 14 people were not detected. While visitors came out there were 1,559 people caught, and 37 people were not seen. From the seven days of testing, 99.12% of incoming visitors were detected and 97.68% of outgoing visitors were detected. So that it can be concluded, that this tool has been functioning correctly.

### INTRODUCTION

In modern times, many tourist attractions are visited, one of which is the Mount of Lights tour which is located in the Gampong Pasar area, Tapaktuan District. South Aceh Regency with Tapaktuan as the capital city holds so many charms and unique stories behind it. This area is often referred to as Dragon City and is known for its beautiful marine tourism. One of the places that are legendary and is considered mystical by the local community is Tapaktuan nature tourism. This tour is located in Gampong Pasar, Tapaktuan District, South Aceh. Approximately 1.5 km from the center of Tapaktuan City. To visit it is not easy, visitors have to pass through rocks of various sizes. The time to visit the location starts from 08.00 - 18.00 WIB. Data on the number of visitors to a tourist place is very important to find out how many visitors are interested in visiting the place. Until now, to get data on the number of visitors, generally still use the manual method (Kusumo, 2019). With the rapid development of electronic technology and so rapidly experiencing a revolution through the means or media. Various types of equipment have been made by humans to meet the wants and needs in carrying out all activities. Advances in science and technology encourage humans to try to overcome the problems that arise around them and ease human work (Sulaiman, 2017).

The concept of the Internet of Things (IoT) is increasingly being discussed in various fields along with the development of the world in this information age. Among them is a rain monitoring system in the drying process (Ilham, 2021). Infusion out notification (Candra, 2020). Prototype of alcohol counter on fruit (Nursila, 2021). Lamp dick tool (Candra, 2019). Heart rate monitoring (Ilham, 2019).

Internet of Things in its implementation can also identify, find, track, monitor objects, and trigger related events automatically and in real-time. The development and application of computers, the Internet, and other information and communication technologies (ICTs) have had a profound impact on society. Economic management, production operations, social management, and even personal life (Junaidi, 2015). From the description above, the author wants to create a tool to calculate the number of visitors to Mount Lampu tourism in Tapaktuan, South Aceh based on the Internet of Things.

### LITERATURE REVIEW

#### NodeMCU

NodeMCU is an electronic board based on the ESP8266 module chip with the ability to run microcontroller functions and also an internet connection (wifi). There are several I/O pins so that they can be developed into monitoring and controlling applications for IoT projects (Fauzi, et al, 2017).

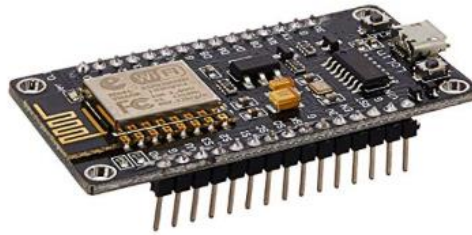


Figure 1. NodeMCU

### Ultrasonic sensor

An ultrasonic sensor is a sensor that functions to convert physical quantities (sound) into electrical quantities and vice versa. This sensor is a ready-to-use ultrasonic sensor, a device that functions as a sender, receiver, and controller of ultrasonic waves (Budiarto, 2021).



Figure 2. Ultrasonic sensor

### LCD (Liquid Crystal Display)

LCD (Liquid Crystal Display) is one type of electronic display made with CMOS logic technology that works by not producing light but reflecting the light around it to the front-lit or transmitting light from the back-lit. LCD (Liquid Crystal Display) functions as a data viewer in the form of characters, letters, numbers, or graphics (Ahmadil, 2018).

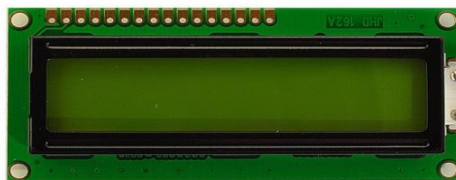


Figure 3. LCD (Liquid Crystal Display)

### ThingSpeak

ThingSpeak is an open source "Internet of Things" application and API for storing and retrieving data from things using HTTP over the Internet or via a Local Area Network.

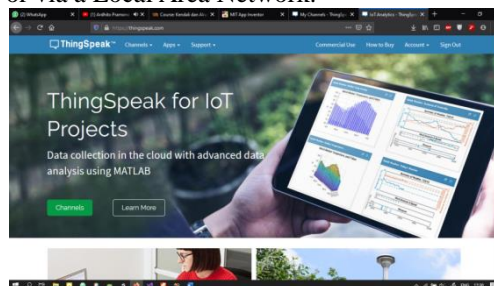


Figure 4. ThingSpeak

## METHOD

### Hardware

The hardware used in the design of the Number of Visitors Counter on Mount Lampu Tapaktuan South Aceh tourism based on the Internet of Things, among others:

Table 1. Hardware

No	Name	Function
1	NodeMCU	Functions as a controller of components in calculating the number of visitors on the IOT-based Mount Lamps Tapaktuan South Aceh tourism
2	Ultrasonic sensor	Functions as an Object Detection Tool
3	Smartphone	Functions as a monitoring medium
4	Adapter	Functions as a voltage source
5	Wire cable	Serves as a liaison between one component and another component
6	LCD	Function to display the results of the number of visitors who pass by

### Software

The software used in the design of the Number of Visitors Counting Tool on the Mount Lampu Tapaktuan South Aceh tour based on the Internet of Things is:

1. Arduino idea  
Used for programming inside NodeMCU
2. Thingspeak  
Used to store and retrieve data from the Visitor Counting Tool on the Mount Lampu Tapaktuan South Aceh tour based on the Internet of Things

### System Design Diagram

This design was made to simplify the process of designing a tool to calculate the number of visitors on the Mount Lampu tourism in Tapaktuan, South Aceh based on the Internet of Things. The following is a system design as shown in Figure 5.

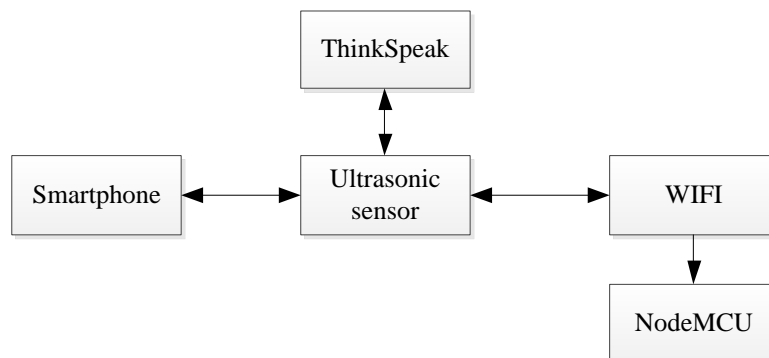


Figure 5. System Design Diagram

### Function:

1. Thingspeak functions to store and retrieve data on the number of visitors who come to Mount Lampu Tapaktuan, South Aceh
2. Ultrasonic sensor serves to detect objects that are running
3. Smartphone works as a device to run Thingspeak
4. WIFI serves to connect clients with access points
5. NodeMCU functions as a microcontroller enhancement

**Flowchart**

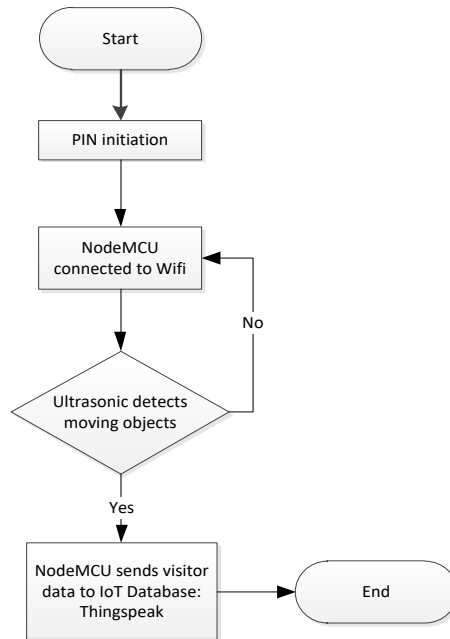


Figure 6. Flowchart

From Figure 6. above, it can be seen that when the system starts, the pins are initialized and the NodeMCU is connected to wifi, then it is connected to two ultrasonic sensors at the entrance and exit to detect running objects. If no object is running, the sensor does not detect it, if the sensor detects it, the NodeMCU will send visitor data to the Internet of Things Thingspeak Database.

**Design Scheme**

The whole series of tools for calculating the number of visitors on the Mount Lampu Tapaktuan South Aceh tour based on the Internet of Things can be seen in Figure 7.

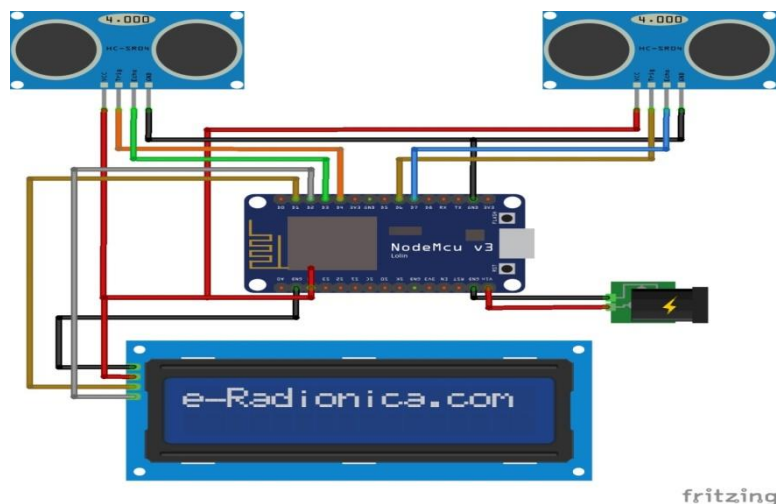


Figure 7. Design Scheme

**RESULTS AND DISCUSSION**

**Overall Toolkit**



Figure 8. Overall Toolkit

**Thingspeak Display**

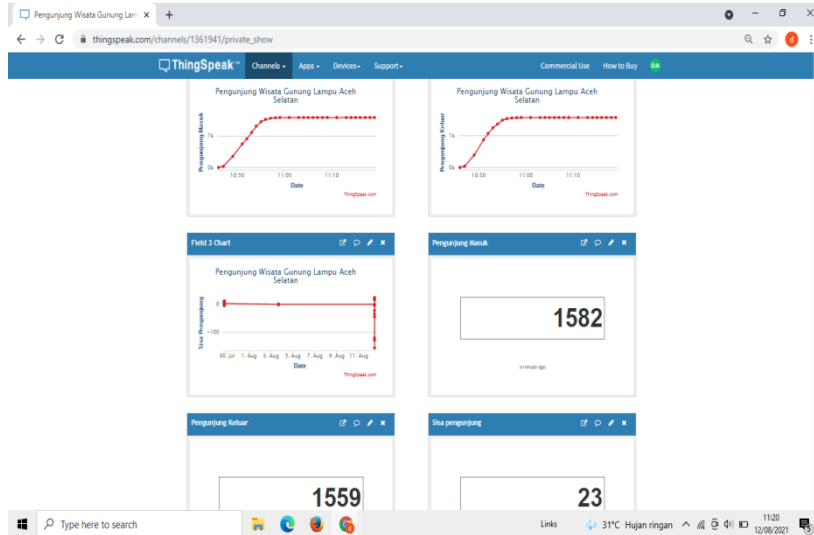


Figure 9. Thingspeak Display

Every passing visitor will be read by ultrasonic sensors and sent to the thingspeak server using the internet network and API key that has been registered. The ultrasonic sensor will send data that has been read to the thing peak channel that is connected to the device so that the results of the number of visitors can be monitored in the form of graphs and tables making it easier to find out the number of visitors entering and leaving the Mount Lampu Tapaktuan tour, South Aceh.

**Test Table**

Table 2. Test results of incoming visitors and outgoing visitors

No	Date	Manual Quantity	Visitors Login		Outgoing Visitors	
			Detected	Not detected	Detected	Not detected
1	27-07-2021	211 people	208 people	3 people	208 people	3 people
2	28-07-2021	176 people	176 people	0 people	164 people	0 people
3	29-07-2021	202 people	199 people	3 people	193 people	3 people
4	30-07-2021	149 people	149 people	0 people	149 people	0 people
5	31-07-2021	350 people	346 people	4 people	346 people	4 people
6	01-08-2021	398 people	396 people	2 people	394 people	4 people
7	02-08-2021	110 people	108 people	2 people	105 people	5 people
<b>Amount</b>		<b>1.596 people</b>	<b>1.582 people</b>	<b>14 people</b>	<b>1.559 people</b>	<b>37 people</b>



From table 2. Test results for seven days there are several manual data 1,596 people. In Visitors, Login found 1,582 people were detected, and 14 people were not detected. Meanwhile, for outbound visitors, 1,559 people were detected, and 37 people were not detected. Of the seven days of testing on incoming visitors, 99.12% were detected and 97.68% were detected for outgoing visitors.

### CONCLUSIONS

1. From the results of testing the tool for seven days, there are 1,596 people from manual data. On Login Visitors found 1,582 people who were successfully detected, and 14 people were not detected. Meanwhile, for outgoing visitors, 1,559 people were detected, and 37 people were not detected. Of the seven days of testing on incoming visitors, 99.12% were detected and 97.68% were detected for outgoing visitors.
2. The designed number of visitors can be viewed directly from the LCD (Liquid Crystal Display), where the LCD (Liquid Crystal Display) will provide data on the number of incoming and outgoing visitors that have been received by the Ultrasonic Sensor.
3. Every visitor who is read by the ultrasonic sensor can be monitored via the Thingspeak web.

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