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MONITORING WATER LEVELS AS FLOOD DETECTORS BY UTILIZING TELEGRAM APPLICATIONS BASED ON IOT (INTERNET OF THINGS)

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Flood is a natural disaster that occurs when excessive flow of water will submerge the land. Floods also often occur because most of the garbage is thrown carelessly so that the drains or sewers are clogged especially with the continuous rain for days so that the overflow of water causes flooding and many casualties. To overcome this problem, there needs to be a solution so that there are no more casualties and losses, namely making a water level monitoring system by utilizing the telegram application as a notification medium. The system will be made by utilizing Arduino UNO as a controller and based on IoT (Internet Of Things) so that information can be sent accurately. This study aims to make the local community aware of overflowing water. The designed tool will automatically detect water from safe, alert and dangerous status. If the water level rises to a danger status, nature will issue an alarm sound and automatically send a message to the telegram application that the water level is in danger status. This system will later be implemented for the community in various flood-prone areas.

Keywords: Flood, IoT (Internet Of Things), Arduino UNO, Telegram

1. Introduction

Floods are natural disasters that occur when excessive water flows and submerges land. It has always been a problem that made residents feel very uncomfortable. When the flood came, the residents did not make the slightest preparation to save valuable items. Floods are currently a natural phenomenon that often occurs in residential areas adjacent to rivers. Besides that, residents also do not keep the environment clean, throw waste into the river, so that many water flows are clogged causing the water to overflow. Apart from littering and also the occurrence of rain that continues for days without stopping, causing the river to overflow, there will be flooding.

To overcome this problem, it is necessary to have a system that can operate or detect water levels so that it can minimize casualties and losses that occur. In this research, the system/tool that will be designed is a tool that can monitor the occurrence of flooding remotely by utilizing the IoT (Internet Of Things) method and providing information via telegram messages that can be monitored in real time so that it can provide information on safe status, alert or danger in real time quickly and accurately. If the water level rises to a dangerous status, the device will emit an alarm sound and automatically send a message to the telegram application that the water level is in a dangerous status. With the use of internet communication, it is very easy to reach from all circles of society. This system will later be implemented for people in various flood-prone areas.

2. Methods

2.1 Research Stages

At the research stage, the flow of the research will be described and explained one by one how the system of the entire research will be built. The following is a picture of the research stages.

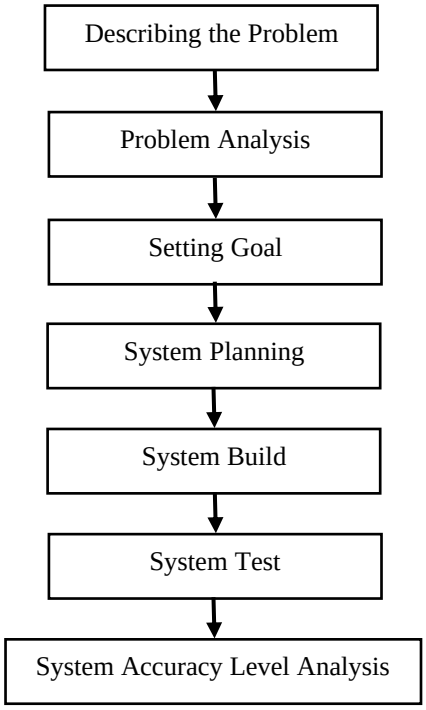

Figure 1. Research Stage Design

1. Describing the Problem
   Describing the problem transparently will support in preparing and realizing a flood detection system tool by measuring the water level to be studied, it must be described first, because without being able to describe the problem, determine and define the boundaries of the problem to be studied, there will never be a best solution. the problem. So this step is the most important first step in this research.
2. Problem Analysis
   The problem analysis step is a step to find out the problem that has been defined by its scope or limitations. By analyzing the problems that have been set, it is hoped that these problems can be studied easily.
3. Setting Goals
   Based on the understanding of the problem, the objectives to be achieved in conducting this research are determined. At this goal set targets to be achieved, the most important in solving existing problems
4. System planning
   This stage is the stage of the design of the device that is carried out, at this stage the framework of the device is made and preparation of the arrangement of the flood detection system tools by measuring the water level
5. System Build
   This stage is the stage for making the control system tool turn on and off the room lights remotely. The manufacture of the tool is based on the framework and design of the tool that was made in the previous stage.
6. System Test

Testing the tool is done by detecting the water level using an ultrasonic sensor which is controlled by the NodeMCU development board microcontroller as a control center and is connected and equipped with a wifi network.

7. System Accuracy Level Analysis
   This stage is the stage where the analysis is carried out in conducting internet communication in remote areas with 3G network coverage.

2.2 Research design

The block diagram for detecting floods is shown in Figure 1. The system designed uses Ultrasonic Sensors by utilizing the Arduino Uno with the IoT (Internet of Things) concept with an interface utilizing a telegram. The block diagram design can be seen in the image below :

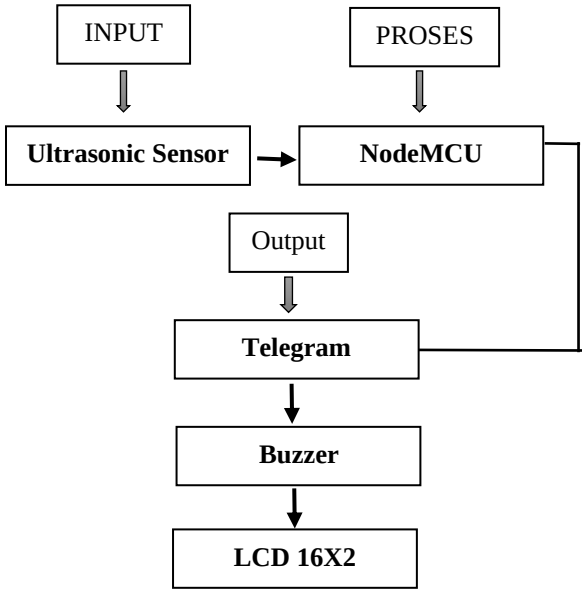

Figure 2. Block Diagram Design

To see the flow of the structure of the program, it can be described in the form of a flowchat as follows :

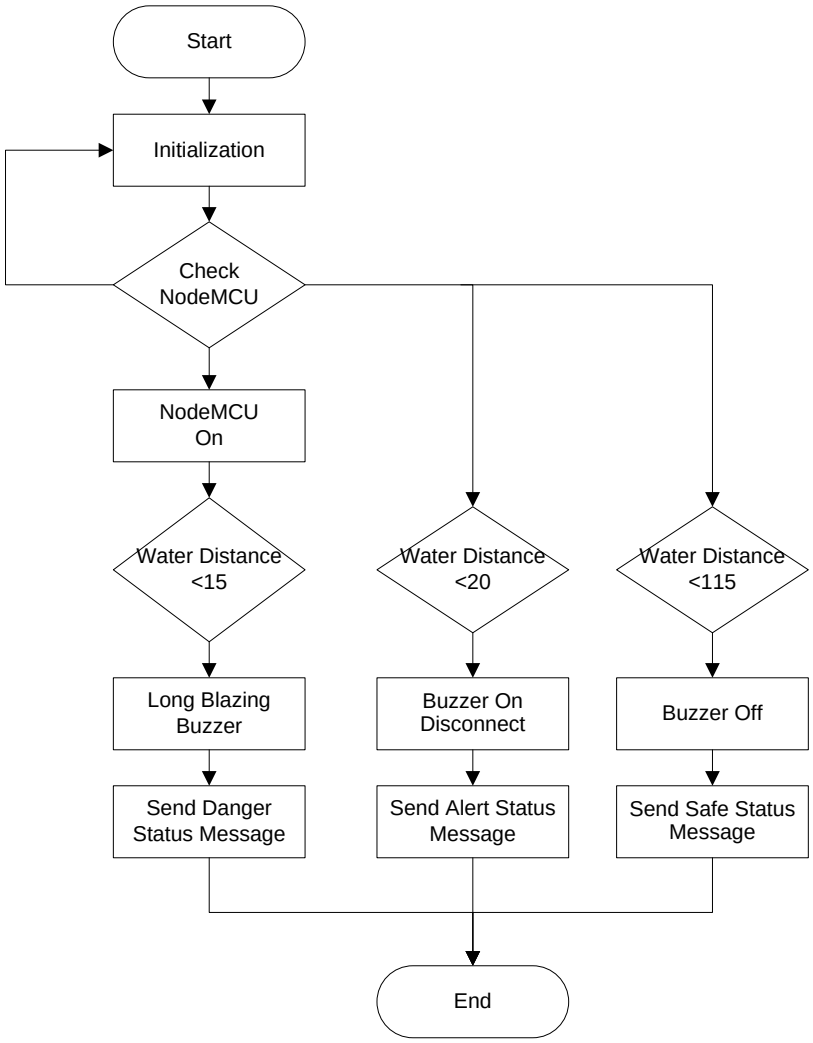

Figure 3. Flowchart

3 RESULTS AND DISCUSSION

The results of this study explain how to test the river detection system by utilizing ultrasonic sensors and providing information by telegram communication quickly and accurately so that later residents will be able to anticipate or prepare themselves if suddenly heavy rain hits and causes flooding. The first of the tests carried out was testing the ultrasonic sensor working system to measure the water level in centimeters (cm). The test results can be seen in the table below.

Table 1. Test Results of Water Level Status With Ultrasonic Sensors

Water Level (cm)	Altitude Measured By Sensor (cm)	Sensor Distance To The Water Surface	Sensor read Distance	Accuracy (%) Of Distance Measurement
0,2	0,5	1,46	1,42	97,25
0,3	0,7	1,44	1,40	97,22
0,6	0,10	1.41	1,37	97.17
0,8	0,12	1,38	1,35	97,11
0,11	0,15	1.35	1.32	97.10
0,14	0,18	1.32	1.30	97.05
0.17	0.20	1.30	1.26	97.00
0.29	0.32	1.17	1.14	96.85
0.32	0.35	1.13	1.10	97.34
0.39	0.41	1.08	1.06	97,23

Based on the table above, it can be seen the results of testing the status of the water level using an ultrasonic sensor in units (cm). From the test results it can be seen that the sensor is running well. To see the working system, the entire tool can be displayed during testing along with a picture of the tool.

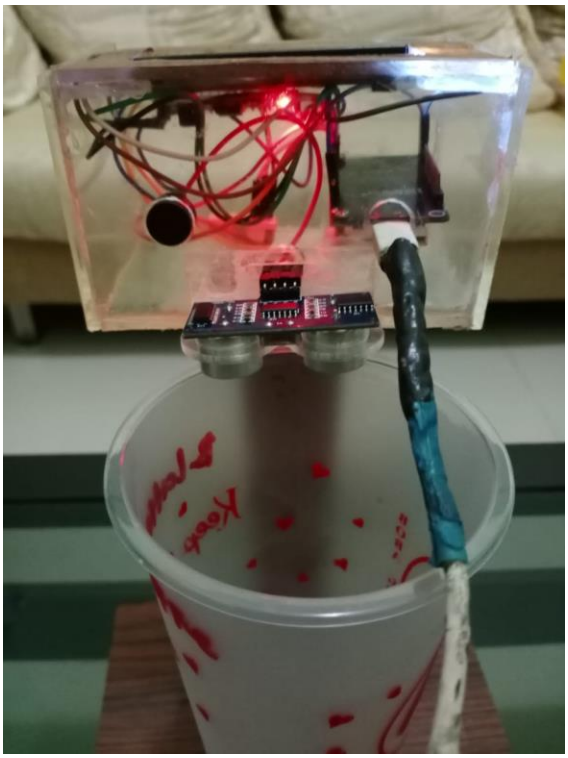

Figure 4. Ultrasonic Sensor Test for Measuring Water Level

The next test carried out is testing the results of the sensor detection reading that can be accepted by the application. At this stage, the measurement of safe, alert and dangerous sensors will be carried out which is useful for knowing the system will send messages automatically to the telegram application if

conditions are not good. If the situation is on standby, the message will be sent to telegram with an alert status, it is a warning sign that the community hopes that a flood will occur and if the situation is in danger, a message will be sent to telegram with a hazard status, then there is a high probability that a flood will occur. To see the working system of the application can be seen in the image below.

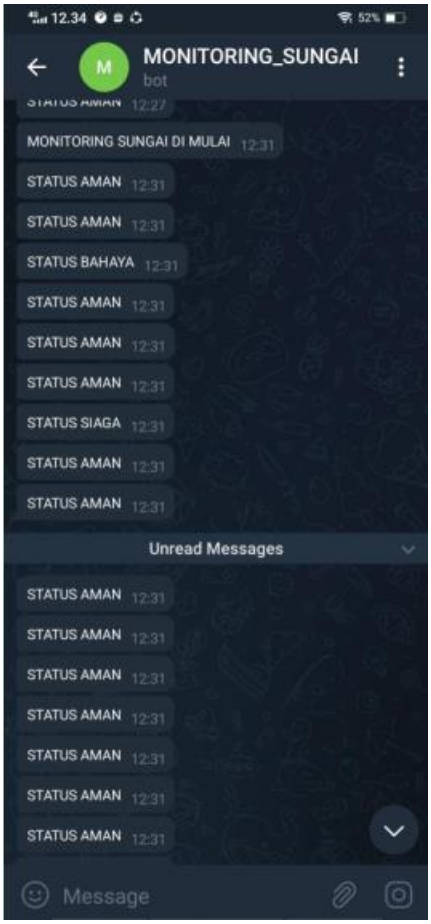

Figure 5. Message Notification

The picture above explains that the information sent via telegram goes well. To be clear, further testing will be carried out on the time of sending messages to Telegram and how long it will take to send messages. This test aims to find out how long it takes the system to convey messages to the community at the time of a flood. The time recorded in this test is the time when the alarm sounds and sending messages to the telegram application. The test results can be seen in the table below.

Table 2 Test Results for Sending Messages to the Telegram Application

Delivery To	Success (yes/no)	Time required(s)
1	Yes	6.50
2	Yes	6.74
3	Yes	6.73
4	Yes	7

5	Yes	7
6	Yes	7
7	Yes	6.7
8	Yes	7.85
9	Yes	6.82
10	Yes	6.79

For further testing, a flood detection test is carried out by utilizing internet communication and sending message information via the telegram application. As for the test for the status that was informed was safe, alert and dangerous. The test results can be seen in the table below.

Table 3. Flood Detector Test Results

Sensor read river water level (m)	Sensor read floodgate height (m)	The reading height of the rainfall sensors (m)	Send message or not	Status sensor
0.04	0.03	0.03	No	Safe
0.15	0.09	0.03	No	Safe
0.22	0.12	0.03	No	Safe
0.21	0.23	0.03	No	Standby
0.27	0.27	0.03	Yes	Standby
0.23	0.22	2	Yes	Standby
0.40	0.35	0.22	Yes	Danger
0.35	0.05	0.22	Yes	Danger
0.42	0.11	0.22	Yes	Danger
0.43	0.41	0.22	Yes	Danger

4. Conclusions

Based on the test results of Monitoring Water Levels as Flood Detectors by Utilizing the IoT (Internet Of Things)-Based Telegram Application, several conclusions were obtained as follows: The implementation of a water level monitoring system as a flood detector that is connected to the telegram application as an information medium is running well and successfully measuring river water levels, and can send messages to telegram with the right status and size. The Telegram application can receive information from the ultrasonic sensor detection server well. Despite having time to receive information for 10-15 seconds. The weakness of the designed system is an error in water measurement caused by the presence of garbage or objects that float and pass through the sensor at the same time.

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