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# WEATHER PARAMETER USING IOT TO SUPPORT TRADITIONAL FARMING INDUSTRY

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***Abstract***

*Early warning system the height the river water based on Parameter-based Weather IoT that supports Traditional Farm Industry is a concept that aims to extend the benefits of internet connectivity that is connected with the land farmers traditionally farmed, especially in the area of Sidoarjo that has always depended on the cycles of nature. Issues facing coastal areas as the height of the surface of the soil is equal to or lower than the sea level is rising, that Rob flooding sea water due to the tide is too high. This led to the loss of traditional farm for farmers because of the height of water is the river water that goes into a swath of farmers exceed the limiting height of the pool, while the characteristics of fish cultivated, the milkfish will jump towards the direction of water flow come. These events can result in problems such as loss of fish stocked, milkfish farmed fish loss and even ruined the harvest. One of anticipation made by farmer pond is making a fairly high embankment, but often these ways fail. To that end, this research will do monitoring water levels in the river's lips as a means of early detection of occurrence of floods Rob. The results of the monitoring will be linked to the system controlling the height of the safety net will be installed to surround the pond. The nets will be raised following the results of detection of the height of the water automatically, so that it will provide a barrier for the fish would likely jump out of ponds. While the calculation method to be used is the method of Fuzzy. Expected by the existence of this study, the rate of loss of seed or fish can be reduced significantly.*

***Keywords: IoT, Smart fish pond, monitoring, controlling***

## Introduction

Sidoarjo is one of the sources of biological barns in the province of East Java. In addition, this city includes the city of Minapolitan. The city has a pond area of 29.9% of the total area of the Regency. The famous aquaculture is milkfish. Milkfish is a biological source commodity that is in great demand by Indonesian people with various types of processed products [2016].

The characteristics of ponds in the Sidoarjo are the use of sea water as a medium of cultivation by utilizing the topology of the coastal area which has a distance of ground surface height between 0 - 3 m above sea level. Traditional ponds use tidal currents of sea water that carry plankton as a natural feed for milkfish. During high tide, pond farmers will open the embankment door to drain seawater into the pond. But the obstacle that is often faced at this time is the high tide increase or what is commonly called the Rob flood.

Last December 2017, the coastal area of Sidoarjo experienced a flood of Rob up to a height of 150 cm above sea level. This resulted in several villages submerged at 30-50 cm in residential areas, and 70-100 cm in the area of hundreds of hectares of ponds, and reached losses of up to hundreds of millions of rupiah due to the large number of fish and shrimp lost due to this flood [2017].

The high level of sedimentation and climate change, causing tidal water to enter the coast faster to the river that flows through the pond. The government's efforts to overcome this are by dredging sediments and making embankments. But this seems to be a routine agenda that must be carried out every year and does not solve the problem, especially to reduce the losses of farmers due to floods that often occur.

This proposed research seeks to help overcome this problem, with a wider impact. As the initial stage of the study, a water level monitoring system on the shoreline and river lips will be made using sensors

automatically. The data that will be obtain, can be used to determine the speed of rising tide of sea water. The data will later be processed in a data center that serves to provide early warning in the event of an increase in water level above a certain normal limit. A warning can be a notification that will be disseminated through a mobile application.

Whereas for the advanced stage of this research, a safety net control system will be installed around the pond area. Based on the water level data obtained, the height of the net will be set automatically to reduce the potential for losing fish if the water exceeds the height of the embankment. This is to anticipate the behavior of milkfish that can jump up to one meter above the water level.

## Research methods

The stages of the research process include several stages:

1. Colekting Data

Data were obtained through interviews with pond farmers located around the banks of the Sidoarjo River, BMKG Sidoarjo and data from the Sidoarjo Irrigation Office.

2. Modeling System

Based on the results of the analysis, the system design was built to make a model of Modeling Early Warning System for River Water Height Based on IoT Based Weather Parameters. The next stage is building to make the model designed to the prototype in which there are systems built using certain applications. In addition, a decision support system method is also being applied to the application.

3. Test and evaluate Modeling System

The general system model for monitoring river water levels is shown in Figure. 1. This early detection system consists of two fundamental parts: detection of river water levels and providing information to fishpond owners. Detection of river water levels detects whether sea water is experiencing tides so that the surface of the river water is higher than the surface of the fishpond embankment. This can be done with various types of sensors. How to detect river water level due to high tide may differ in height between the sea and the sea lip but all the data from the sensor at a certain distance along the river flow around the pond is collected in a data. This information must then be sent to the system to inform farmers and other users. The dissemination of this information can be done either through a simple system such as the light in the pillars where there is a sensor can be done with mobile and web applications

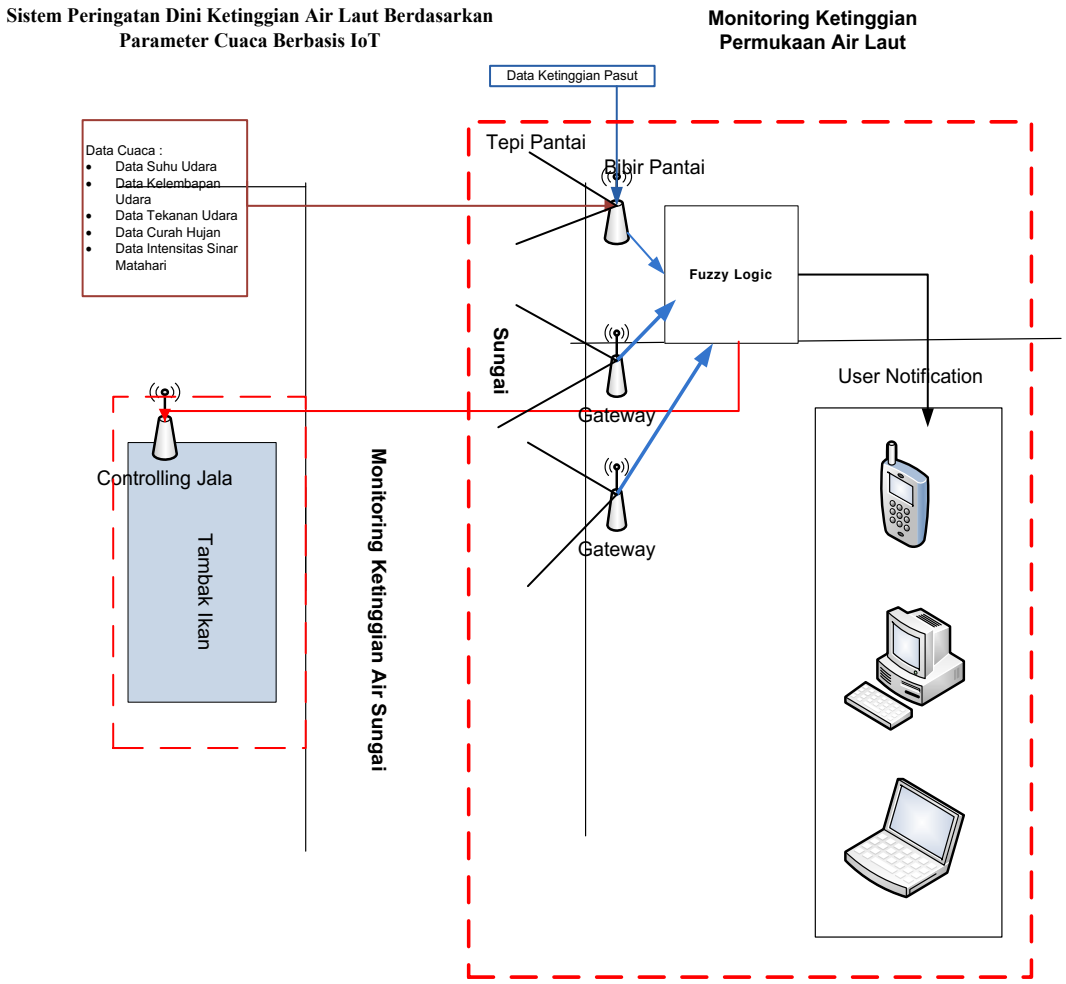


Figure. 1. River Height Early Warning System Based on Weather Parameter using IoT to Support Traditional Farming Industry

4. Flow Chart Monitoring Ketinggian Air sungai

The following is a flow chart modeling system for river water level early warning based on IoT based weather parameters as shown in Figure 2 as follows:

**1) Wether Data**

Input of weather information data is obtained from AWS sensors installed on the beach which are recorded every 4 hours and dictation in the data base.

**2) Sea Level**

The process of calculating the detection of sea level by looking at existing weather data. This is intended to see whether there is a correspondence with weather changes that occur with sea level.

**3) River Water Level**

The process of measuring changes in the height of river water flow around the pond. The process of changing the surface water level of the river by looking at the data in the process of detecting sea level. In this section AI begins to be applied to the modeling system, meaning that in this section all data derived from the process of measuring changes in sea level and changes in river surface water levels have an impact on the river water level in the next and or the water level of the river exceeds the surface of the fishpond embankment

**4) Delivery of Information on Changes in River Surface Water Levels**

In this section the system will send information on changes in river water levels that will occur to the farmer and other parties. All processes of changing sea level, river surface are stored in the database.

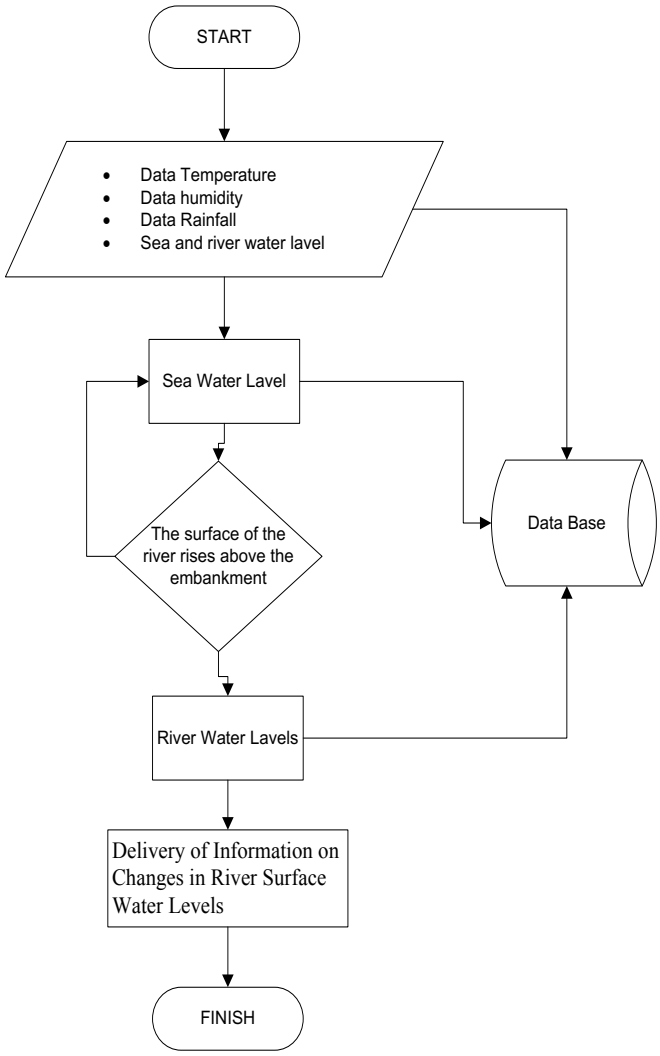


Figure 2. River Water Lavel

## Research Results and Discussion

### 1. Setup Data

User data from this application must be recorded in the database. The user data will be get information from the server in real time. The data consists of user ID (KTP, institution), mobile number, distance of the location of the pond with the river bank, height of the embankment from the river mouth.

### 2. Weather and Sea Level Height

Weather information is obtained from the number 1 AWS sensor made, namely Temperature, Humidity, Sunlight, Air Pressure sensors and to obtain water level data from ultrasound sensors. The trial was carried out a rather broad place by building models of the sea, river flow and fish farming ponds. For seawater, a size of 2 x 2 meters is made and a depth of 50 cm, the river is made to a width of 50 cm and a length of 5 meters, assuming a length of 50cm is proportional to the 5 meter width of the river and 1 meter is proportional to the river length per 1 km, and elevation angle the river from the pool lip 200 as in figure 3.

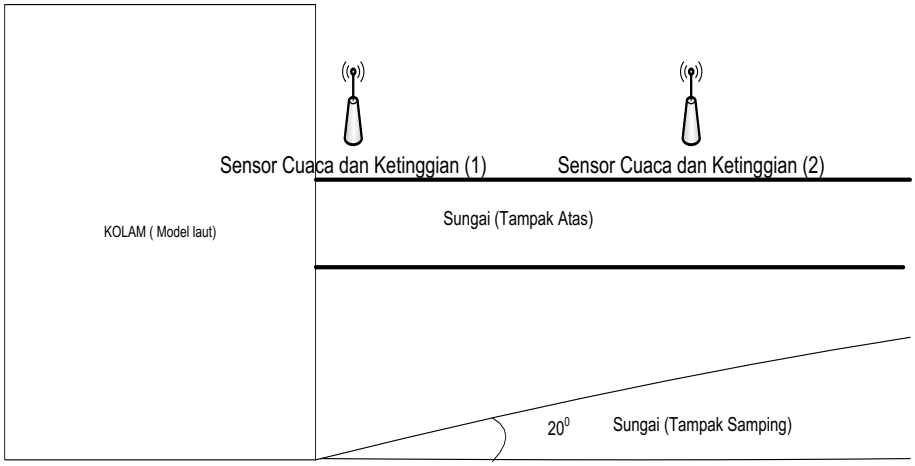


**Figure 3. Modeling River System**

To get weather data by means of air temperature, air humidity and air pressure by using a fan that has water gusts, while to obtain data on the intensity of the sun's light the light sensor is closed with a certain thickness of fabric and the last to get the data of the sea level of the reservoir pool filled with water with a certain amount of volume. With the data obtained in this way, an analysis can be performed presented by a formal algorithm as Algorithm 1. The algorithm 1 is run by each pool monitoring sensor in real-time.

```
Algorithm 1 Detection Sensor ketinggian air laut dan  cuaca
data: K, C, T, Hj,SMt,KairLaut, Date,Time
Procedure Inputdata_sea_water_levels
    Establish Connection with Local Gateway
    Establish Connection with Remote MySQL Database
end procedure
Procedure Sea Water Lavels
    Pulse 10uS on Trigger Wire
    Wait for signal on Echo Wire
    Record time from trigger signal to echo
    Calculate sensor distance detected, Sd
end procedure
procedure DATABASE UPDATE
if Sd > Td then
    Using Ui Send 'True' to MySQL Database
else
    Using Ui Send 'False' to MySQL Database
end if
end procedure
```

### 3. River Water Levels

Weather information is obtained from the number 2 AWS sensor made, namely temperature, humidity, sun exposure, air pressure sensors and to obtain water level data obtained from ultrasound sensors. as in figure 3. To get the data done in the same way as sub-point 4.2, but to measure the river water level taken on the river open in the pond.

**Algorithm 2 Detection Sensor River Water Lavels**

```
data: K, C, T, Hj,SMt,KairSungai, Date,Time
Procedure Inputdata_sensor_sungai
    Establish Connection with Local Gateway
    Establish Connection with Remote MySQL Database
end procedure
Procedure River water Lavels
    Pulse 10uS on Trigger Wire
```

```
        Wait for signal on Echo Wire
        Record time from trigger signal to echo
        Calculate sensor distance detected, Sd
end procedure
procedure Database Update
if Sd > Td then
        Using Ui Send 'True' to MySQL Database
else
        Using Ui Send 'False' to MySQL Database
end if
end procedure
```

The above analysis, presented a formal algorithm as Algorithm 2 to detect weather and surface height of river flow. The algorithm 2 is run by each pool monitoring senor in real time.

### 4. Delivery of Information on Changes in River Surface Water Levels

Data obtained from AWS 1 sensors and AWS 2 sensors is sent to the server. The data is processed using Fuzzy AI to determine whether the information provides an indication of changes in river water levels that exceed the riverbanks. AI is very important because it will provide information to farmers and other users. Delivery of AI information is sent via mobile and web applications in the hope that users get the correct information**.**

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## Conclusions and recommendations

The trial activity involving 100 data sampling has a variety of different weather conditions and changes in sea level (pond) height under normal conditions. From the results of the 92.5% trial the monitoring system went well and 7.5% of the system did not recognize it well. Problems that arise when the river model is changed, the speed of the flow of water both from the sea and from the land is changed. Some anomalous data factors are intended, the data suddenly rainfall in the high sea area or in the direction of the sea does not cause rain and on land there is rain or occurs in the rainy sea and rainy land. Thus the researchers know how much the actual river water level is. Findings that occur in the direction of the speed of sea water over the river and the speed of the river water that is sea-side are also not yet considered to calculate properly.

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