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Automated Fish Feeder using Iot Module

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Abstract

Fish are considered auspicious and powerful in Vastu shastra, and they reflect good fortune, prosperity, and abundance in feng shui. Additionally, fish can provide a high degree of positive vibes, create a pleasant environment, relieve stress, and assist in a good night's sleep. Proper management of a fish tank at home will help to reduce hypertension and a rapid heartbeat. The quality and liquid level, the number of calories fed to the fish, the feeding cycles, and temperature fluctuations are all assessed.The project's objective is to computerize the system and reduce human intervention, by using a smartphone where the control for initiating the system can be done remotely by the user. Simultaneously, instant data of the feed, volume of water, the ambience of the water tank are noticed by the user and hence one can monitor the system in his/her absence. Tinkercad is used to build the simulation results.

Keywords: RTC, PIC microcontroller, Servo Motor,Water level, Temperature range,Wi-Fi module.

1. Introduction

The prevalence of aquaculture is skyrocketing. This domain's accomplishments is inextricably linked to the ideal environmental factors that affect the survival and well being of fish.Even though a fish tank is appealing, retaining it pristine is a tough task.Feeding must be performed on time.It is pivotal for fish owners, whether they are pets or aquaculture, to adjust the food supply to protect the lives of the fish.By using the standard manual feeding system, the owner of a fish farm in certain jobs would need more manpower.As previously stated, the commercial dimension of feedstuffs will dictate the business's survival, especially in the case of incredibly agroforestry projects. In order to overcome this issue, we are dealing on a new proposal.

Furthermore, overfeeding causes the feed to rot.For a larger area, it will definitely be complicated for users to access the complete feeding pattern. For instance the dosage for goldfish is 5% of its body weight, given twice a day at 06.30 and 17.00. Since aquarium fish are extremely sensitive to temperature changes, maintaining it is critical.For reference, the average temperature for goldfish is 68F-74F, flower horn is 80F-85F, angel fish is 78F-84F, and tiger fish is 77F-82F.The main objective of this paper is to set up an autonomous system for receiving fish feed continuously, as well as to use the Internet of Things to monitor water level and temperature, both of which are crucial to the project's success. Modem, Bluetooth, and satellite were the three most popular IoT communication networks available.

The pellets are powered by a Direct Current motor beneath the storage.[1]The timer is said to analyze the characteristics of the motor that drives the sphere former, which drops the balls.The controller came with a keypad, givingmore flexibility in deciding the appropriate rpm depending on their cattle, as well as allowing the fish to be injected at the appropriate cycle time.[2]The module consists of an alternator, hold, a fishing storage compartment, a Programmable Logic Controller, and a Global Device for Mobile Communication.[3]The fishes are fed by the machine through a tube that runs from space to the fish. The size of the opening is detected by a block connected to a motor.[4] A timer is used to govern the number of feeding sessions. A feedback system also detects the remaining feed level in the store. On the whole, the unit will keep an eye on the state of the fish tank.[5]Aquaculture Device[6] is a cutting-edge product that enables aqua farmers[7] to feed aquatic creatures[8][9] in their fisheries and different fishing ecosystems[10].A boat with an optimized container for loading fish feed is the device's most important component[11]Due to the ponds' remote location and dependency on clean freshwater, one alternative is to have an extension module, such as the Wivity modem, to enable end-users to navigate and manipulate those IoT network attributes[12].

A cylindrical can, distribution tubes, andstand make up the unit[13]Stepper motor is used under the canister to adjust the volume of feed[14].The microcontroller will process a timer to control the rotational speed of the motor[15] It automatically dispenses food at scheduled times[16].This idea is expected so that this will help local farmers, especially armature farmers, improve their aquaculture efforts.

2..Prefered AFF System

The system aims at designing an automated fish feeder using an IOT module. The level of water in the tank and its temperature can be observed at any time from any location using a smartphone. The user will have control over the servomotor's rotation to regulate the feed rate to feed fishes. Following the proper schedule and amount preset by the user.

This device feeds fish, thus avoiding overfeeding. By using IoT technology, cloud space is allocated for the information to be stored which can be accessed with login credentials.

Space is createdin the cloud for storing data, resulting in a log page from which one can get the web page with a username and password, in order to provide analogue inputs to the motor from an android platform.

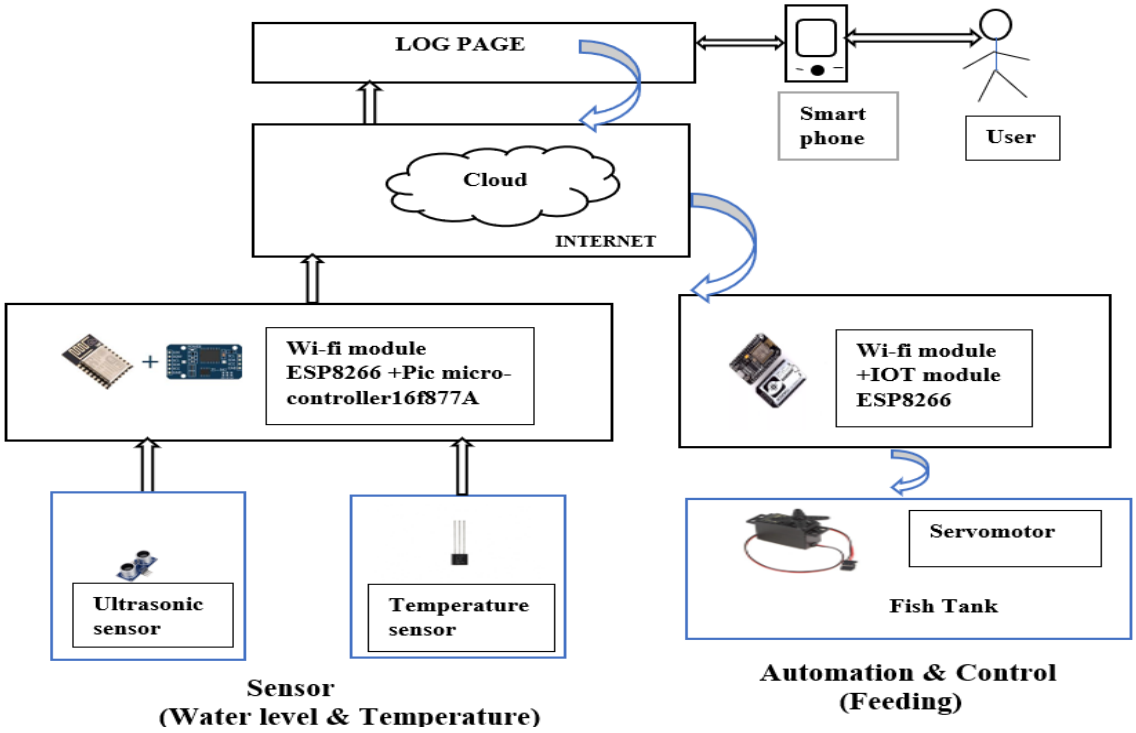

Fig 1.1 Mechanism offish feeder

A 12V DC supply is used to power a system.The sensors detect the water level and temperature range of the tank. The clock pulse from the rtc is given to themicrocontroller, and the servo motor rotates in response to the

clock pulse.The iot is linked to the microcontroller via the max232 protocol (ic chip)[17]Iot will be used to manage this framework.

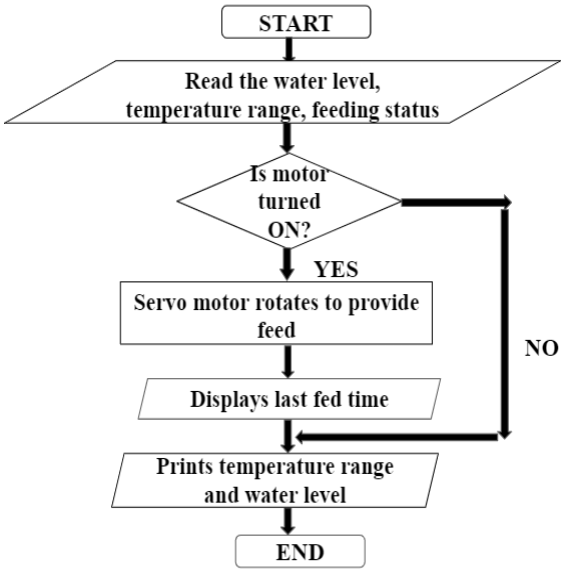

Fig 1.2 Process of Data flow

The user interface program starts after the specified feeding time has passed, and the system eventually runs. The servo motor drives and the fish are nourished when the machine is turned on, so the last feed status is not shown. In each of these scenarios, it simultaneously validates the temperature range and the water level.

3. System Overview

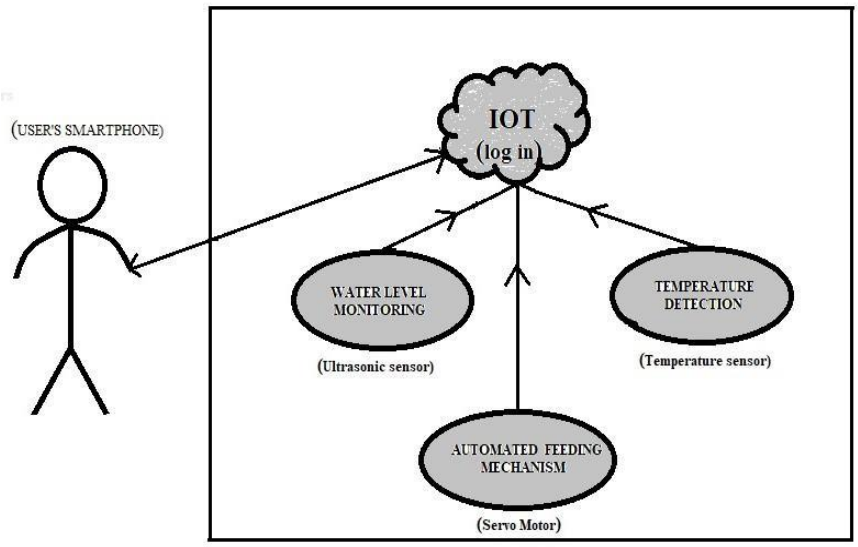

Fig 1.2 Protocol implementation of ourproject.

We are using an iot to control level of the water, and automate the feed system, which will be shown on a 16*2 lcd display and the data will be given to the user at the same time.

Comparison table :

S.No	Factors	Existing method	New Methodology
1	**Food dispensing**	Chance of extra disposal	Limits atprecise interims
2	**Equipment Mal- functioning**	Receiver will not be notified	Capable of tracing
3	**Mode of execution**	Needs to be dealt by hand	Gadgets can be employed for supervising
4	**Temp assessment**	Imperceptible	Values are recognised
5	**Volumeof H_2O**	Hard to Spot	Water table can be inferred

4. Circuit Simulation

To illustrate the fish feeding process in detail, we use TINKERCAD as a circuit simulation tool. We conducted this simulation on connecting a servo motor that rotates, thereby dropping the fish feed, using an Arduino Uno[18]. The distance between the feed box and the water tank is then calculated using an ultrasonic sensor[19] As a result, we will be able to see how the values of distance change over time. By doing so, we would be able to determine the duration of the feeding process.

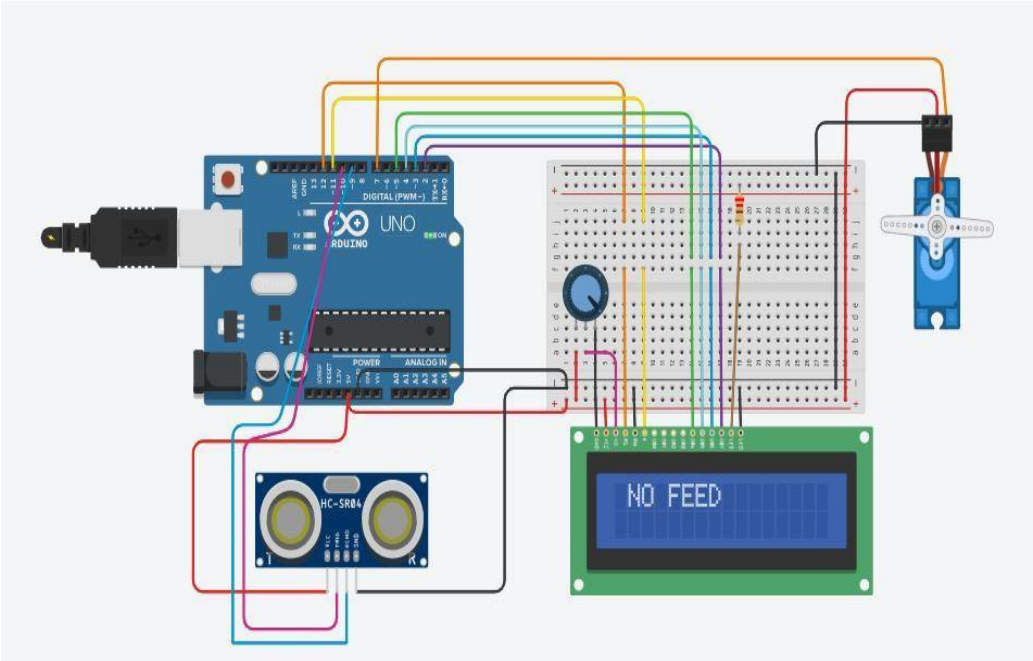

Fig:1.3 The feed box is closed, and the feeding process begins.

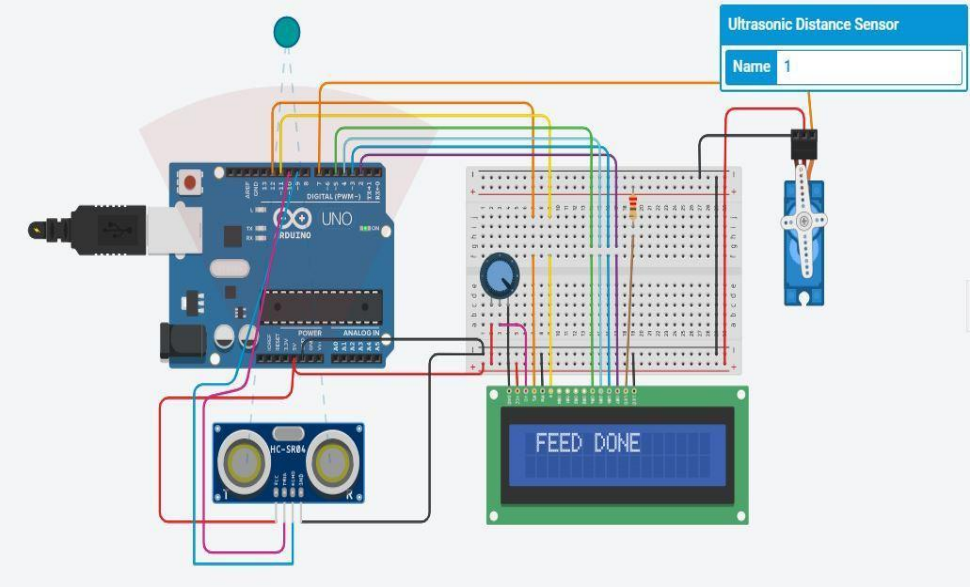

Fig:1.4 The Feed box is opened, and the process of feeding is done.

Pic microcontroller over arduino:

Since it uses RISC architecture, the PIC's efficacy is very accurate. It has an inbuilt ADC, which is not found in Arduino or ATMEL. It uses less power and has five ports. Gui that is easily programmable. It connects analog circuits in a simple way.This controller is affordable.

6. Hardware Prototype

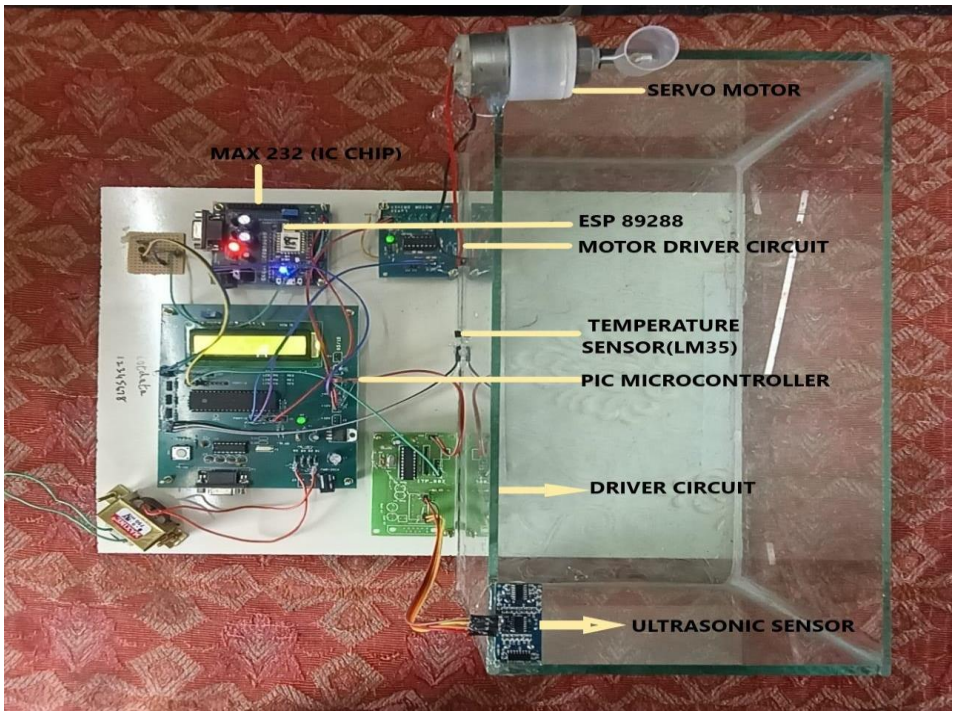

Fig 1.5 Design ofhardware kit

Step-down transformer turns 230V (AC) to 12V(AC) to power the pic controller. Electricity is provided to the microcontroller system. A bridge rectifier will then be used to transform 12V (AC) to 12V (DC).The ripples are wiped using capacitors between them. Afterwards, the voltage regulator reduces 12V (DC) to 5V (DC) so that the PIC controller can be charged.

PIC16F877A is an 8-bit CMOS FLASH microcontroller with a 200-ns instruction execution time. There are 40 pins, EEPROM data memory of 256 bytes self-programming, and an ICD on it. The PIC's operating voltage ranges from 2 to 5.5 volts.

Max232 is a dual transmitter/dual receiver integrated circuit for RX, TX, CTS, and RTS signal conversion. It operates at 5 volts and 8 milliamperes. It facilitates the communication between the IoT board and the PIC microcontroller

The wifi framework incorporates a Tensilica 32-bit chipset as well as normal digital embedded processors. To achieve low energy consumption, it employs several technological innovations. It has a maximum frequency of 160 MHz and runs at that frequency. Users' application programming and enhancements to the RTOS and wireless stack consume 80 percent of the computing resources.

An ultrasonic sensor is an electronic system that uses sound waves to determine the distance between two objects. The supply voltage is 5 volts (DC), and the supply current is 15 milliamperes. The output voltage ranges from 0 to 5V. The size is 2cm to 400cm, and the accuracy is 0.3cm. In either case, it aids in determining whether the water level is low or high.

A servomotor is a precision-control actuator. It has a 5V power supply (DC). Its orientation is extremely precise. It spins at a speed of 60 revolutions per minute and is driven by 12 volts. The fish feed is dropped into the water in the tank using the movement of a servomotor that the user controls.

The LM35 is a temperature sensor[20] IC with a high degree of precision. The input voltages are 35V and -2V, respectively. Typically 5V is used. The LM35 has a temperature sensitivity of 10 mV/°C.Suitable for temperatures ranging from -55 to 150 degrees Celsius. It detects the temperature of water at any time.

7. Tabulation

Sl.no	**Date**	**Time**	**Temperature (in degree)**	**Total Feed Amount**	**Feed status**
1	13-03-2021	07.30	24.5	10 gm	FEED DONE
2	13-03-2021	16.00	25	0 gm	NOT FED
3	14-03-2021	07.30	24	11 gm	FEED DONE
4	14-03-2021	18.00	24	10 gm	FEEDDONE
5	15-03-2021	07.30	25.5	9 gm	FEED DONE
6	15-03-2021	15:00	25	0 gm	NOT FED
7	16-03-2021	07:30	24	9 gm	FEED DONE
8	16-03-2021	18:00	24.3	10gm	FEED DONE

Tab.1 Data Analysis of Hardware prototype

The actual information[21] is then transmitted and stored. A mobile device is used to inspect and set the fish feeding schedule. Every second, the system will display the sensor readings. Feeding takes place twice a day, at 7.30 a.m and 6.00 p.m.

S.NO	DATE	DISTANCE (cm)	TIME
1	13-03-2021	21.00	7:30:00
2	13-03-2021	20.89	7:30:01
3	13-03-2021	20.72	7:30:02
4	13-03-2021	20.50	7:30:03
5	13-03-2021	21.00	18:00:00
6	13-03-2021	20.82	18:00:01
7	13-03-2021	20.74	18:00:02
8	13-03-2021	20.58	18:00:03

Tab.2 Data Analysis of Circuit Simulation

A target serves as a feed ball for the ultrasonic sensor in this simulation. The feed box will be opened and fish will be fed when you reach a certain distance[24].When the feed ball is returned to its original position, the feed box closes and the feeding, which is controlled by an operator, comes to a halt.

8. Results

Simulation result:

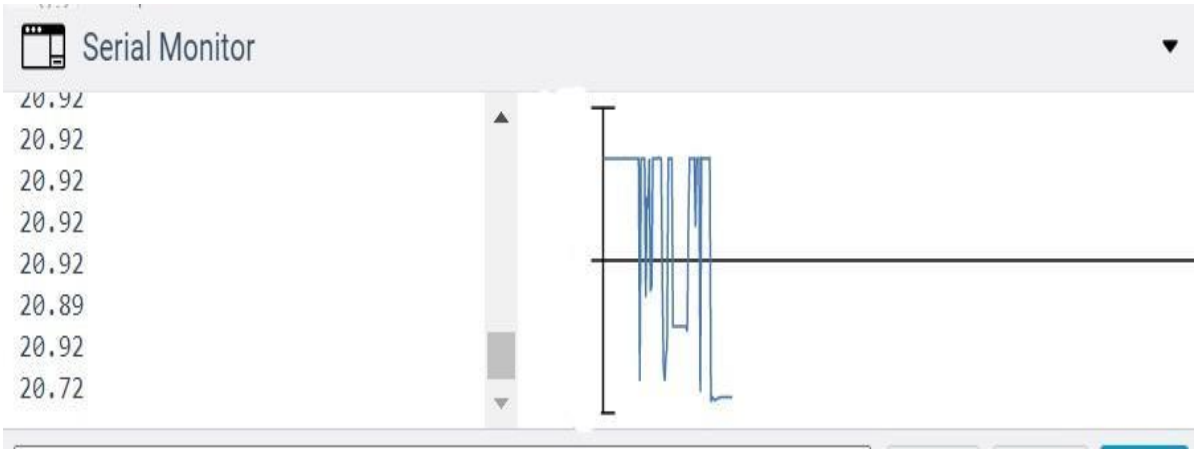

Fig:1.6 Variation in distance over time

The graph portrays the variance of distance with time so that we can get a good picture of how the feed approaches the target in regular intervals[23] of set time.

Hardware results:

The feed amount to be fed is calculated by the product of the size of fishes,rate of feed and the

number of fishes. The feed status (fed or not fed) are displayed andthese output are shown in the fig 1.4 and fig 1.5

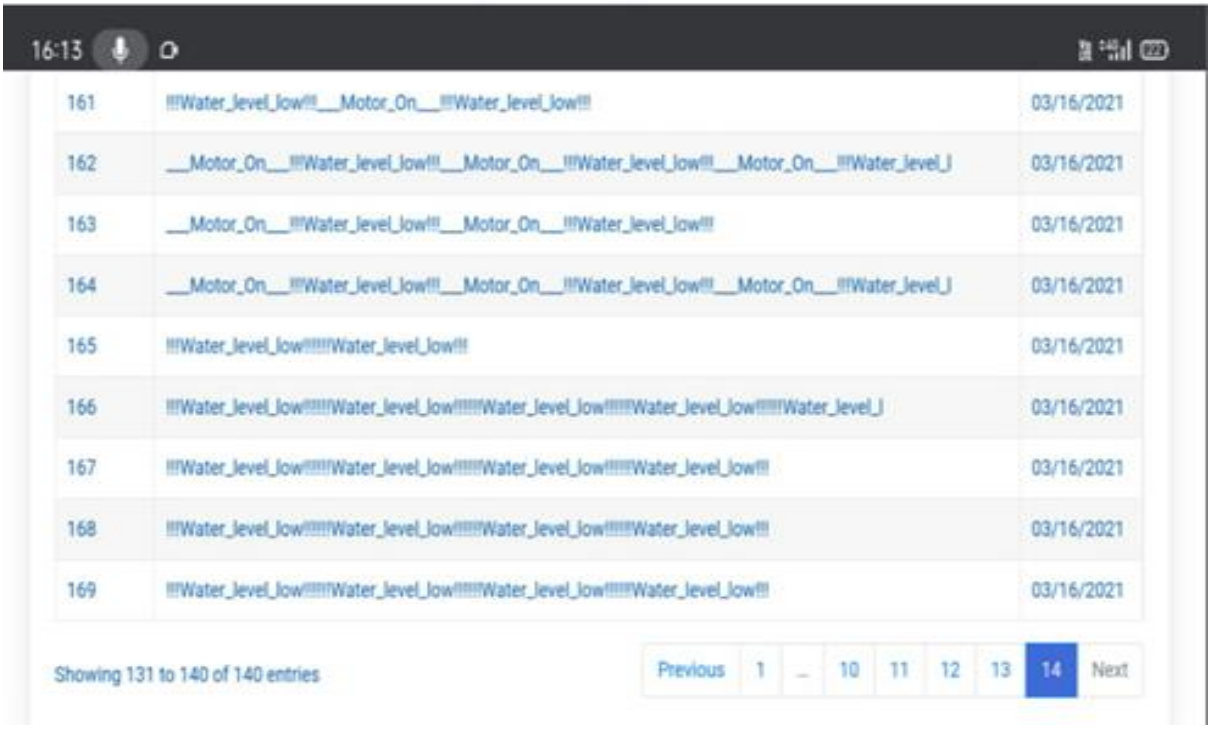

Fig1.7 Display of data to the user in thesmartphone

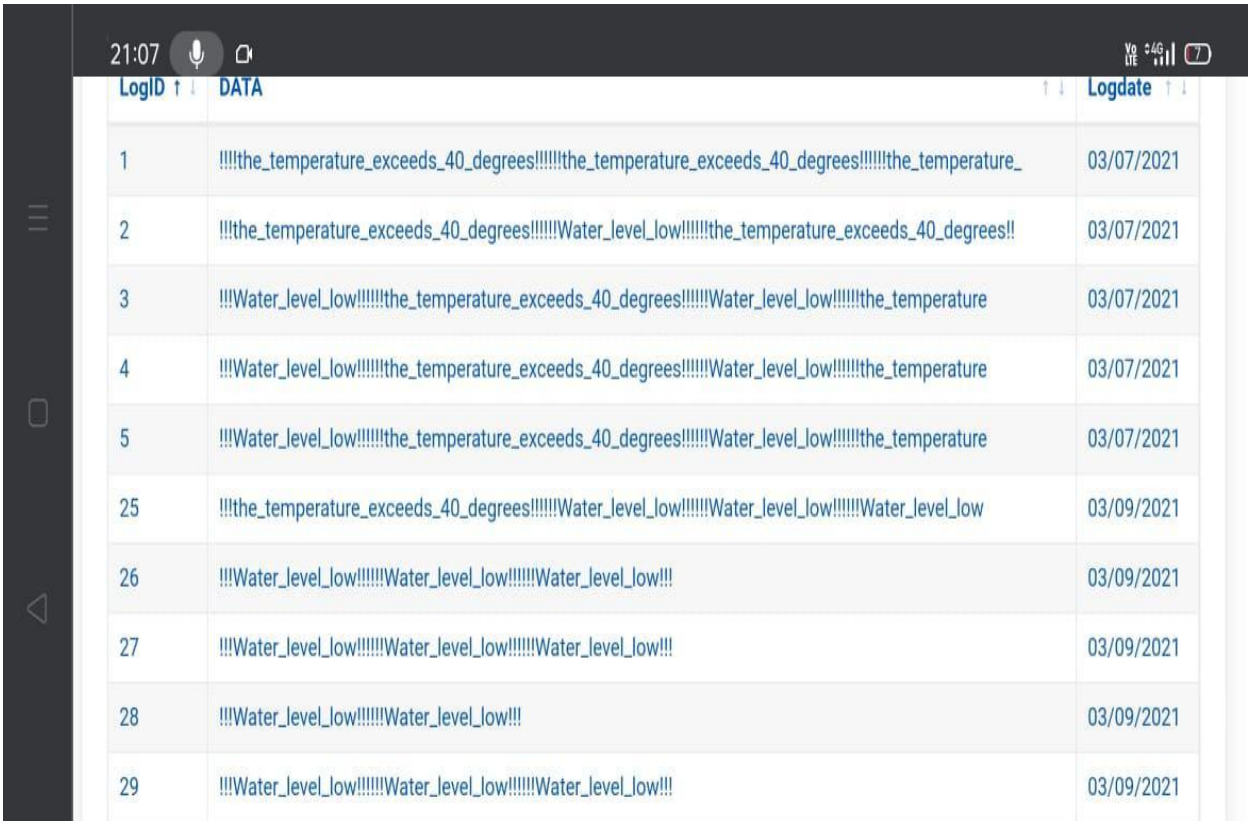

Fig 1.8 Temperature range of the water in the tank

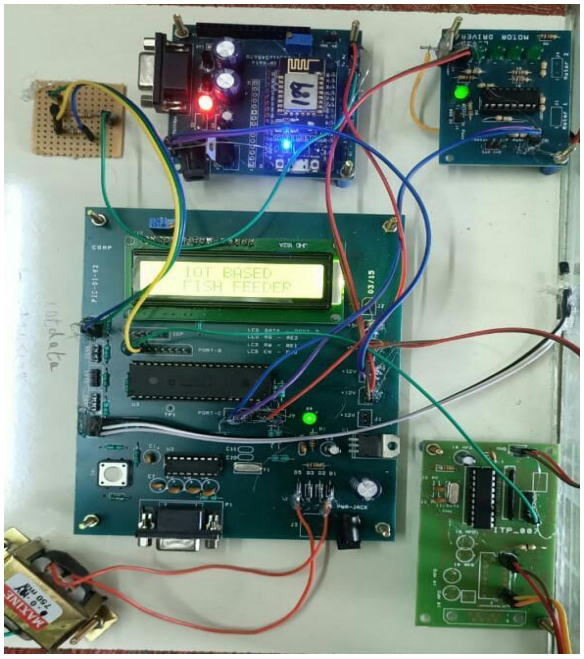

Fig:1.9 View of the machine when it first boots up

Systematising the entire twirling course,records the time it takes for food to arrive at its destination. The guest will be given a note.

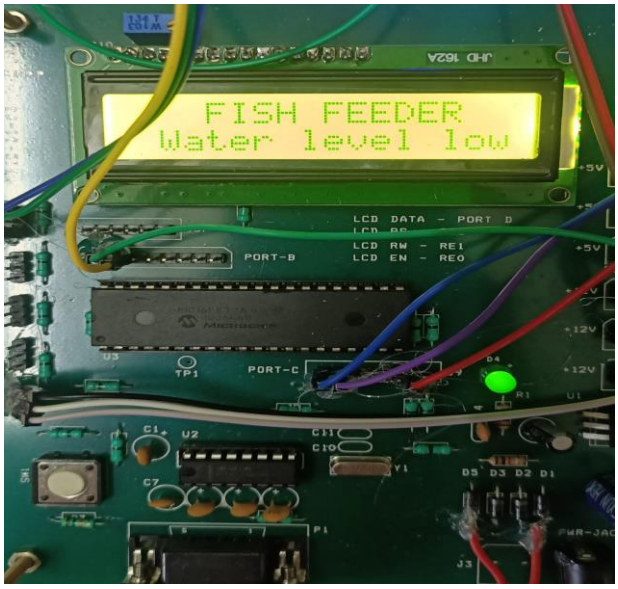

Fig:1.10 Indicating the unit's outcome.

9. Conclusion

This design was created to keep track of water levels and temperature fluctuations. These parameters are sensed by an ultrasonic sensor and an LM35 sensor, and the data from the IoT board is stored in the cloud[25] and can be recorded at any time. With login information, one can check the status of how things are progressing by receiving updates frequently.It also provides the ability to monitor the amount of feed to be fed using a servo motor via a pic microcontroller with a voltage supply at regular intervals. As a result, the whole application can be seen on a smartphone.

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