Smart Aqua Nurturing System for Fish

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Abstract—The people who rare owners of the pet fish are usually distressed when they are away from the fishery field environment because they will not be able to feed them on time and monitor the various conditions of the field. These reasons may lead to starvation and overfeeding risking the health of the fish and this also leads to poor water quality in the fishery field. Thus monitoring of the fishery field is of much importance and very much beneficial for the owners.
This paper presents a design which makes use of Raspberry Pi which performs several aspects of the field. The fish feeder as its main controler in the development completly automated feeder system in order to facilitate the owners in customizing the feeding process and monitoring various aspects of the field.

Keywords- Fish monitoring; Fish feeder; Android studio.

I. INTRODUCTION

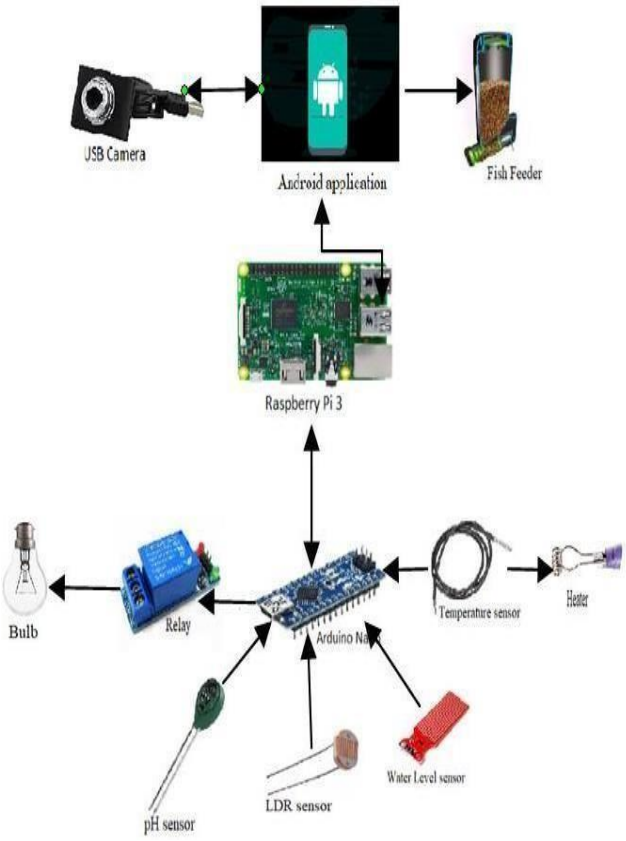

Fig.1 Overview of implementation

The completely automated feeder system is an electronics based device which is mainly built to feed the pet fish at predefined regular intervals . This system is often used to reduce the complexities and difficulties faced by the owner when they are away from the fishery field [1]. This design helps in overcoming few problems such as overfeeding, too little feeding which leads to starvation of the fish and pollution of the fishery field. The smart aqua nurturing system consists of various sub System is the main subsystem of the design. It consists of the feeder container for the storage of the fish feed. It has two outlet controlled by dc motor, one outlet is used for store the food pellets and the dc motor will be switched on foe desired seconds and the food get dispersed through second outlet [2]. The users are also provided with the facility of customizing the feeding time and the amount of feed that has to be fed accordingly.

The raspberry pi is nothing but a series of single board computers which was developed by the raspberry pi foundations. In this proposed design of the automatic fish feeder system, Raspberry Pi is used as the main microcontroller in the above proposed automatic design of the pet fish feeder. This Raspberry Pi is connected to the internet so that the users can check the condition of the fish and USB camera is placed above the aquarium to make sure user can visualize the fish status. [3]

Arduino is an open source project that is created for microcontroller based kits for building digital devices and interactive objects that can send and control physical devices. It is used to send instruction to driver and communicate with Wi- fi for data transmission.

The main aim and agenda of developing this pet fish feeder was to get rid of the problem of unhealthy environment of the fishery field that was leading to the death of the fish by treating various malfunctions of the feeder and chemical conditions of the field.

Hence, this system is completely automated and reduces the manual stress by providing several features to the users of this system to monitor the field at all times even when they are away from the field environment[4].

People with Ancient civilization background were very fond of keeping pet fish for the purpose of entertainment. This later became a hobby among people in recent times too. So facilitating this growing demand there were many developments and inventions that were carried out and one among those inventions was the pet feeder system and its monitoring.

II. REQUIREMENTS

Hardware and software requirements are listed below:

- Processor i3+: They do not require much power. These Processor are more affordable, and they have hyper threading for improved performance under load.
- RAM (4GB): RAM has an eruptive memory. It erases the memory once the power supply is stopped. It has high speed memory.
- Hard Disk (80GB): It is used to store any type of information (files, pictures, videos etc) which can be accessed later.
- Arduino UNO :Microcontrollers are integrated within the circuit board. These circuit boards are called Arduino UNO.this Arduino software works on Windows ,Mac and Linux.the microcontrollers used are ATmega AVR's by a company called Atmel.

Fig.2 Arduino UNO V3

- Raspberry Pi 3 B+: It has a Quad Core of 1.4GHz.it is credit card size computer. it has a build in RAM and CPU. to load a OS this pi, uses a micro SD memory card as hard drive.

Fig.3 Raspberry pi 3 B+

- pH Sensor: A device used to measure the ph(acidity or alkalinity) of a liquid. It has a measuring probes connected to an electronic meter that measures and displays pH reading.
- LDR Sensor: Light dependent resistor is a light sensor and a resistor. The resistance varies as the amount of light is incident. Light and resistance are inversely proportional.
- Water level Sensor: elevation of water surface above an established data.

Temperature sensor – DS18B20 is water temperature sensor, It can read from -15 to 125 C. it is produced by DALLAS s. it can directly convert recorded temperature signal to the digital signals serially. it communicates on a single bus.

Fig.4 Temperature sensor

- Heater: device used maintain the temperature of water in aquariums to the desired body temperature of the fish. Heater are selected according to volume of water in the tanks.
- Bulb and Relay: A relay is an electromagnetic switch. it is used in applications to turn on and off a circuit by a low power signal. thereby controlling bulb in in the circuit.
- USB Camera: The Raspberry Pi camera module can be used to take video, as well as photographs.
- Android Studio: Android Studio is a tool that makes developing an Android App much easier. It is an IDE that contains a text editor, debugging tools and tools for running your app.
- Java and HTML: java is a general-purpose programming language that is used in a distributive environment on the internet, java is popularly used in console ,GUI,web and mobile applications, game development and also to make embedded systems, java is also used to develop software for devices.java is platform independent.java files are coverted to bit code format using compiler. Hypertext Markup Language (HTML) is the standard markup language for creating web pages.

III. METHODOLOGY

The proposed methodology consists of five operations i.e.

1. Feeding the fish
2. Heater control
3. Light control
4. Water level and quality notification
5. Snap of the Aquarium

1. **Feeding the fish**: The Android application is used to control the amount of feed and is also possible to set the predetermined time through which we can feed

2. **Heater Control:** The temperature of the water is continuously sensed, if the temperature is lesser

than the threshold set then heater is switched on and vice versa.

3. **Light Control:** The LDR sensor senses the luminosity in the surrounding environment and if the light is sufficient for the fish to survive then bulb gets automatically switched off through relay, at the dark hour bulb is switched on through relay.

4. **Water Level and Quality Notification:** Water level sensor monitors the water level in the fishery field and notifies when the level is below threshold. pH sensor monitors the water quality within the fishery field, when water turns more acidic andnotification is sent to the user.

5. **Snap of the Aquarium**: As the user wishes to visualize the snap of their fishery field then user can request via android application and receive the same.

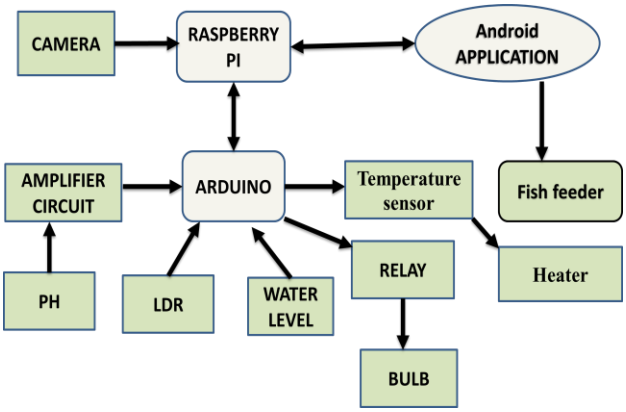

Fig.5 Block Diagram

As shown in the block diagram the first step in the process. begins with user sending the request via android application to the Fish Feeder system to feed the fishes. the sensors are used to maintain the environment of the fisheryfield

As fish requires a temperature of 25 to 27C, which is maintained by the Dallas temperature sensor and the heater [4].

The water pH level becomes acidic due to the biodegradable activity of the fish waste, so the pH sensor helps to maintain it by notifying the user. The LDR sensor senses the luminosity and controls the bulb through relay [4].

Water Level sensor senses the water level to the set threshold and notifies the user [4].

usb camera provides the snap of the aquarium as requested by the user through android application.

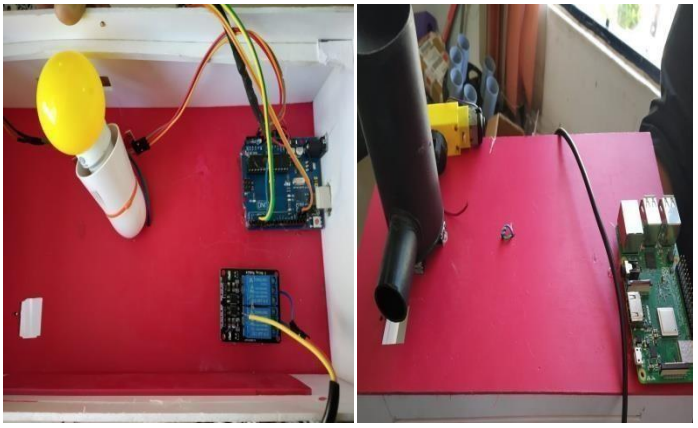

Fig.6 Assembling of components.

IV. ANDROID APPLICATION

Android application for our project was developed using Android studio. Java is the language used to develop an application. and the dashboard design is done using HTML language.

Fig.7 Dashboard of Application.

The abstract view of the android application is as depicted in the pictures.

As soon as the application is opened, the opening screen with the name of the app appears. After few seconds the opening template of the application appears, which is the main working template of the application developed to control and monitor various aspects of the fishery field.

This template mainly consists of a scrollbar,3 buttons and a switch.

The scrollbar is used to set the timing during which the motor that has been interfaced to the feeder has to be turned on for dispensing the feed through feeder system accordingly.

Each position in the scrollbar represents the time during which the motor is kept in on condition. Suppose if we need to feed about 5 to 10 pellets of food we keep the position of

the scrollbar at 1 such that the motor is on for 1sec in order to dispense the food pellets [5].

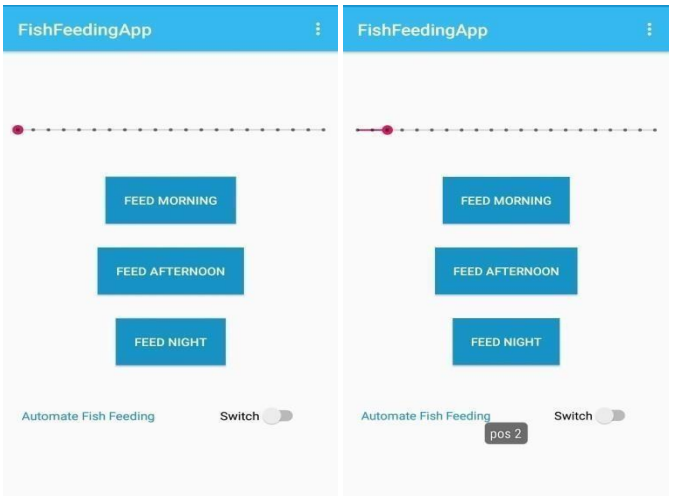

Fig.8 Template of the application

This process can be completely customized based on the user's requirement. The 3 buttons are provided in order to feed manually whenever it is necessary to do so i.e.it can at morning, noon or night according to user's choice and convenience. There is a need to specify the feed quantity that has to be fed and the time at which it has to be dispensed to the fishery field if not there will be a pop up alert message saying "Set food quantity and time". Once the quantity and time is specified the user can feed the fish manually using those 3 buttons. The process of feeding can be completely atomized by turning on the Automatic Fish Feeding switch after setting the quantity of feed that has to be fed.

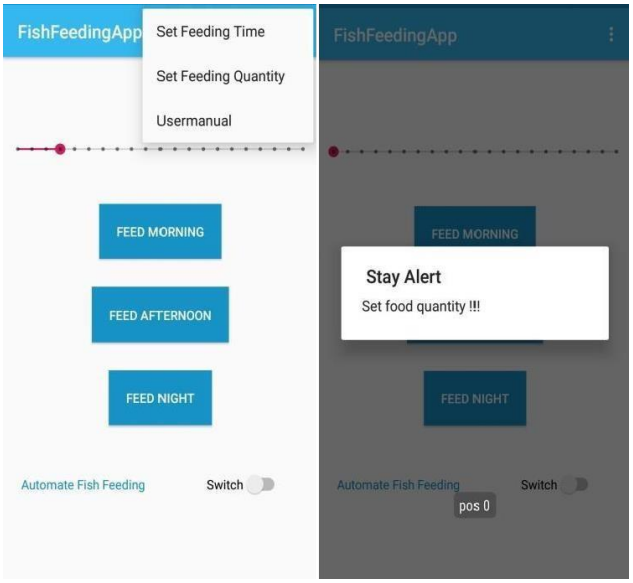

Fig.9 Template of the application

V. ANDROID STUDI

Android Studio is a tool that makes developing an Android App much easier. It is an IDE that contains a text editor, debugging tools and tools for running your app. It supports all the programming languages of Intellij e.g. Java, C++, Kotlin.It also supports all versions of java.

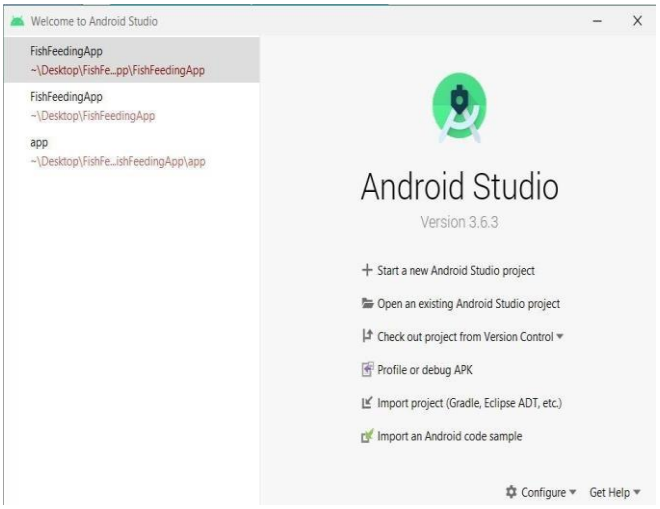

Fig.10 Android studio

It supports Template-based wizards to create common Android designs and components. It has a rich layout editor that allows users to drag and drop UI components. As shown we can start new project and program using java according to our requirements.

VI. CONCLUSIONS

The Project presented in this paper mainly aims at relaxing the distressed fish owners in feeding their fish on time and also facilitate them by providing the complete control of monitoring their fishery field in spite of their absence. This system is completely automated providing various features of control like feeding fish automatically as well as manually based on their requirements, temperature control of the system,Ph control of the system, controlling of light, water level monitoring of the field and most importantly complete visual view is provided to the users of the system to have detailed knowledge about the activities taking place in the fishery field there by promoting the users in all aspects of fishery field.

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