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A Robust Fish Feeding System

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Abstract: ***Fish in the hatcheries are sold by weight. For making the fish gain weight the fish need to swim (exercise) when the feed is provided which is thrown at specific place in the pond randomly. The problem is how to distribute the fish feed around the pond and develop such device that feed should be evenly distributed in pond which enable the fish to swim across the pond to gain maximum weight Our approach to the problem is to make a robotic boat comprising of SONAR & Ultrasonic sensors which detects the fish in the water on which it is floating .After detecting the fish, the robotic boat drops the feed while moving away from it. This makes the fish to move and follow the boat in order to eat the feed. With this the fish gains additional weight and become healthy.***

Key words --- SONAR, Ultrasonic Sensors, Robotic boat etc.

I. INTRODUCTION

Fish farming is perspective business, indeed, fish feeding is one of the crucial forms of intensification of the fish-farming process. Correct fish feeding in farming allows applying more dense plantings, and, thereby, increasing the fish productivity of ponds. Currently, fisheries around the world try to use various artificial food additives, which include all the substances necessary for the healthy growth and development of fish . Feeding the fish is based on natural food, which the fish can usually find in natural water reservoirs, but on farms, this food contains more vitamins and other nutrients . Additionally, aquaculture is the cultivation of fish and crayfishes in the closed-cycle systems. Like any business or occupation, aquaculture can face many risks and challenges.

Aquaculture makes it possible to grow living organisms in small volumes in conditions as close as possible to natural ones. The task of any aqua-farmer is to create such conditions in which the fish can behave comfortable and grow fast. Indeed, such growth is possible only in conditions, which are as close to natural

ones as possible, and include rational feeding of all species of fish, regardless of their size and activity. More often, the natural habitat of a particular type of fish is in a much worse form, including drying up and salinization of water bodies and pollution with industrial wastes. All this affects the natural habitat of fish. Finally, the task of the farmer is to create such conditions that the fish would feel comfortable for reproduction.

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An intelligent feeding system is a quite simple and low cost which will motivate the fish farmers to acquire it. Moreover, the system can reports will convey information about the number and size of fish and their behavior.

Indicators will contain information about such categories of fish as large,small, and medium ones.

On this analysis of the physical fish size & its behavior, a farmer can draw conclusions about the correlation between these two indicators. However, an intelligent feeding system can reduce the amount of used feed by 20%. However, a false positive rate, which detects hungry fish without reasons, can feed the fished when they are full. The percentage of damage from such false feeding is not fully researched. This system will provide the estimation of the preference fish feeding by using efficient ways can observe fish behavior and response with feeding which is significant for the farmers to improve fish production in a short period of time and at low cost.

II. PROPOSED METHODOLOGY:

Fish farming has gained traction in recent years due to depleting stocks in the ocean that have forced people to rear marine life in a domesticated environment. However, feeding has become a challenge since vast amounts of food are wasted that may lead to water toxicity. In any case, manual feeding is not efficiently leading to high operational costs. Development of an automatic feeding system is highly advised since it enables a farmer to automate the process thus enhancing efficiency. The Sustainable Aquaculture Feed System is a useful digital device that can identify fish species, sex, and count, which enables the farmer to develop a feeding program. Broadly, the automation of fish feeding systems is bound to improve efficiency in aquaculture farms.

III. BLOCK DIAGRAM

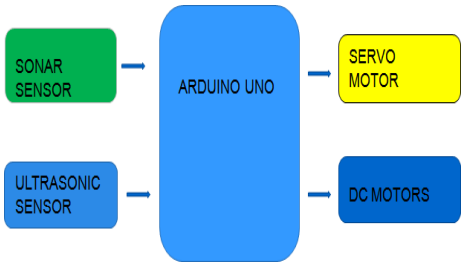

Fig: 3.1 Block diagram

Sensors of SONAR

In most of the industrial applications Ultrasonic detection is most frequently used to detect concealed tracks, abnormalities in composites, metals, ceramics, plastics and for detection of water level. For this intention the physics laws which are signifying the transmission of sound waves throughout the solid materials were used ever since ultrasonic detectors using sound waves instead of light as detecting means.

Distance Measurement through Sonar sensor

An ultrasonic detector employs various sensors that are used for applications pertaining to distance measuring. A short burst of ultrasonic sound from these gadgets repeatedly transmits towards a target, which reflects the waves of sound towards the sensor. The time needed for an echo is measured by a system which then measures the time to return towards the sensor and then computes the expanse in reaching the target using the pace of sound in a medium.

For industrially accessible ultrasonic, different sort of transducers are employed for cleaning devices. Ultrasonic transducers are fastened to a stainless steel pan where it is crammed with a solvent and applied with a square wave, vibration energy is conferred on the liquid.

Ultrasonic Sensors

Around the world, ultrasonic sensors are mostly used outdoors and indoors in the all exclusive and inclusive phenomenon, for a numerous range of applications. Piezoelectric crystals are used in the proposed ultrasonic sensors uses very high frequency sound waves for resonating at a desired frequency and then to convert electric energy into an acoustic energy and vice versa. Sound waves are reflected, transmitted from the target back towards the transducer. Mostly the targets can have any reflective form, though they are round in structure. Certain parameters/characteristics, such as changes in temperature & humidity, target surface angle, roughness of reflective surface can affect the operation of the sensors. An object passing through the range of preset will be detected and an output signal is generated. The point detected is independent material or reflectivity and target size.

Ranging Measurement:

From the sensor, precise distance of an object moving to and fro is computed via time intermission between reflected and transmitted bursts of ultrasonic sound. The change of distance is incessantly calculated and outputted. Distance change is continuously calculated and outputted.

Ultrasonic Sensors WorkUltrasonic sensors, sound vibrates at a frequency higher than the assortment of human hearing. Microphones are the transducers that are used to send and receive the ultrasonic sound. Like many other sensors, our ultrasonic sensors, to send a pulse and to receive an echo uses a single transducer. The sensor resolves/computes the distance to a target by measuring time lapses.

Servo motor

A servo motor can be considered as an electrical device which can rotate or push an object with colossal precision. If in any application, one want to rotate an object at some specific angles or distance, then use servo motor is essential. The motor is just is structured with a simple motor which runs through a servo mechanism. If the motor used is of DC powered then it is known as DC servo motor and if the motor used is of AC powered motor then it is considered as AC servo motor. We can get a very lofty torque servo motor in a light weight and small packages. Additional to these features they are being used in many of the applications like RC

GNU General Public License (GPL), (LGPL) or Lesser General Public License is permitting the manufacture of Arduino boards and software distribution by anyone. Commercial availability of Arduino boards are as do-it-yourself (DIY) kits or generally in preassembled form.

A variety of microprocessors and controllers are used in Arduino board designs. Digital and analog input/output (I/O) pins are incorporated on the boards, equipped with sets of that may be interfaced to various breadboards (*shields*) or expansion boards and other circuits. The boards features serial communication interfaces, including (USB) Universal Serial Bus on few models, which are mainly used for loading programs from personal computers. The microcontrollers are basically programmed using a parlance of features from the and C++, C languages programming.

Working Principle

Floating robot which is used to feed the fish is programmed to automatically move in the pond, detect edges and adjust its direction underneath the robot is used to detect the fish. After the fish is detected the robot starts releasing the feed. The amount of feed released is controlled by mini servo motor which opens and closes the feeding aperture. The robot movement is controlled tw elicopters, Robotics, toy car, planes, machine etc.

IR SENSOR

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. All the objects radiate thermal radiations in some form, usually in the infrared spectrum. These differently classified radiations can be detected by an infrared sensor though they are are invisible to our eyes. The emitter simply composes of an IR LED (Light Emitting Diode) and a detector is simply composes of an IR photodiode which is susceptible to IR light of the equivalent wavelength as that emitted by the IR LED. When the IR light falls on the photodiode, output voltages, the resistances and change in proportion to the enormity.

Algorithm of Robust Mechanism

a) The ultrasonic sensors placed at the boat edges detects the pond edges and adjust its direction. All this detecting and controlling units are connected to the Arduino Uno which acts as a central brain of the robot. The whole equipment is power supplied by a portable battery. Therefore by this the

robot makes the fish to follow her and feeds them by releasing the food through aperture. This makes the fish to gain weight.

b) Floating robot which is used to feed the fish is programmed to automatically move in the pond, detect edges and adjust its direction.

c) A special water proof sonar sensor placed underneath the robot is used to detect the fish. After the fish is detected the robot starts releasing the feed. The amount of feed released is controlled by mini servo motor which opens and closes the feeding aperture.

d)The robot movement is controlled by two dc fans placed

behind the boat.

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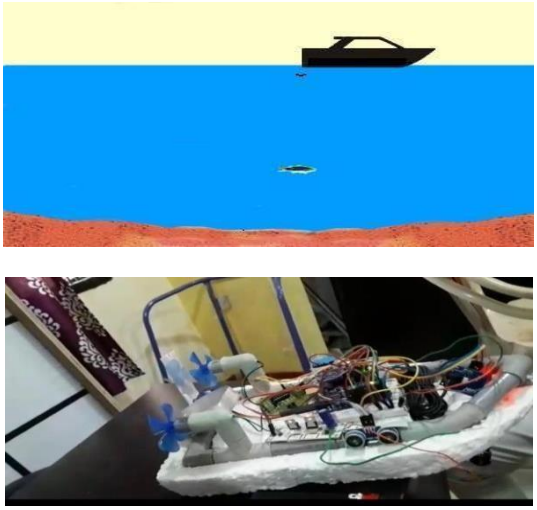

Fig 3.2. Side view of boat and fish

d) The whole equipment is power supplied by a portable battery.

e) Therefore by this the robot makes the fish to follow her and feeds them by releasing feed. This makes the fish to gain weight

IV. ADVANTAGES

a. Due to low cost and automatic feeding system using the robotic.
b. Boat makes the fish to move while feeding, this makes the fish gain more weight and become healthy.
c. 8051 microcontroller ARDUINO and optimized program makes the boat robust and self efficient.

V. RESULT

After successful testing of all the actuation's and movement of the boat. The model is made run in the pond consisting of fishes for different time periods. The time period is the time at which the fishes eat the food. This process is carried out for some months and weights of all the fishes are measured in regular intervals. A great positive variation is observed. This include muscle strength, mass of the body and also fishes been seen very active. Active fishes are very healthy and tasty. The overall investment on the boat has brought high positive results. The investment of the aqua farmer reduces along with the sustainable productivity.

VI. CONCLUSION:

In this robust fish feeding mechanism with the aid of UV and IR sensors, the feed is dropped on the line of the boat after detecting the fish. The feed is dropped at a calculated distance which is near to a fish. This ensures the fish to swim in the water near to the water bed where the pressure is high. The swimming of fish will ensure a healthy activity for a fish and it grows in weight. A healthy and weighable fish has a good market and hence the aqua farmer is benefited.

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