PRANVEER SINGH INSTITUTE OF TECHNOLOGY

Major Project Proposal

Team Id: 25_CS_IOT_4A_09

Team Details:

S No	Full Name	Roll No	Branch & Section	Mob No
1	Devashish Mishra	2101641550035	CS(IoT)-A	9695763459
2	Pragati Singh	2101641550055	CS(IoT)-A	9752220060
3	Aman Nigam	2101641550015	CS(IoT)-A	9559989994
4	Aishwariya Gupta	2101641550012	CS(IoT)-A	8604821705

Project Title:

Fish Monitoring System (Aquaculture)

Domain: (Select all relevant Options)

1. Software-Web Application	2. Software-Mobile Application
3. Artificial Intelligence/MachineLearning/Deep Learning ✓	4. Computer Vision/Image Processing ✓
5. Blockchain	6. Internet of Things ✓
7. Natural Language Processing	8. Big Data / Cloud Computing
9. Others (Specify if any):	

PRANVEER SINGH INSTITUTE OF TECHNOLOGY

Problem Statement:

Design and develop an advanced fish monitoring system leveraging IoT, AI/ML, and image recognition technologies to monitor fish patterns, movements, and feeding behaviors within an aquatic environment. The system should be capable of tracking individual fish, detecting their movements, recognizing feeding events, and controlling a food feeder accordingly. The objective is to create a comprehensive solution that provides real-time insights into fish behavior, automates feeding processes, and enhances overall management and care of the fish population in the tank or aquatic facility.

Proposed Solution:

- Our proposed solution integrates IoT sensors for monitoring fish movements and water quality parameters, enabling real-time data collection within the aquarium environment. These sensors, strategically placed within the tank, capture motion and track changes in water parameters such as pH, temperature, and oxygen levels. The collected data is processed using AI/ML algorithms, trained to recognize fish species, individual fish, and their behavioral patterns.

- Employing image recognition technology further enhances the system's capabilities by identifying feeding events based on visual cues. By analyzing video footage from cameras installed in the tank, the system detects when fish are feeding, triggering the activation of an automated food feeder.

- Additionally, the solution includes features for monitoring the health and well-being of the fish population, utilizing AI-driven analytics to detect anomalies in behavior or water quality. Alerts are generated in case of deviations from predefined thresholds, enabling timely intervention by aquarium caretakers.

- Furthermore, the system incorporates feedback loops to continuously improve its accuracy and performance over time. Through iterative training of the AI models and fine-tuning of sensor parameters, the solution adapts to the specific needs and dynamics of the aquarium environment.

- In summary, our integrated solution combines IoT sensors, AI/ML algorithms, and image recognition technology to provide comprehensive monitoring of fish patterns, movements, and feeding behaviors, while also ensuring optimal water quality and overall aquarium management.

Unique/Distinctive feature of the solution:

1.Explain the uniqueness and distinctive features of the (product / process / service) solution)

Our fish monitoring system integrates advanced AI/ML algorithms for precise fish recognition, enabling detailed tracking of movements and behaviors. Real-time IoT sensors provide continuous monitoring of environmental parameters like water quality, triggering alerts for deviations. Image recognition technology automates feeding, detecting fish approaching the feeding area and triggering feeders.

Customizable insights empower users to set thresholds for alerts regarding abnormal behaviors, water quality fluctuations, or feeding events. Scalable and adaptable, the system suits aquariums of varying sizes and types, from home setups to large aquatic facilities. Overall, it offers a comprehensive solution for aquarium management, promoting fish health and well-being in diverse aquatic environments.

2.How your proposed / developed (product / process / service) solution is different from similar kind of product by the competitors if any:

Our fish monitoring solution distinguishes itself through advanced AI/ML algorithms for precise fish recognition and behavior analysis, providing detailed insights into fish movements. Real-time IoT sensors offer continuous monitoring, coupled with customizable alerts for proactive intervention in maintaining optimal environmental conditions.

The integration of image recognition technology enables automated feeding, ensuring precise and controlled feeding while minimizing wastage. Additionally, our solution's scalability and adaptability cater to aquariums of varying sizes and types, offering flexibility for diverse applications.

Unlike competitors, our comprehensive solution addresses multiple aspects of aquarium management, providing a holistic approach to promoting fish health and well-being in aquatic environments.

Tools/Technology Uses:

Hardware Requirements:

1.ESP32-CAM

2.Turbidity Sensor

3.pH Sensor

4.Temperature Sensor

5.Motion Sensor

6.Microcontroller

7.Actuators

8.LED Lighting System

9.Power Supply

10.Connectivity Module

Software Requirements:

1. IDE : VS CODE

2. Programming language:Python AI/ML Libraries(Flask,OpenCV,TensorFlow,etc)

3. Database service:MySQL or MongoDB

4.Cloud Platform : Google Cloud or Microsoft Azure (if required)

PRANVEER SINGH INSTITUTE OF TECHNOLOGY

(To be Filled by Faculty/Evaluator)

Proposal Evaluation:

1. Right Identification of the Problem (Appropriate selection of the problem)?
   a) Excellent b) Good c) Needs Improvement d) Unacceptable

2. Relevance of the Solution (Adequately addressing the problem/need)?
   a) Excellent b) Good c) Needs Improvement d) Unacceptable

3. Innovativeness in the Solution (Distinctive innovative components/features of the solution)?
   a) Excellent b) Good c) Needs Improvement d) Unacceptable

4. Uniqueness of the Solution (Intellectual Property Component)?
   a) Excellent b) Good c) Needs Improvement d) Unacceptable

Improvements/ Suggestions by the Evaluator:

1.
2.
3.
4.

Name of Faculty:

Designation:

Signature with Date:

Guidelines:

- One Proposal per team will be submitted by the team leader only.
- A Team can have a maximum of 5 Members.
- Upload the document in .doc or .pdf format with font size 12, single spacing, Times New Roman font only.