

Future Scope

The proposed IoT-based smart fish farming system presents a strong foundation for innovation and scalability in sustainable aquaculture. Looking ahead, several promising directions can further enhance its impact and adoption:

- 1. Advanced Sensor Integration**

Future implementations can expand sensor capabilities to monitor additional parameters such as nitrate levels, fish movement behavior, and real-time feeding activity, allowing for more comprehensive ecosystem analysis.

- 2. Collaboration with Research Institutions**

Partnerships with academic and research organizations can facilitate continuous innovation, prototyping, and real-world validation of aquaculture technologies.

- 3. Blockchain for Supply Chain Traceability**

Incorporating blockchain technology can improve transparency and traceability across the seafood supply chain, ensuring ethical sourcing, quality assurance, and regulatory compliance.

- 4. Establishing Industry Standards**

Developing standardized protocols and data formats in collaboration with governmental agencies will help promote consistency, interoperability, and widespread adoption of smart aquaculture systems.

- 5. Data Sharing and Aquaculture Networks**

Building a connected community of fish farmers through secure data-sharing platforms can promote collective learning, benchmarking, and resource optimization across the industry.

- 6. Environmental Impact Assessment**

Ongoing research is needed to evaluate the ecological impact of deploying IoT systems in aquatic environments, including sensor durability, energy consumption, and data transmission efficiency.

- 7. Policy Advocacy and Support**

Engaging with policymakers to formulate supportive regulations, subsidies, and educational programs can accelerate the integration of IoT in traditional fish farming practices, especially in rural and developing regions.