LiveFish AI – Full Project Plan

Overview

LiveFish AI is an offline, real-time mobile AI system designed to help fishermen and conservationists identify fish species and measure their size directly through a smartphone camera. It uses an optimized YOLOv8 Nano model running on Arm-based devices to detect fish in live video streams, estimate size, and store ecological data locally. By empowering local communities, LiveFish AI promotes sustainable fishing practices and generates valuable biodiversity data for global conservation efforts.

Problem Statement

Overfishing and illegal catches are rapidly depleting aquatic ecosystems, particularly in regions like Lake Tanganyika and other major African water bodies. Fishermen lack modern, affordable tools to identify species and ensure they are not catching juveniles. LiveFish AI addresses this gap by providing an accessible, offline AI assistant that works even in remote areas without internet access.

Goal

To create a mobile app that can detect fish in real-time video feeds, measure size using AR techniques, and store or sync ecological data — all without requiring internet connectivity. This helps both local communities and global researchers monitor and protect aquatic biodiversity.

System Overview

Hardware: Android phone with Arm CPU/NPU (Snapdragon, Helio, Unisoc, etc.)
Software Stack: **AI Engine:** YOLOv8 Nano (6 MB INT8 TFLite) **Mobile Framework:** Flutter **AR Measurement:** ARCore or Sceneform **Offline Storage:** Hive / SQLite **Sync:** Firebase or REST API

AI Model Details

YOLOv8 Nano is used for object detection of fish within camera frames.
Input: 320x320x3 RGB image
Output: Bounding boxes [x, y, w, h, confidence, class]
Classes: Single class "fish"
Framework: Ultralytics YOLOv8 + TensorFlow Lite INT8

Parameter	Description
Base Model	YOLOv8n (3M parameters)
Quantization	INT8 Post-Training Quantization
Input Resolution	320x320
Pruning	30% channel pruning
Final Size	6 MB

Inference Time	15 ms on Arm NPU

Datasets and Training

Pretrained on COCO dataset, fine-tuned with Fish4Knowledge, QUT Fish, and local data from Lake Tanganyika. Augmentations include underwater color shifts, motion blur, and occlusions. Trained for 100 epochs at 320x320 resolution to achieve mAP ≥ 85%.

Metric	Target
mAP@0.5	≥ 85%
False Positives	≤ 5%
Speed	15ms @ Snapdragon 8 Gen 2

Mobile App Features

1. Live Detection – Real-time fish detection with bounding boxes.
2. Catch Log – Records size, time, GPS, and confidence.
3. Statistics – Shows total and juvenile ratios.
4. Sync – Uploads cached data when connected.
5. Settings – Manage model packs and offline tools.

Size Measurement Algorithm

Two approaches:
A. **Reference-Based:** Using a card of known length in frame.
B. **ARCore Depth-Based:** Estimate size using phone’s depth API.
Fish length (cm) = (fish_bbox_px / ref_px) * ref_length_cm

Offline Data Logging

All data (species, size, GPS, timestamp) is stored locally in Hive or SQLite. When internet becomes available, data syncs automatically to a global map dashboard.

Phase	Duration	Milestone
Dataset + Training	Week 1–2	Collect and fine-tune YOLOv8n
Optimization	Week 3	Prune and quantize model
Integration	Week 4	Flutter app + real-time inference
AR Measurement	Week 5	Overlay and calibration
Testing & Demo	Week 6	Benchmark + submit

Tech Stack Summary

AI Model: YOLOv8n + TFLite INT8
Languages: Python, Dart
Frameworks: Ultralytics YOLOv8, TensorFlow Lite, Flutter
AR: ARCore / Sceneform
Storage: Hive / SQLite
Cloud: Firebase (optional dashboard)

Example Use Case

A fisherman opens LiveFish AI and points his camera at a fish. The app instantly detects it, showing size, species (fish), and a warning if it’s juvenile. He taps 'Log Catch' to save it offline. Once back online, data syncs to the shared biodiversity dashboard.

Impact

Environmental: Protects young fish populations.
Economic: Sustains long-term fishing viability.
Scientific: Builds open fish population dataset.
Educational: Teaches responsible fishing practices.

Why LiveFish AI Can Win

✔ 100% Arm-based mobile AI solution
✔ Advanced on-device optimization
✔ Offline, real-world impact
✔ Stunning visual demo (AR overlay)
✔ Global problem, local authenticity
✔ Perfect for hackathon submission

Future Enhancements

- Multi-species classification
- Sonar/underwater camera integration
- Real-time conservation dashboard
- Gamified user leaderboard
- Voice feedback in local languages

Conclusion

LiveFish AI proves that powerful AI doesn’t need cloud servers — it can run right in your pocket. By turning smartphones into smart conservation tools, this project merges AI innovation with global ecological impact. Built from Africa, for the world — LiveFish AI is the future of sustainable fishing through on-device intelligence.