Student Project Proposal: GuardUs Cloud Data Pipeline & Dashboard

GuardUs Innovations Company Synopsis:

GuardUs Innovations is an early startup that aims to reduce livestock / predator interactions. We aim to achieve this through an autonomous, next-generation smart device, that will guard and protect herds 24/7. To learn more about us: GuardUsInnovations.com

Project Overview

Objective:
To design and implement a modular, cloud-based data ingestion and visualization system that supports the GuardUs smart collar platform, enabling real-time and historical insights into livestock activity and device behavior.

Deliverables

1. Cloud Data Pipeline (AWS)

- - Set up a secure AWS pipeline using IoT Core, Lambda, DynamoDB or TimeStream, and S3 to receive, process, and store telemetry from livestock collars.
  - Ensure device data (e.g., GPS, threat alerts, health metrics) is ingested in near real-time.

2. Admin Web App (React or similar)

- - Display livestock status, alerts, GPS locations, and system diagnostics.
  - Allow basic configuration: alert thresholds, tag assignment, and active/inactive device toggling.

3. Security & Logging

- - Use AWS Cognito (or similar) for user authentication.
  - Log API actions for audit and debugging.

Encapsulation Strategy

- - Mock Devices: Students will work with simulated data streams (e.g., JSON over MQTT) rather than actual devices.
  - Clear API Contracts: GuardUs will provide a schema for expected telemetry and configuration interfaces.

- No IP Access: Core ML threat detection, firmware, and hardware design will be off-limits.

Time Estimate

Task	Time Estimate (Hours)
AWS IoT data ingestion	60–80
Lambda processing + storage	40–60
Front-end app (basic)	100–120
Authentication & permissions	30–40
Documentation & handoff	20–30
Total	~300–330

Learning Objectives (for students)

- - Build a production-like cloud data pipeline with AWS tools.
  - Work with real-time IoT-style telemetry and messaging (MQTT, REST).
  - Develop a front-end with state management, user auth, and real data visualization.
  - Collaborate using GitHub and follow version-controlled agile workflows.

Summary for Faculty

This project is a well-defined, modular subsystem that supports a larger conservation technology initiative. The scope is realistic, technically enriching, and protected from proprietary exposure. Students will work on a real-world use case while contributing meaningful infrastructure to the GuardUs ecosystem.