**Project 1: Real-Time Telecom Fraud Detection — SmartShield™ Style**

**Goal:** Detect anomalous calls and potential telecom fraud in real time.  
**Timeline:** 4–6 weeks

**Week 1: Research & Data Prep**

* Read 2–3 articles/blogs/papers on telecom fraud detection and anomaly detection.
* Collect or simulate call metadata (caller ID, duration, location, call frequency).
* Clean dataset (remove nulls, normalize values, timestamp events).
* Write Python script to simulate live call events.

**Week 2: Streaming Pipeline Setup**

* Install Apache Kafka locally or via Docker.
* Write a Python producer script to stream call events into a Kafka topic.
* Verify message flow by consuming them with a simple Kafka consumer.
* Document architecture diagram (Producer → Kafka → Consumer).

**Week 3–4: Fraud Detection Logic**

* Implement rule-based fraud checks (e.g., multiple calls from spoofed IDs, unusual call duration patterns).
* Train a simple ML anomaly detector (Isolation Forest or One-Class SVM) on call metadata.
* Integrate model into consumer pipeline (consume → detect → output decision).
* Store flagged events in PostgreSQL or MongoDB.

**Week 5–6: Evaluation & Documentation**

* Write evaluation scripts: precision, recall, false positives.
* Run test streams and record fraud detection performance.
* Save results (charts, logs) into GitHub repo.
* Document full workflow with diagrams + screenshots in README.