Healthcare CRM Project: Predicting Medical Equipment Failure

Problem Statement

Predicting medical device failure is crucial for ensuring patient safety, minimizing downtime, and reducing maintenance costs. This use case involves leveraging data analytics and machine learning to predict potential failures of medical devices before they occur.

Project Overview

This project proposes a **Healthcare CRM integrated with predictive analytics** to monitor medical equipment performance, forecast potential failures, and trigger preventive maintenance.

- **System Role**: The CRM acts as a central platform for collecting equipment data (usage hours, performance metrics, error logs, maintenance history) and applying predictive models.

- **Users**: Hospital administrators, biomedical engineers, maintenance teams, and device manufacturers.

- **Value**:

    o Enhances patient safety by avoiding sudden device breakdowns.

    o Reduces downtime of critical machines like ventilators, MRI scanners, and dialysis machines.

    o Saves costs by shifting from reactive to preventive maintenance.

    o Provides decision-makers with actionable insights via dashboards and reports.

Objectives

- ◆ **Improve efficiency** by automating device monitoring and maintenance scheduling.

- ◆ **Ensure data accuracy** with centralized storage of equipment history and real-time sensor data.

- ◆ **Predict failures** using machine learning models integrated into the CRM.

- ◆ **Enhance patient safety** by ensuring reliable medical device availability.

- ◆ **Provide better reporting** with dashboards showing device health, failure trends, and cost savings.

- ◆ **Reduce operational costs** by preventing unplanned equipment downtime and emergency repairs.

Use Cases

1. **Predictive Maintenance Alerts**

- o The CRM uses historical data and ML models to predict when a ventilator is likely to fail.

- o The system auto-generates a **maintenance task** before failure occurs.

2. **Automated Work Orders**

- o If an MRI machine shows high error logs, the system creates a work order and assigns it to the biomedical engineer.

3. **Real-Time Equipment Health Dashboard**

- o Hospital administrators can view live dashboards with device health scores, predicted risks, and upcoming maintenance schedules.

4. **Device History Management**

- o Engineers and staff can view complete equipment records: purchase date, repair history, usage patterns, and downtime.

5. **Vendor Collaboration**

- o If a failure risk is detected, the CRM can notify the equipment manufacturer/vendor for support.

Example Scenario

- A dialysis machine logs abnormal vibration levels.

- CRM detects the anomaly and ML model predicts **failure within 2 weeks**.

- The system auto-generates a **maintenance work order** and notifies the biomedical engineer.

- The engineer schedules preventive repair, avoiding downtime during patient treatments.