FlowTrack: Employee Traffic Monitoring System

CSE 5911 Capstone Project

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1. Project Background

- Lack of continuous and objective visibility into workforce and workflow on the factory floor
- Current data collection relies on sampling and manual observation → fragmented, unreliable, not scala
- Complex layouts hide bottlenecks, idle zones, and congestion areas
- Managers need a standardized and trusted data source, not scattered reports or subjective judgment
- Absence of intuitive visualization tools (heatmaps, flow charts, timelines) for process optimization
- With digital transformation, companies need a neutral and privacy-safe data view to support productiv safety, and facility decisions

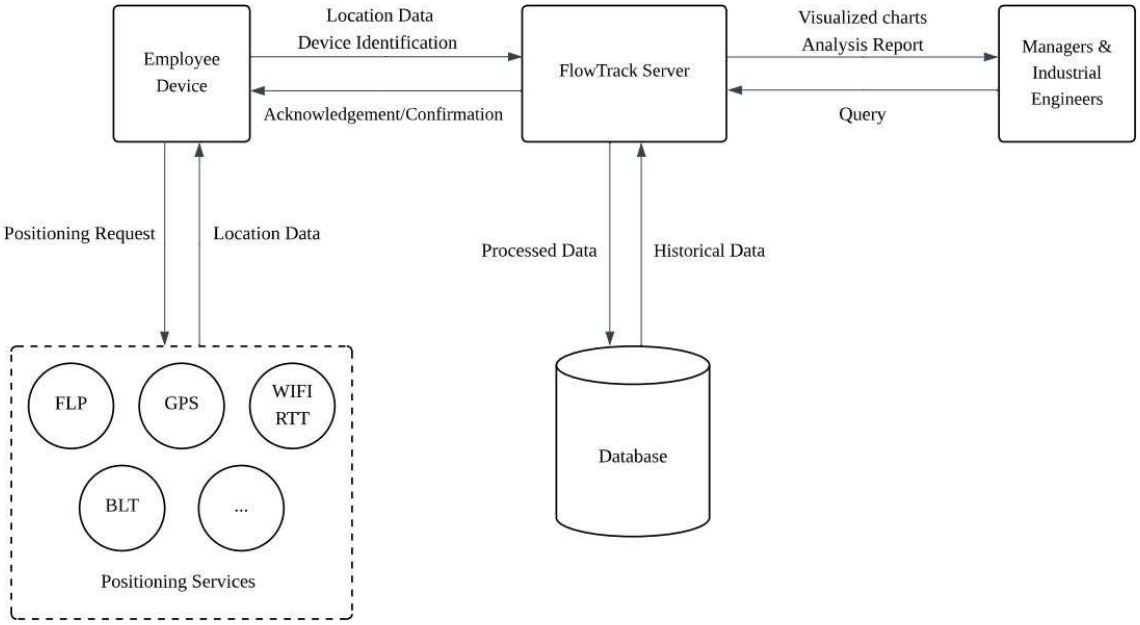
2. Project Objectives

- Data Collection: Real-time, accurate, and reliable location data from employee smartphones.
- Visualization & Reporting: Generate heatmaps, flow charts, and reports to reveal workflow patterns ar bottlenecks.
- Security & Privacy: Ensure privacy protection and compliance; no link to salary or performance evaluat
- Performance & Reliability: Scalable, fault-tolerant system with high availability and backup mechanism
- Usability: Provide a clear, user-friendly interface for managers and engineers.

3. Not included

- **HR / Payroll Integration**
  No connection to salary, promotions, or performance reviews
- **Employee Surveillance**
  No monitoring of individual behavior; data is anonymized and aggregated
- **Advanced AI / Machine Learning**
  No predictive analytics or complex behavior modeling in this phase
- **Centimeter-Level Precision**
  Focus is on room/area-level accuracy, not expensive RTLS solutions
- **Custom Wearable Hardware**
  No proprietary sensors; system relies only on smartphones and low-cost BLE beacons

4. Context Diagram



Actor	Workflow	Data In
Employee Device	During the work period, continuously upload the employees' location information and bind the device identifiers.	Location data (GPS/WiFi RTT/FLP/BLT…) and bonded device id
Positioning Services	Providing positioning signals through external services and hardware	Positioning request
Managers & Industrial Engineers	Submit the query to view the visualized results (heat maps, from-to diagrams, etc.) location information and efficiency analysis.	Command query
Database	Storage and provision of historical data	Processed and cleaned data

5. Conclusion

- Business ValueProvide data-driven insights to improve workflow efficiency, facility layout, and safety
- Technical Value: Integrate multiple positioning technologies (BLE, Wi-Fi RTT, FLP, IMU)Deliver intuitive visualizations (heatmaps, flow charts, spaghetti diagrams)
- Team Goal: 1) Build and deliver a working prototype by the end of the semester

  2)Demonstrate core functions for both business stakeholders and technical peers

Question ?

End