Agentic AI Hackathon: Building Intelligent Agents with IBM Granite and Lang Flow

Problem Statement 1: AI-Based Traffic Congestion Monitoring and Alert System

The Challenge

Urban traffic congestion is influenced by dynamic factors such as vehicle density, peak-hour demand, road incidents, and weather conditions. Traffic management systems collect large volumes of real-time and historical traffic data, but continuous manual analysis is infeasible. This results in delayed identification of congestion buildup and reactive traffic management. There is a need for an intelligent assistive system that can continuously analyze traffic data and identify congestion risks at an early stage.

Traffic Data Analysis Agent

An agent that ingests real-time and historical traffic data including vehicle speed, traffic volume, road occupancy, and incident reports, and organizes them into interpretable traffic trends.

Congestion Trend Detection Agent

An agent that analyzes short-term and long-term traffic patterns to detect abnormal slowdowns, bottlenecks, and congestion formation using historical baselines and threshold-based rules.

Alert & Traffic Advisory Assistant

An agent that generates early congestion alerts and provides route-level traffic advisories (assistive only, non-enforcement).

Outcome

Enable early detection of congestion patterns, improve situational awareness, and supports proactive traffic management.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
 (Using RAG on traffic management guidelines, congestion thresholds, and trusted transportation references.)

Problem Statement 2: Intelligent Agentic System for Traffic Flow Pattern Analysis

The Challenge

Understanding traffic flow behavior across different times of day and locations is essential for congestion mitigation. However, analyzing multi-source traffic data at scale is complex and time-consuming. Without intelligent pattern analysis, traffic planners struggle to identify recurring congestion trends and their underlying causes.

Traffic Data Analysis Agent

An agent that aggregates traffic sensor data, GPS-based speed data, and historical traffic records into structured time-series patterns.

Pattern & Anomaly Detection Agent

An agent that identifies recurring congestion patterns and detects anomalies by comparing real-time traffic conditions with historical norms.

Insight & Recommendation Assistant

An agent that provides data-driven insights and congestion mitigation suggestions based on detected traffic patterns (assistive only).

Outcome

Improves understanding of traffic behavior and supports informed planning and congestion reduction strategies.

Mandatory Tech Stack

LangFlow using IBM Granite Model
 (RAG on urban mobility research, traffic engineering principles, and policy documents.)

Problem Statement 3: AI-Driven Early Warning System for Traffic Congestion Hotspots

The Challenge

Traffic congestion hotspots often develop gradually due to increasing demand, roadworks, or external disruptions. Existing traffic systems lack early warning mechanisms that identify congestion trends before they escalate. An intelligent system is required to continuously monitor traffic data and flag potential congestion of hotspots in advance.

Traffic Data Analysis Agent

An agent that processes vehicle speed, traffic density, travel time, and external factors such as weather or incidents.

Congestion Risk Detection Agent

An agent that detects early signs of congestion by analyzing deviations from historical and seasonal traffic trends.

Alert & Planning Assistant

An agent that issues early warnings and provides planning-level advisories for traffic authorities (assistive only).

Outcome

Reduces congestion severity by enabling proactive traffic planning and early intervention.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
 (Using RAG on congestion management strategies and transportation planning guidelines.)

Problem Statement 4: Agentic AI System for Explainable Traffic Congestion Analysis

The Challenge

Traffic operators often receive congestion alerts without sufficient explanation of underlying causes. This limits trust and effective decision-making. There is a need for an explainable AI system that not only detects congestion but also explains contributing factors using interpretable insights derived from traffic data.

Traffic Data Analysis Agent

An agent that synthesizes traffic data from multiple sources into comprehensive traffic summaries.

Congestion Cause Analysis Agent

An agent that correlates congestion patterns with factors such as time-of-day, road incidents, weather conditions, and traffic volume changes.

Explainable Insight Assistant

An agent that generates human-readable explanations for congestion causes and trends (assistive only).

Outcome

Enhances transparency, trust, and usability of AI-driven traffic congestion analysis.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
 (RAG on traffic engineering literature and urban mobility frameworks.)

Problem Statement 5: AI-Assisted Sustainable Traffic Congestion Analysis System

The Challenge

Traffic congestion significantly contributes to fuel wastage and environmental pollution. Traffic systems often lack intelligence to analyze congestion from a sustainability perspective. There is a need for an AI-based system that can analyze congestion patterns alongside estimated environmental impact to support sustainable urban mobility planning.

Traffic & Environmental Data Analysis Agent

An agent that combines traffic flow data with emission estimation models to analyze congestion impacts.

Impact Trend Detection Agent

An agent that identifies congestion patterns with high environmental impact using historical and contextual data.

Sustainability Advisory Assistant

An agent that provides sustainability-focused traffic management insights (assistive only).

Outcome

Supports environmentally informed traffic planning and congestion mitigation.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
 (Using RAG on sustainable transportation guidelines and environmental policy documents.)

Problem Statement 6: AI-Based Chronic Disease Monitoring Assistant

The Challenge

Patients with chronic conditions such as diabetes, hypertension, and asthma generate daily health data through self-monitoring devices and logs. Healthcare professionals cannot continuously analyze this growing volume of patient-generated data due to time and resource constraints. As a result, early warning signs of health deterioration may be missed, leading to delayed interventions and increased risk of complications. There is a need for an intelligent assistive system that can continuously analyze health logs and support proactive chronic disease management.

Health Data Analysis Agent

An agent that ingests daily patient health data such as blood glucose levels, blood pressure readings, peak flow values, and medication adherence logs, and organizes them into meaningful health trends.

Risk Trend Detection Agent

An agent that analyzes short-term and long-term health trends to identify abnormal patterns or potential deterioration using clinical thresholds and historical data.

Alert & Lifestyle Recommendation Assistant

An agent that generates early warning alerts and provides lifestyle and care recommendations aligned with clinical best practices
 (assistive only, non-diagnostic).

Outcome

Provides early risk awareness and personalized lifestyle guidance, enabling timely intervention and improved chronic disease management.

Mandatory Tech Stack

LangFlow using IBM Granite Model
 (Using RAG on chronic disease management guidelines, clinical thresholds, and trusted healthcare references.)

Problem Statement 7: Intelligent Patient Vital Monitoring and Alert System

The Challenge

Continuous monitoring of patient vital signs such as heart rate, blood pressure, oxygen saturation, and temperature is critical in preventive healthcare. However, healthcare staff cannot manually monitor real-time vital data for multiple patients simultaneously. This increases the risk of delayed response to early signs of health deterioration. An intelligent assistive system is required to continuously analyze vital signs and flag potential risks in advance.

Vital Data Analysis Agent

An agent that processes continuous or periodic vital sign data and summarizes patient health status trends.

Anomaly Detection Agent

An agent that identifies deviations from normal vital ranges using historical baselines and guideline-based thresholds.

Alert & Care Guidance Assistant

An agent that generates alerts and provides general care guidance based on detected anomalies
 (assistive only, non-diagnostic).

Outcome

Improves early risk detection and supports timely clinical attention and patient safety.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
 (Using RAG on standard vital ranges and preventive care guidelines.)

Problem Statement 8: AI-Assisted Medication Adherence Monitoring System

The Challenge

Medication of non-adherence is a major challenge in chronic disease management, often leading to poor health outcomes and increased hospitalizations. Healthcare providers lack continuous visibility in patient medication adherence patterns. There is a need for an assistive AI system that can analyze adherence data and identify patients at risk of non-compliance.

Medication Data Analysis Agent

An agent that analyzes medication intake logs, refill history, and missed-dose patterns.

Adherence Risk Detection Agent

An agent that identifies declining adherence trends using historical patterns and predefined rules.

Reminder & Lifestyle Support Assistant

An agent that generates adherence to reminders and educational insights
 (assistive only, non-diagnostic).

Outcome

Improves medication adherence to awareness and supports better long-term treatment outcomes.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
 (Using RAG on medication adherence best practices and patient education resources.)

Problem Statement 9: AI-Based Preventive Health Risk Assessment System

The Challenge

Preventive healthcare relies on early identification of lifestyle-related health risks. However, patient lifestyle data such as physical activity, sleep patterns, diet logs, and stress indicators are often underutilized. Manual analysis of such data is not scalable. An intelligent assistive system is needed to analyze lifestyle data and highlight potential preventive health risks.

Lifestyle Data Analysis Agent

An agent that processes physical activity, sleep, diet, and stress-related data into health summaries.

Preventive Risk Detection Agent

An agent that identifies risk patterns associated with lifestyle behaviors using guideline-based references.

Health Advisory Assistant

An agent that provides preventive health insights and lifestyle improvement suggestions *(assistive only)*.

Outcome

Supports preventive healthcare awareness and promotes healthier lifestyle choices.

Mandatory Tech Stack

Lang Flow using the IBM Granite Model
(Using RAG on preventive healthcare guidelines and wellness frameworks).

Problem Statement 10: AI-Assisted Remote Patient Monitoring Support System

The Challenge

Remote patient monitoring enables healthcare providers to track patient health outside clinical settings. However, analyzing continuous streams of remote health data is challenging and resource intensive. Without intelligent analysis, actionable insights may be delayed or overlooked. There is a need for an AI-driven assistive system to support remote patient monitoring programs.

Remote Health Data Analysis Agent

An agent that processes home-monitored health data and summarizes patient condition trends.

Risk Pattern Detection Agent

An agent that detects potential health deterioration by comparing current data with historical baselines.

Alert & Patient Guidance Assistant

An agent that provides early alerts and general health guidance
 (assistive only, non-diagnostic).

Outcome

Enhances effectiveness of remote monitoring and supports timely healthcare interventions.

Mandatory Tech Stack

Lang Flow using IBM Granite Model

Using RAG on remote care guidelines and patient monitoring standards.

Problem Statement 11: AI-Based Crop Health Monitoring and Advisory System

The Challenge

Crop health is influenced by multiple factors such as soil conditions, weather patterns, pest activity, and irrigation practices. Farmers often rely on periodic field inspections and experience-based judgment, which may delay the identification of early crop stress. Manual analysis of multi-source agricultural data is not scalable, leading to reduced yield and increased input costs. There is a need for an intelligent assistive system that can continuously analyze crop-related data and provide early insights into potential crop health issues.

Agricultural Data Analysis Agent

An agent that ingests soil moisture levels, temperature, humidity, crop growth stage data, and weather forecasts, organizing them into meaningful crop health trends.

Risk Trend Detection Agent

An agent that analyzes short-term and long-term patterns to identify early signs of crop stress, pest risk, or adverse growing conditions using historical data and agronomic thresholds.

Advisory & Best-Practice Assistant

An agent that generates early alerts and provides agronomy-aligned advisories *(assistive only, non-prescriptive)*.

Outcome

Supports early identification of crop health risks, improves farm decision awareness, and promotes sustainable crop management.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
(Using RAG on agronomy guidelines, crop management best practices, and trusted agricultural references).

Problem Statement 12: Intelligent AI System for Pest and Disease Risk Assessment

The Challenge

Pest and disease outbreaks can rapidly impact crop yield if not identified early. Traditional monitoring methods rely on visual inspections and historical experience, which may not capture early risk conditions driven by weather and environmental changes. There is a need for an intelligent system that can analyze environmental and crop data to assess pest and disease risk proactively.

Environmental & Crop Data Analysis Agent

An agent that processes temperature, humidity, rainfall, crop type, and seasonal data into risk assessment summaries.

Pest & Disease Risk Detection Agent

An agent that identifies favorable conditions for pest and disease development using historical patterns and agronomic thresholds.

Risk Alert & Preventive Advisory Assistant

An agent that generates risk alerts and preventive care insights
(assistive only, non-chemical recommendation).

Outcome

Improves early awareness of pest and disease risks, reducing crop loss, and unnecessary interventions.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
(Using RAG on integrated pest management (IPM) guidelines and agricultural extension resources.

Problem Statement 13: AI-Assisted Precision Irrigation Monitoring System

The Challenge

Inefficient irrigation practices lead to water wastage, crop stress, and reduced productivity. Farmers often lack continuous insights into soil moisture dynamics and crop water requirements. Manual irrigation decisions may not adapt to changing weather and soil conditions. There is a need for an intelligent assistive system that can analyze irrigation-related data and support water-efficient farming practices.

Soil & Weather Data Analysis Agent

An agent that processes soil moisture, evapotranspiration data, rainfall, and crop growth stages into irrigation-relevant insights.

Water Stress Detection Agent

An agent that identifies under-irrigation or over-irrigation patterns using historical and seasonal baselines.

Irrigation Advisory Assistant

An agent that provides water-efficiency and scheduling insights
 (assistive only, non-automated control).

Outcome

Promotes efficient water use, reduces resource wastage, and supports sustainable irrigation practices.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
 (Using RAG on irrigation guidelines and sustainable water management frameworks).

Problem Statement 14: AI-Based Climate Risk Assessment for Agriculture

The Challenge

Climate variability significantly affects agricultural productivity through extreme weather events, shifting seasons, and unpredictable rainfall. Farmers and planners often lack tools to interpret climate data in an actionable manner. There is a need for an intelligent assistive system that can analyze climate trends and assess agricultural risk at a local level.

Climate & Crop Data Analysis Agent

An agent that processes historical climate data, seasonal forecasts, and crop calendars.

Climate Risk Detection Agent

An agent that identifies potential climate-related risks such as drought stress, heat waves, or excessive rainfall using trend analysis.

Advisory & Planning Assistant

An agent that provides climate-risk insights and adaptive planning suggestions
(assistive only).

Outcome

Enhances climate resilience planning and supports informed agricultural decision-making.

Mandatory Tech Stack

Lang Flow using IBM Granite Model
(Using RAG on climate-smart agriculture guidelines and agricultural policy documents).

Problem Statement 15: AI-Assisted Yield Trend Analysis and Farm Planning System

The Challenge

Understanding yield variability across seasons is essential for improving farm productivity. However, yield data combined with environmental and management factors is often underutilized due to analysis of complexity. An intelligent system is required to analyze historical yield trends and identify contributing factors.

Yield & Farm Data Analysis Agent

An agent that processes historical yield records, crop inputs, weather conditions, and soil data.

Trend & Correlation Detection Agent

An agent that identifies patterns and correlations affecting yield performance using historical data.

Planning & Insight Assistant

An agent that provides data-driven insights for farm planning and improvement
 (assistive only).

Outcome

Supports better farm planning, productivity analysis, and sustainable agricultural practices.

Mandatory Tech Stack

Lang Flow using IBM Granite Model.
 (Using RAG on crop yield studies, farm management guidelines, and agricultural research references.