The Fatigue-Aware Slow Travel Agent

An Agentic AI System for Comfort-Optimized Itineraries

Team 405

Outline

- **Introduction** – Problem & Motivation
- **Objectives** – What We Aim to Build
- **Research Plan** – Tasks & Methodology
- **Timeline** – 10-Week Delivery Schedule
- **References** – Key Literature & Tools

Introduction

Problem Background & Motivation

"Special Forces Tourism"

The Problem

- Post-pandemic trend: **maximize attractions** in minimal time
- Leads to **physical exhaustion** and superficial engagement
- Contradicts **Slow Travel** principles – pacing, sustainability, deep connection

Traditional TRS Limitations

- Optimize solely for **distance or popularity**
- Ignore traveler's **real-time physical state**
- No awareness of **fatigue accumulation**

Why LLM-Powered Agents?

Static Algorithms vs. Autonomous Agents

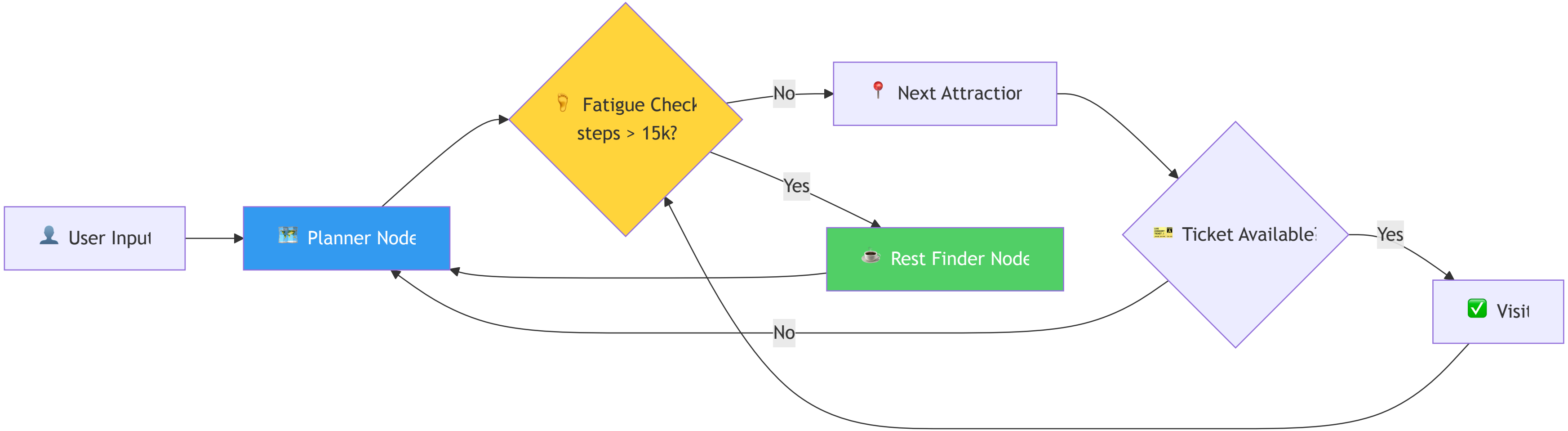
Aspect	Traditional TRS	LLM Agent
Planning	Fixed rules	Adaptive reasoning
State	Stateless	Stateful memory
Tools	Single data source	Multi-modal tools
Recovery	Fails on errors	Self-corrects

Key Enablers

- **ReAct Framework** – Reasoning + Acting in LLMs
- **LangGraph** – Stateful, cyclic graph workflows
- **Browser-use** – CV-based web browsing for real-time data
- **Amap API** – Precise geocoding & route planning

Our Proposed Solution

A **Slow Travel Planner Agent** that dynamically adjusts itineraries based on fatigue



> **Core Idea**: Maintain a stateful **fatigue metric** (step count + transit time) and dynamically insert rest nodes when thresholds are exceeded.

Objectives

What We Aim to Build

Objectives

🎯 Obj 1: Fatigue-Adaptive Logic

Implement a state-machine workflow that tracks **cumulative walking distance** and triggers **rest interventions** when thresholds (e.g., 15,000 steps) are exceeded.

🔧 Obj 2: Multi-Modal Tool Usage

Synergize **structured geolocation data** (Amap API) with **unstructured web data** (real-time ticket availability & crowd forecasts via Browser-use).

🔄 Obj 3: Cyclic Planning with LangGraph

Move beyond linear chains → create a **cyclic graph architecture** enabling self-correction and iterative re-planning based on environmental feedback.

🖥️ Obj 4: Human-Centric Interface

Deploy a **Streamlit UI** that visualizes the "slow travel" logic, showing users **where and why** rest stops were added.

Research Plan

Tasks & Methodology

Task 1: Infrastructure & Tools

Subtask 1.1 – Amap API Wrappers

Develop Python modules for:

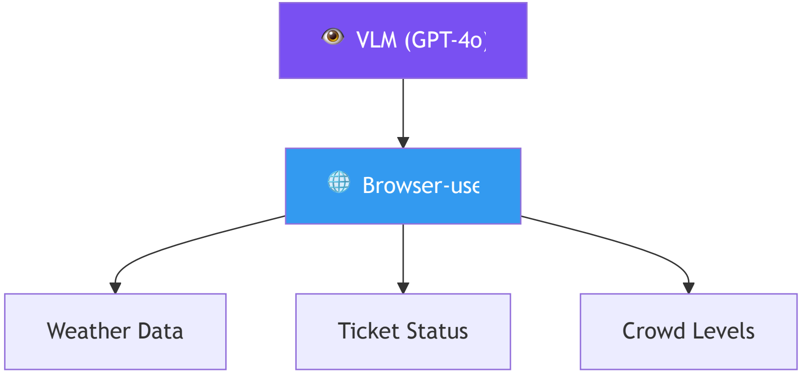
- **Geocoding** – Address ↔ Coordinates
- **Walking Route Planning** – Distance & step estimation
- **Traffic Status** – Real-time congestion data

```python
import requests

class AmapClient:
    BASE = "https://restapi.amap.com/v3"

    def geocode(self, address: str):
```

Subtask 1.2 – Browser-use Integration

Automate unstructured data retrieval with a Vision-Language Model:

- Parse **weather warnings** from weather sites
- Check **ticket availability** on scenic spot websites
- Assess **real-time crowd levels** from live feeds
- Powered by **GPT-4o / Gemini** vision capabilities

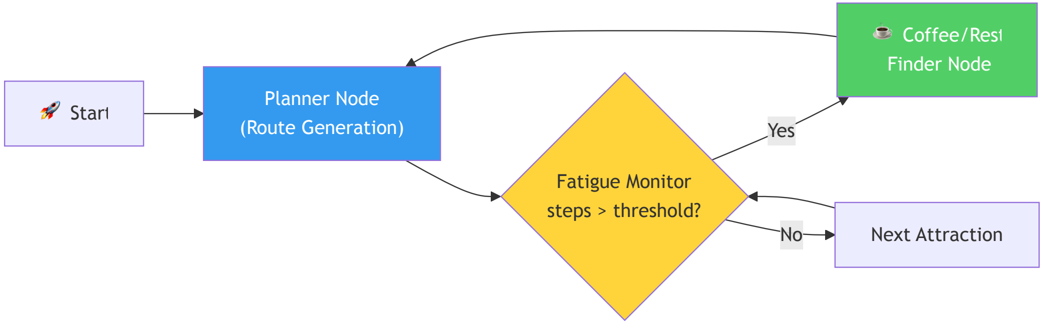


Task 2: Agent Architecture (LangGraph)

Subtask 2.1 – AgentState Schema

```python
from typing import TypedDict, List, Optional

class AgentState(TypedDict):
    user_itinerary: List[dict]       # Ordered list of POIs
    current_step_count: int          # Cumulative steps
    fatigue_level: float             # Normalized 0.0 - 1.0
    weather_constraints: Optional[str]
    current_location: tuple          # (lat, lng)
    visited: List[str]              # Already visited POIs
    rest_stops_inserted: int        # Count of rest interventions
```

Subtask 2.2 – Core Node Logic



Task 3: Integration & Optimization

Subtask 3.1 – Conditional Edges

Key conditional routing logic:

- **Fatigue threshold exceeded** → Route to Rest Finder
- **Ticket sold out** → Return to Planner → Select alternative
- **Bad weather detected** → Swap outdoor → indoor POI
- **All POIs visited** → Generate summary & end

Subtask 3.2 – Prompt Engineering

"Anti-Special Forces" prompting to ensure the LLM:

- Prioritizes **relaxed pacing** over POI count
- Suggests **local experiences** (cafés, parks, markets)
- Respects **daily step budgets**
- Generates **natural rest transitions** (not abrupt stops)

Task 4: Evaluation & Interface

Subtask 4.1 – Streamlit Dashboard

Visualize the itinerary and fatigue curve:

- 🗺️ **Interactive Map** with route & rest stops
- 📈 **Fatigue Curve** showing energy over time
- 🔄 **Re-planning Events** log
- ⚙️ **User Controls** for threshold tuning

Subtask 4.2 – Evaluation Metrics

Compare against standard "greedy" algorithms:

Metric	Greedy	Our Agent
Avg. Daily Steps	~25,000	≤15,000
Rest Stops / Day	0-1	3-5
Re-planning Rate	0%	Dynamic
User Fatigue Score	High	Low

Timeline

10-Week Delivery Schedule

Project Timeline

Week	Task	Deliverable
1-2	Theoretical Framework	Background Research & Architecture Diagram
3-4	Tool Implementation	Functional Amap API & Browser-use modules
5-6	Core Agent Development	Working "Fatigue Monitoring" prototype
7-8	Integration & UI	Streamlit Web App v1.0
9	Testing & Refinement	Performance Report
10	Final Submission	Project Report & Presentation Deck

References

Key Literature & Tools

References

Slow Travel & Tourism

1. Cheer, J. M., Milano, C., & Novelli, M. (2019). Tourism and community resilience in the Anthropocene. *J. Sustainable Tourism*, 27(4), 554-572.
2. Dickinson, J. E., Lumsdon, L. M., & Robbins, D. (2011). Slow travel: Issues for tourism and climate change. *J. Sustainable Tourism*, 19(3), 281-302.
3. Lim, K. H., et al. (2019). Tour recommendation and itinerary planning: A survey. *AI Review*, 52, 405-439.

LLM Agents & Frameworks

4. Xi, Z., et al. (2023). The Rise and Potential of LLM Based Agents: A Survey. *arXiv:2309.07864*.
5. Schick, T., et al. (2023). Toolformer: Language Models Can Teach Themselves to Use Tools. *arXiv:2302.04761*.
6. Yao, S., et al. (2023). ReAct: Synergizing Reasoning and Acting in LLMs. *ICLR*.

Tools & Planning

7. LangChain AI. (2024). LangGraph. https://langchain-ai.github.io/langgraph/
8. Browser-use. (2025). https://github.com/browser-use/browser-use
9. AutoNavi. (2025). Amap Web Service API. https://lbs.amap.com/api/webservice/summary/

Thank You

Questions & Discussion