



SkyResolve: AI Agents for Intelligent Airline Complaint Resolution

UnitedPhoenix (Team 12):

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Agenda

1. Problem Statement
2. Data Sources
3. Agentic Architecture
4. Responsible AI
5. Future Vision
6. Prototype Demo

Meet the team



Katy Koo



Mahender Reddy



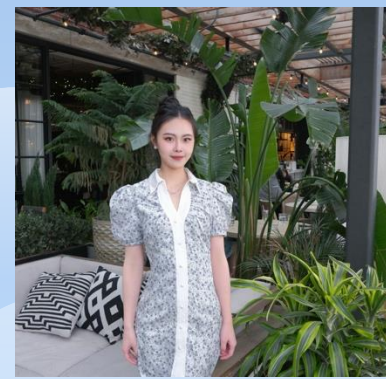
Rohit Kumar



Ulka Khobragade



Jonathan Liu



Tilly Hu

EXECUTIVE SUMMARY

Overview:

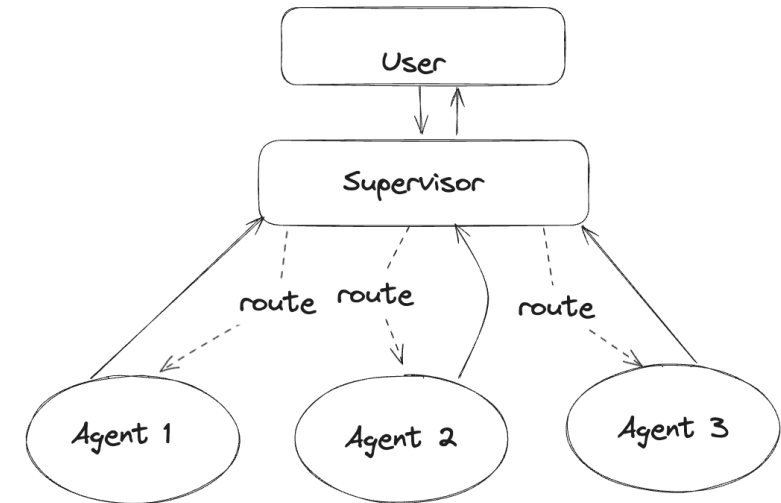
United Airlines experiences frequent and costly delays due to infrastructure issues, structural damage, and inefficient incident routing. Our AI-powered platform revolutionizes the fault reporting pipeline by leveraging multimodal inputs (images + text) and specialized agents to triage and resolve issues in real time.

Solution Highlights:

- **Mobile App:** On-site crew can report issues via image and voice.
- **Global + Specialized AI Agents:** Classify and route incidents to relevant departments using RAG over internal manuals.
- **Model Context Protocol (MCP):** Maintains shared understanding and avoids redundant processing.

Strategic Value:

- Reduces aircraft ground time and service interruptions.
- Improves interdepartmental coordination and response SLAs.
- Enhances passenger experience, brand perception, and cost control.

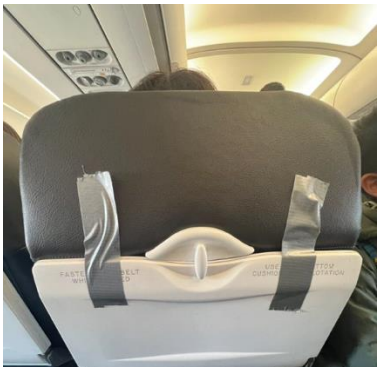


Supervisor Agent Architecture



Data Sources

Broken Seats images



Created synthetic data using Gemini

Aircraft Interior Inspection Manual

Objective: To identify and rectify any defects in passenger and crew seats that may compromise safety or passenger comfort.

Frequency: Pre-flight checks, daily checks, and scheduled maintenance checks (A, B, C, D checks).

Tools Required: Flashlight, measuring tape, work order form, protective gloves.

Procedure:

1. Visual Inspection (All Seats):

- * 1.1. **Upholstery:** Check for tears, rips, stains, excessive wear, loose seams, and burns. Report any damage exceeding 1 inch in any dimension (per Airline Standard 25-10). *If damage found: Complete

Form-SIG*

- * 1.2. **Cushioning:** Inspect for proper cushioning. Squeeze seat cushion to ensure adequate support. Report any significant compression or loss of form. *If damage found: Complete Form-SIG*

- * 1.3. **Armrests:** Verify armrests are securely attached and functional. Check for damage, including cracks, loose hinges, and worn padding. Inspect armrest release mechanisms (if applicable) for proper operation. (Airline Standard 25-20 for hinge integrity). *If damage found: Complete Form-SIG*

- * 1.4. **Seat Belts:** Examine seat belts for fraying, cuts, excessive wear, and proper operation of buckles. Ensure belt length is adequate for all passengers. Check for retraction functionality. Replace any belt showing signs of significant damage. Refer to AMM 25-50 for seat belt replacement procedures. *If damage found: Complete Form-SIG*

- * 1.5. **Seat Back Tables:** Inspect for proper latching and locking mechanisms. Ensure tables are clean, undamaged (no cracks or chips), and can support a reasonable weight (Airline Standard 25-30: minimum weight capacity 10 lbs). Check for smooth and complete deployment and stowing. *If damage found:

```
{
  "Section": "Seat Inspection Guidelines",
  "Reports": [
    {
      "Form ID": "Form-SIG",
      "Inspector Name": "Isabelle Dubois",
      "Inspector ID": "ID7492",
      "Date": "2023-10-27",
      "Aircraft ID": "A320-XYZ123",
      "Inspection Zone": "Cabin",
      "Issue Type": "Upholstery Tear",
      "Issue Description": "Seat 32A has a 4-inch tear in the seat cushion upholstery, exposing foam.",
      "Severity": "Medium",
      "Action Taken": "Seat taped over and marked out of service. Passenger relocated.",
      "Department Contacted": "Maintenance",
      "Status": "Open"
    },
    {
      "Form ID": "Form-SIG",
      "Inspector Name": "Kenji Sato",
      "Inspector ID": "ID8503",
      "Date": "2023-10-27",
      "Aircraft ID": "B737-ABC456",
      "Inspection Zone": "Cabin",
      "Issue Type": "Inoperative Seat Belt Buckle",
      "Issue Description": "Seat belt buckle on seat 14B is jammed and will not release.",
      "Severity": "High",
      "Action Taken": "Seat marked out of service. Passenger relocated.",
      "Department Contacted": "Maintenance Control Center",
      "Status": "Escalated"
    }
  ]
}
```

Manuals and prefilled sample forms to give context to Agents on how to fill forms



Impact of Delays: The Business Case for Intervention

\$100

U.S. airlines face **~\$100 per block-minute** in operating costs—covering fuel, labor, maintenance, etc.

\$8B

FAA estimates indicate flight delays cost carriers roughly **\$8 billion per year** in direct operational expenses.

\$200M

Boeing 737 MAX 9 groundings (structural door failure) hit United to the tune of **\$200 million in Q1 2024**.

\$1000

Prevent even a **10-minute average delay per aircraft** = ~\$1,000 saved per flight (10 × \$100).





Save valuable time for service crew and flight attendants by eliminating manual form-filling and streamlining documentation workflows.



Notes: 1. <https://www.airlines.org/dataset/u-s-passenger-carrier-delay-costs/>
2. <https://www.nbcdfw.com/news/local/flight-delays-cost-passengers-17-billion-airlines-8-billion-annually/103212/>
3. <https://apnews.com/article/united-airlines-financial-results-first-quarter-8236a68116172babe8727f4bc1d01241>

Impact of Delays: Passengers Story





r/unitedairlines • 5 mo. ago
jack732

...

Most absurd reason you've seen for a delay?

Question

On Saturday we sat on the tarmac for 2 full hours past departure time while they attempted (and ultimately failed) to repair a single first class seat. They ultimately moved the individual back to economy after booting an old man from a window seat to a middle seat further back, since the first class pax who had to move back only wanted a window or aisle. By the time we landed, several people had missed international connections, due to a single faulty seat which wasn't even fixed.



r/unitedairlines • 7 mo. ago
Ok-Drawer8410

...

My letter to United-time to change carriers to an airline that cares

Discussion

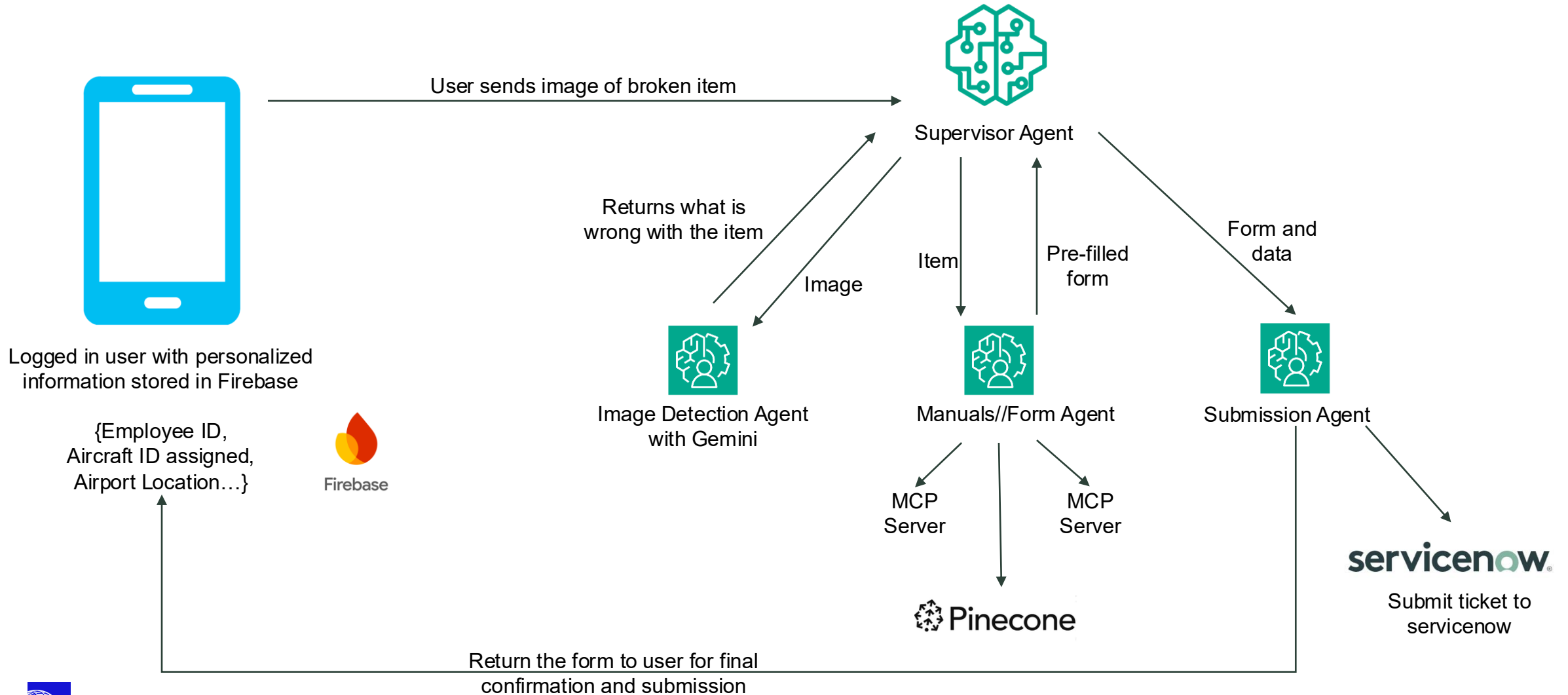
These delays and disregard for your passengers is unacceptable. We boarded at 6:20 pm on Denver. It is now 8:02 pm and we are sitting on the tarmac waiting for your customer service team to release us because of a seat back that was reported not working.



Notes: 1. https://www.reddit.com/r/unitedairlines/comments/1hw2wb5/most_absurd_reason_youve_seen_for_a_delay
2. https://www.reddit.com/r/unitedairlines/comments/1gq3d7s/my_letter_to_unitedtime_to_change_carriers_to_an/

Multi-Agent Architecture

Using Langgraph powered by Gemini 2.0



Responsible AI – Risk Mitigation Framework

Category	Potential Risks	Mitigations Implemented
Fairness	Biased triaging—e.g., hygiene issues deprioritized over structural ones	Balanced training data across all departments.
Reliability & Safety	False positives/negatives in visual classification could delay safety-critical repairs	Human-in-the-loop verification.
Privacy & Security	Leakage of passenger data or maintenance logs	Edge anonymization, secure image pipelines, and role-based access control (RBAC)
Inclusiveness	System neglects inputs from non-technical staff or multilingual crew	Multimodal UI (text + image); support for multiple languages; mobile-first design
Transparency & Accountability	Black-box model decisions hinder traceability	Log agent reasoning steps; dashboards for auditability and error trace



Future Vision



Voice Chat Support: Fully hands-free reporting for crew in real-time scenarios



Multilingual Interface: Inclusive support for global crew diversity



Passenger-Level Access: Allow travelers to report issues (e.g., lost baggage, seat malfunctions) directly via app



Closed-Loop Resolution Feedback: Real-time updates and ticket lifecycle visibility for all users



Demo

Thank You

Appendix

Demo

