



MIND SPRINT

AUTOMATED AIRCRAFT MARSHALLER SYSTEM



TEAM
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PROBLEMS STATEMENT

1



High Human Dependency & Error Risk

- Manual signals can be misread or miscommunicated.
- Fatigue and stress increase chances of mistakes.

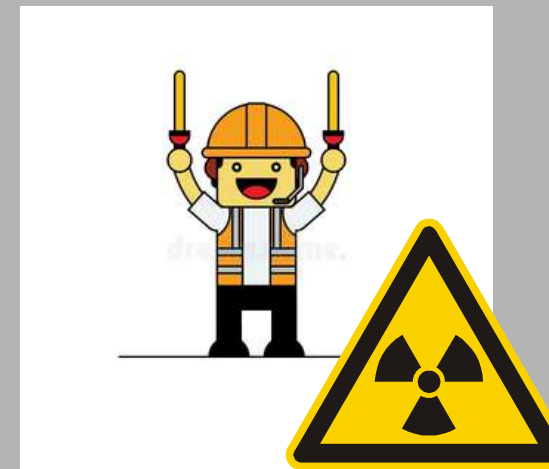
2



Environmental Visibility Limitations

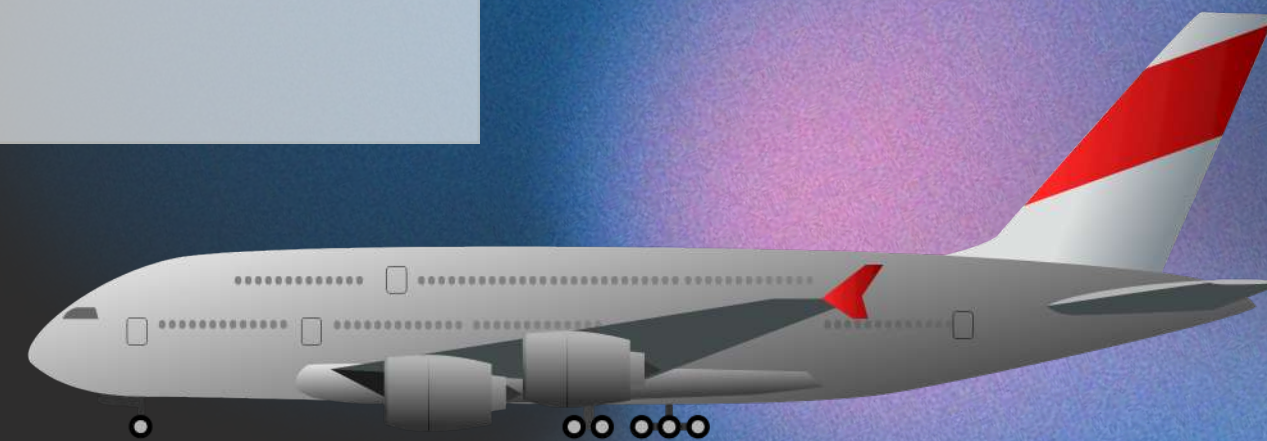
- Fog, rain, sunlight, and low light make signals hard to see.
- Poor visibility leads to delays and unsafe parking.

3



Safety Hazards & Operational Inefficiency

- Marshallers stand close to moving aircraft, risking injuries.
- Manual guidance slows operations and increases delays.



PROPOSED SOLUTION

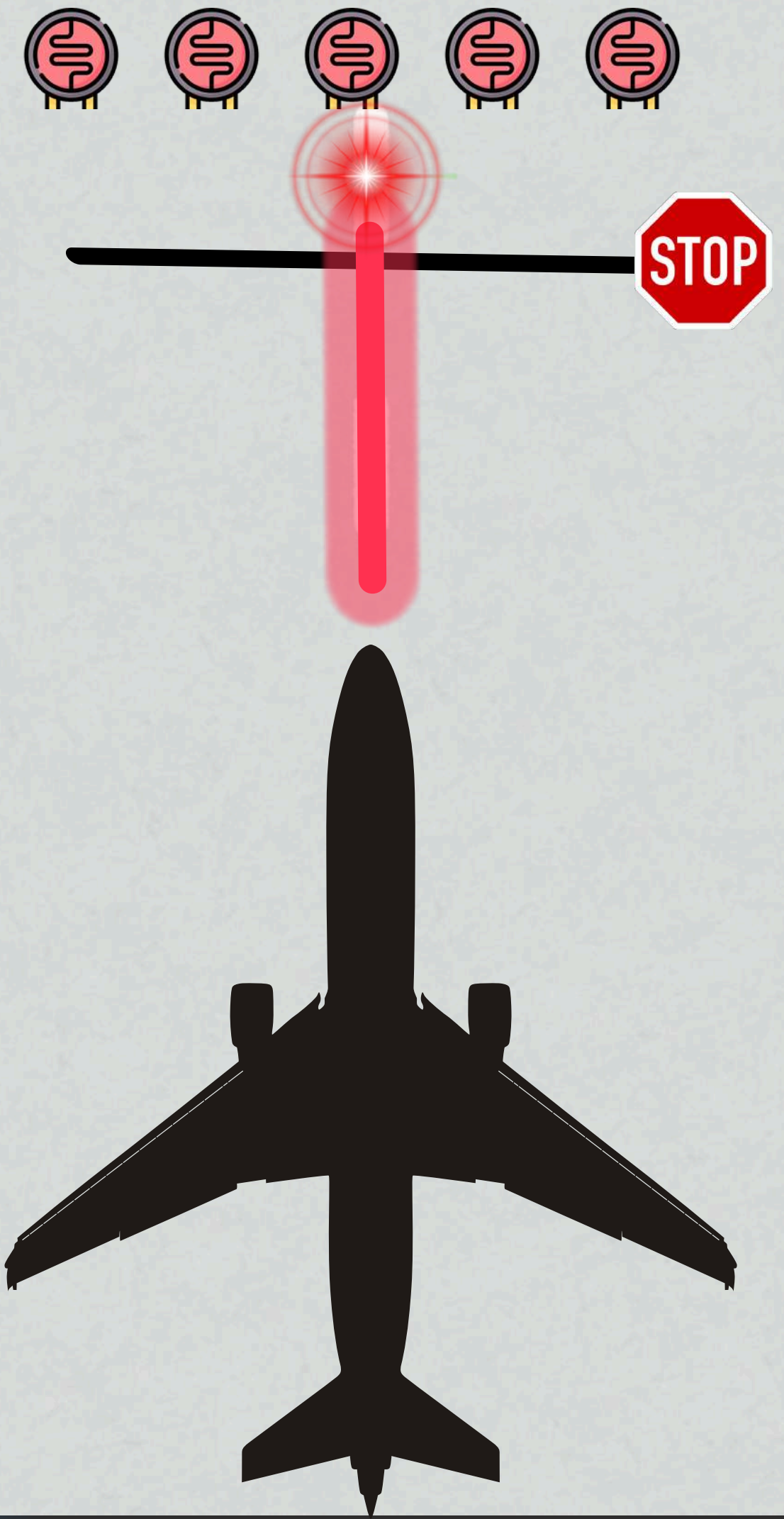
1. Automated Laser-Sensor Alignment System



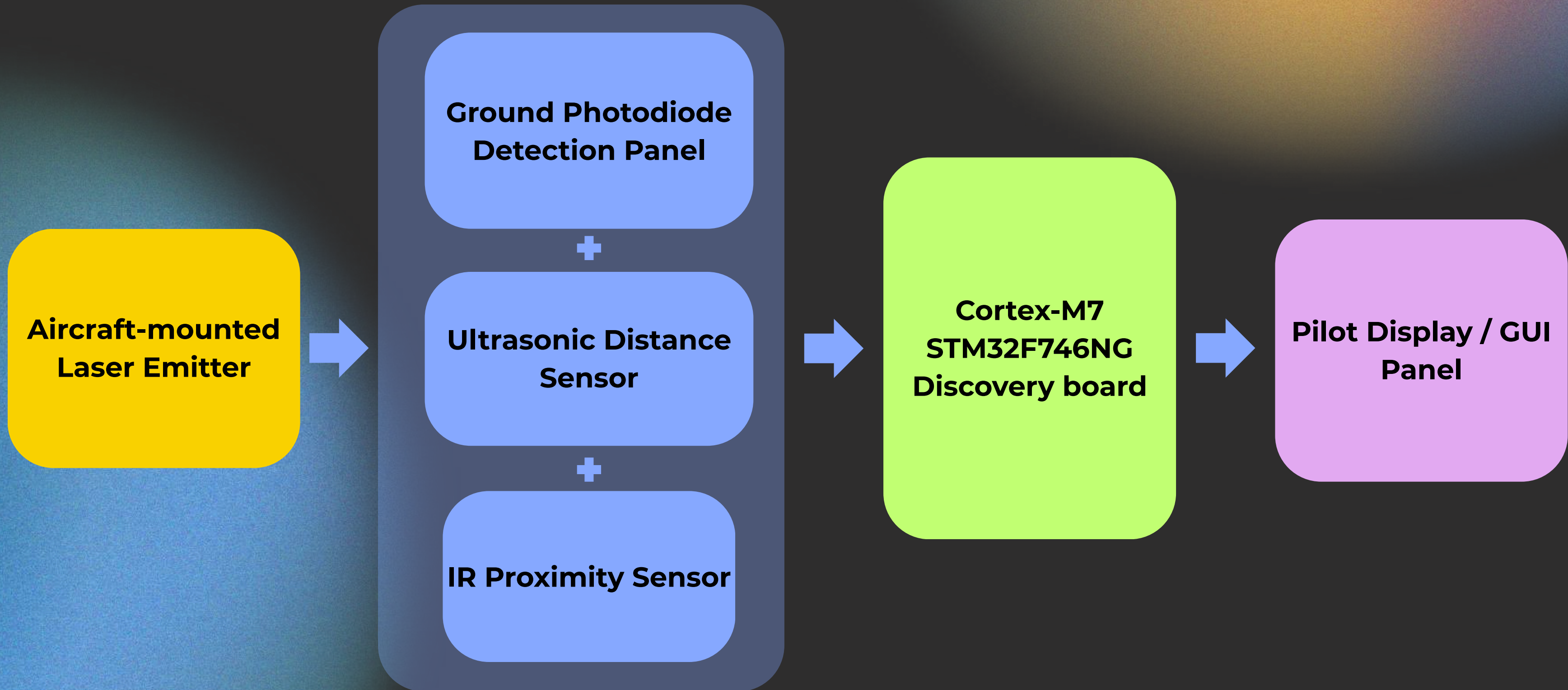
2. Digital Pilot Guidance + Distance Tracking



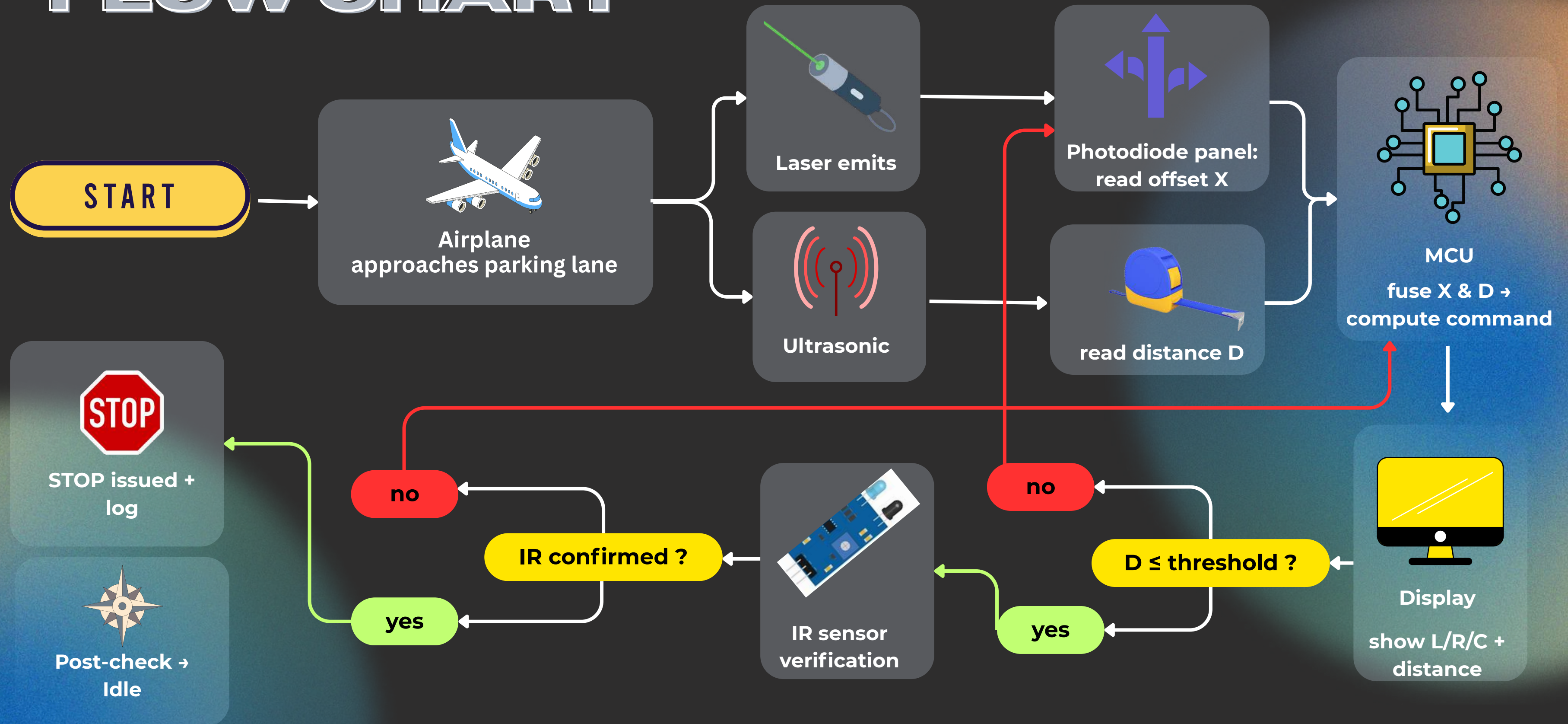
3. Intelligent Proximity-Based Auto-Stop Mechanism



SYSTEM ARCHITECTURE



PROCESS FLOW CHART



HARDWARE & SENSOR LOGIC

Function	Component	Logic
Alignment	Laser + Photodiodes (LDR replaced with photodiodes for accuracy)	Center hit = aligned; beam shift = left/right deviation
Approach	Ultrasonic Sensor	Measures aircraft distance continuously during taxi-in
Stop Detection	IR Sensor + Ultrasonic	Triggers STOP when aircraft reaches final threshold point
Processing	STM32F746NG Discovery	Reads sensors, fuses data, computes guidance, updates display
Display	TFT / LED Digital Panel	Converts MCU commands into visual marshalling cues



REAL TIME APPLICATIONS

- **Small & Regional Airports**
Low-cost alternative to VDGS for accurate, safe aircraft parking.
- **Aviation Training Institutes**
Ideal for teaching marshalling, alignment, and ground-handling concepts.
- **UAV & Drone Testing Zones**
Supports autonomous landing, alignment, and docking trials.
- **R&D & Engineering Labs**
Suitable for testing sensor fusion, distance measurement, and automation algorithms.
- **Industrial Vehicle Docking**
Helps AGVs and warehouse vehicles achieve safe, precise docking.
- **Tech Expos & Demonstrations**
Highly visual prototype for showcasing smart automation systems.



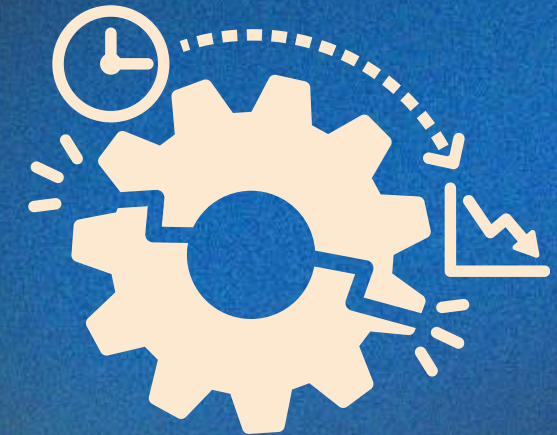
CONCLUSION



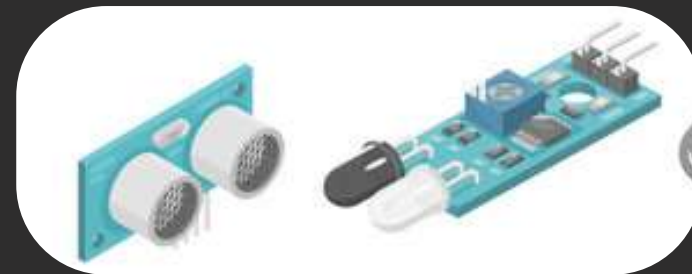
Developed a low-cost, portable automated marshalling system



Implemented laser-based alignment detection



Enabled real-time autonomous guidance and decision-making



Integrated LDR sensors, ultrasonic/IR sensing, and efficient microcontroller logic



Displayed clear marshalling outputs: LEFT, RIGHT, FORWARD, SLOW, STOP

THANKS

Presented by
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