

Introduction

Aircraft inspections are slow and inconsistent when performed manually. Our project automates the scanning process to improve reliability, reduce inspection time, and ensure accurate detection of surface defects ≥ 5 mm.

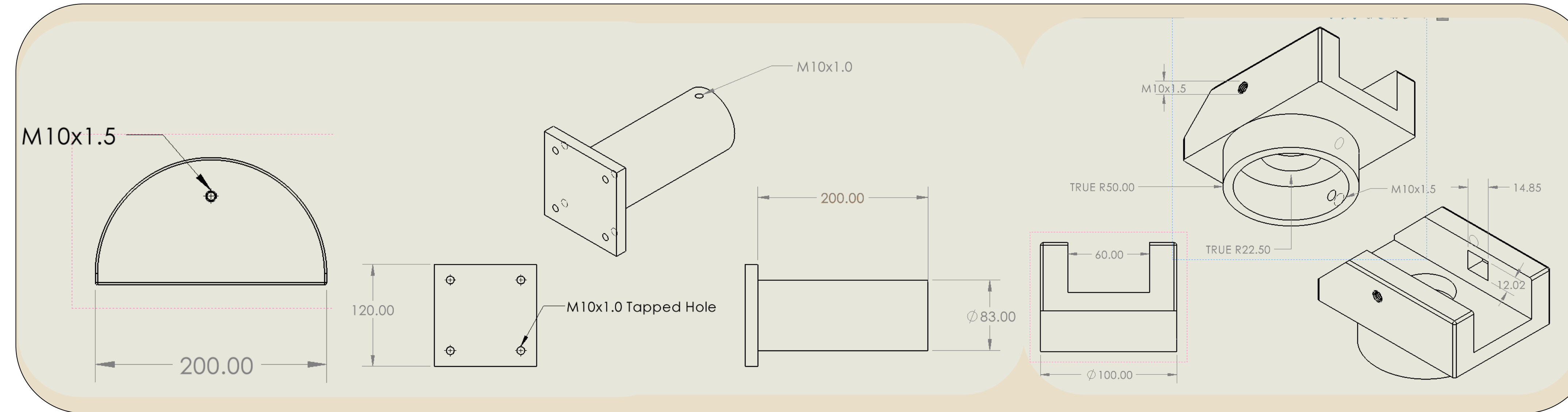
SPECIFICATIONS

Rechargeable Li-ion battery, ≥ 5000 mAh, 5V output	Detects surface damage accurately at up to 1 m distance	Rotors must withstand total system weight
System must carry ≥ 3 kg payload	Capable of 180° rotation (0–180 sweep)	Stable operation from -10°C to 50°C

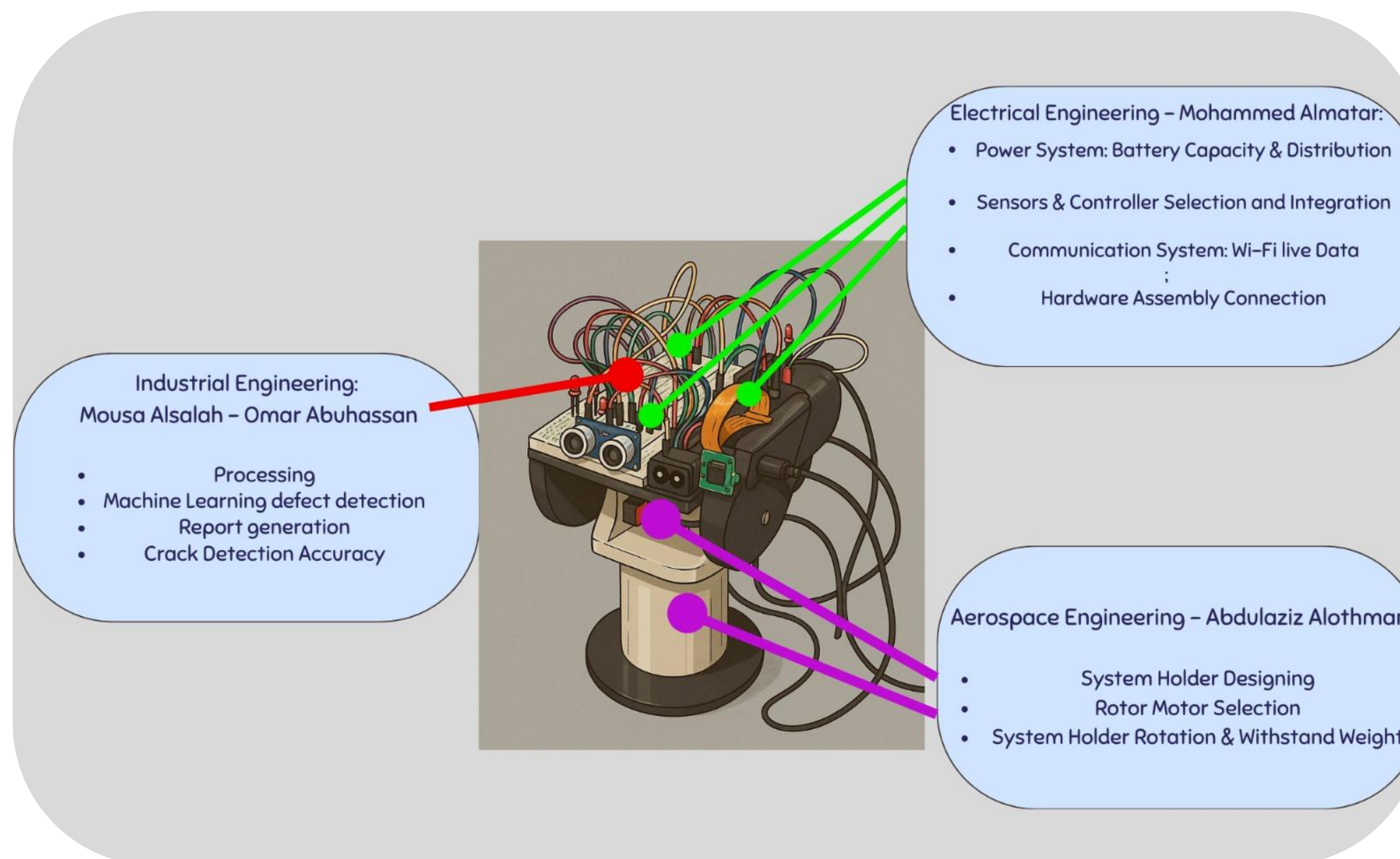
CONSTRAINTS

Battery Weight Limit	False Alarm Rate	Sensor Voltage Compatibility
Communication Range	Compact Electronics	Stability

SYSTEM HOLDER DESIGN



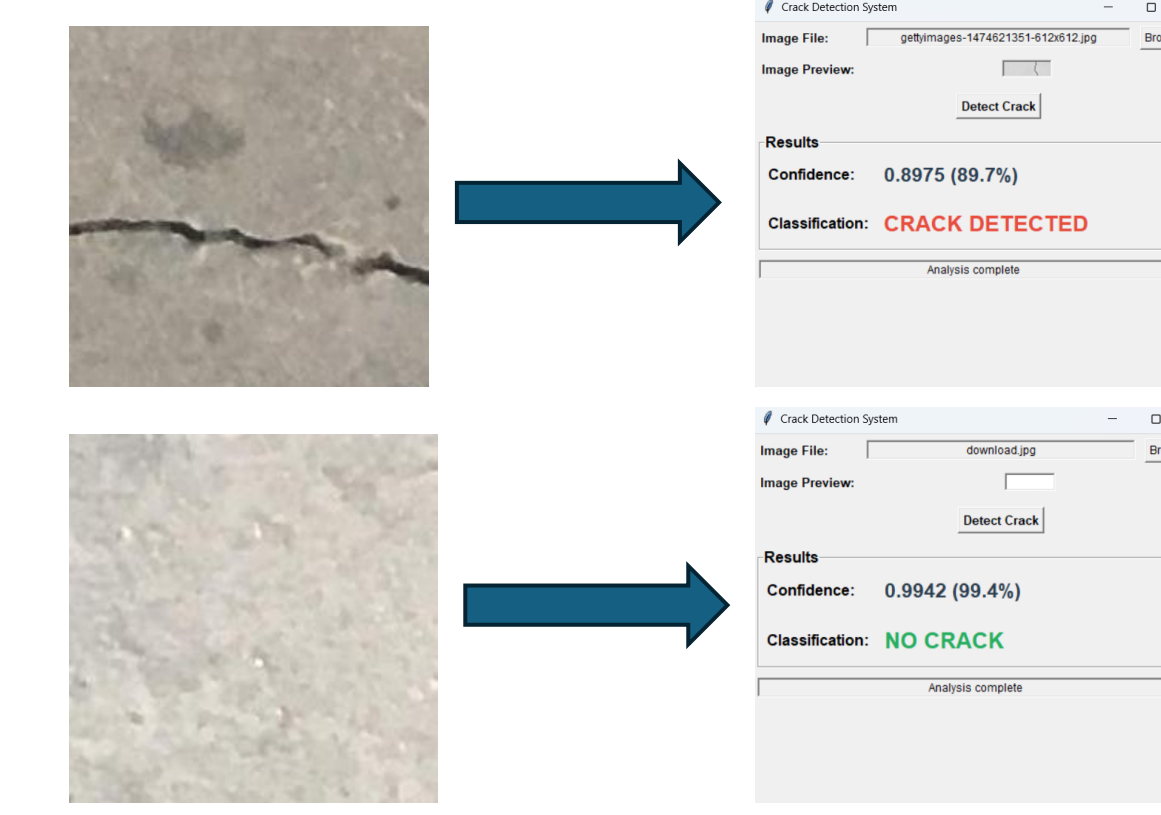
INTEGRATED SYSTEM STRUCTURE



TESTING / VALIDATION

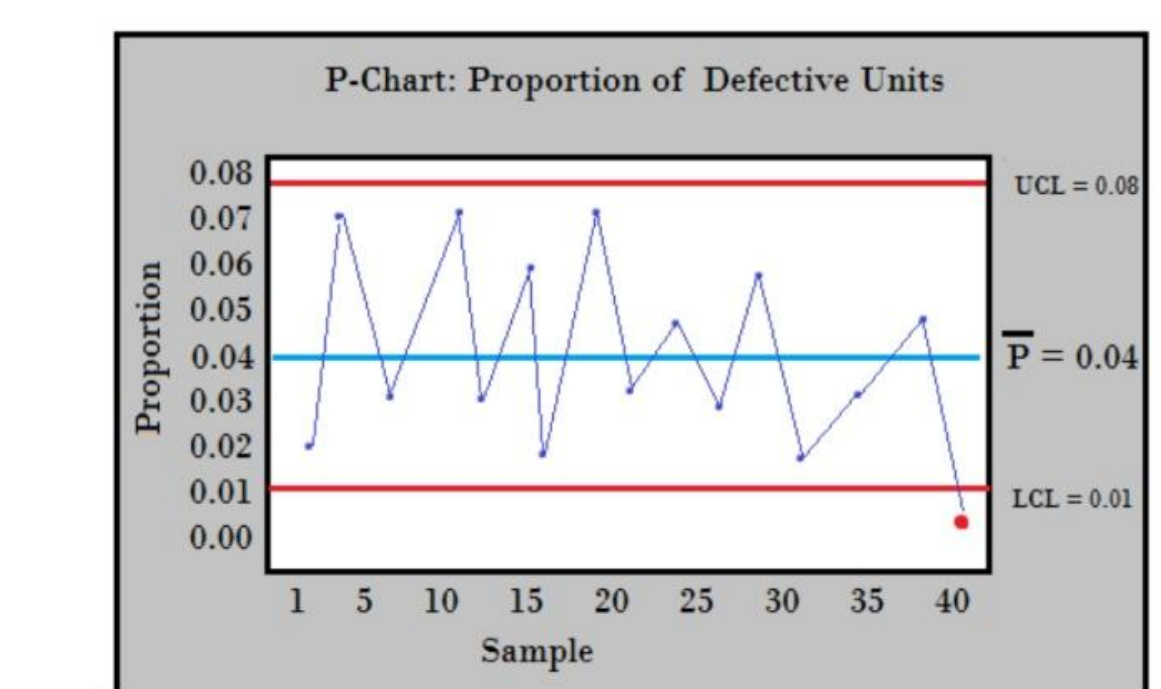
Crack detection

Validated basic surface-defect detection using sample images and controlled lighting conditions.



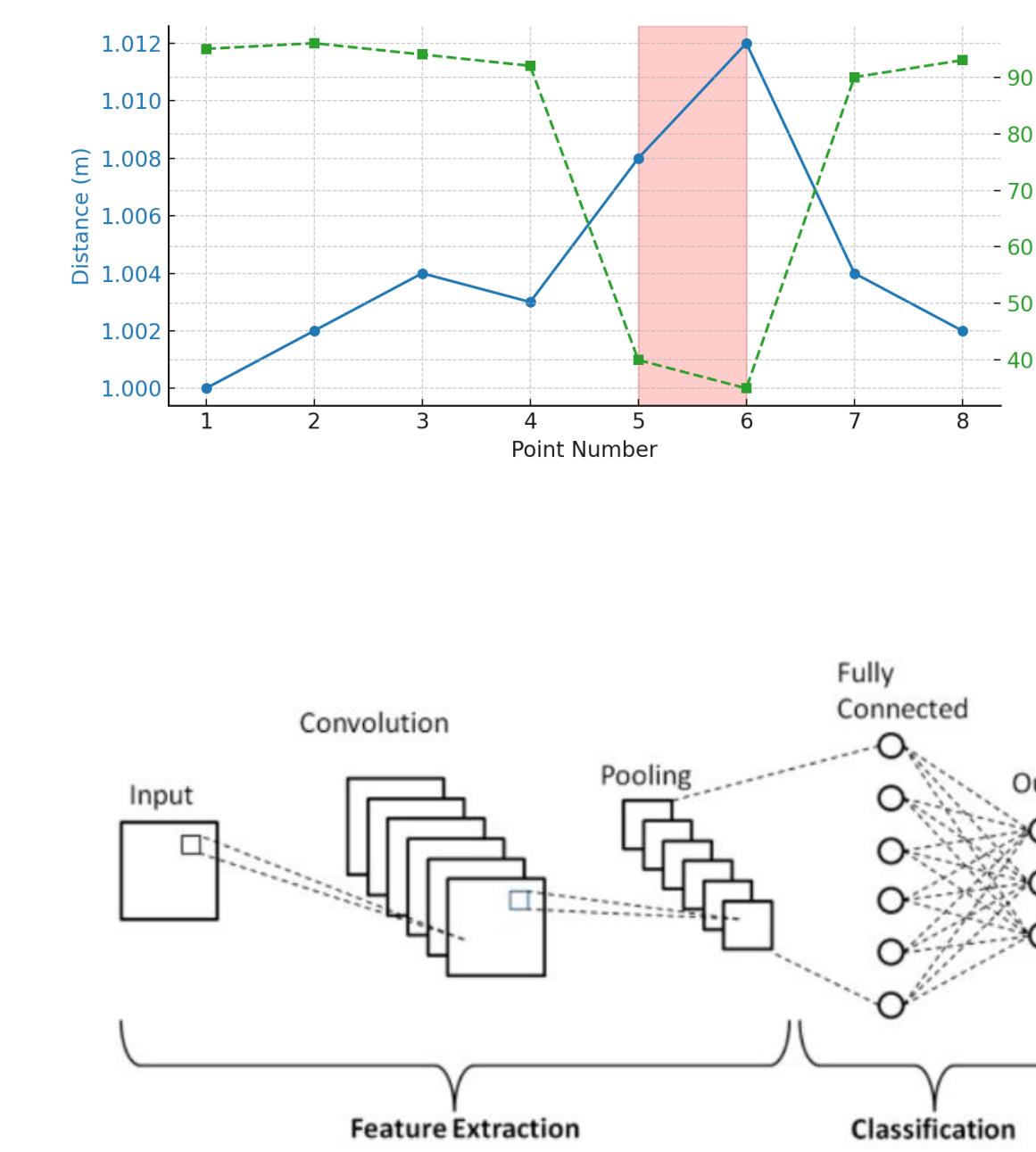
Sensors Depth

Validated basic surface-defect detection using sample images and controlled lighting conditions.



Machine Learning

Baseline ML pipeline validated using labeled defect images to confirm correct processing and classification flow.



CONCLUSION

The project achieved accurate, stable sweep motion and met all requirements, providing a reliable foundation for automated aircraft surface inspection.