

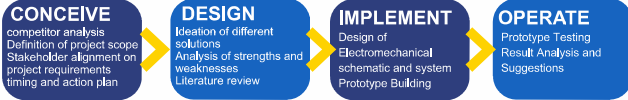
This project originated during my industrial placement at Ryanair Engineering (PAMG), where I performed aircraft maintenance.

Interactive Toolbox for Aviation Maintenance

RYANAIR Engineering by PAMG

ME3PRO 2025/26
Golnaz Ebrati Shahrestani

CDIO



CONCEIVE

EXISTING METHODS AND MARKET ANALYSIS

Existing Tool Control solutions do not meet company requirements

Challenges identified

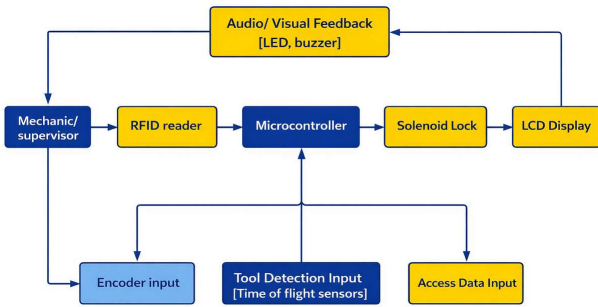
- 01 Lacking A-Check tool storage organisation
- 02 Lacking user interaction
- 03 Lacking tool access restriction
- 04 Lacking Knowledge of missing tools

	LOW FUNCTIONAL CAPABILITY	HIGH FUNCTIONAL CAPABILITY
LOW COST	OPEN TOOL STORAGE <ul style="list-style-type: none"> Basic organization No access control High risk of loss and FOD 	PROPOSED SMART TOOLBOX (MARKET GAP) <ul style="list-style-type: none"> Human-centred design Automated access control Real-time tool detection Cost-effective alternative
HIGH COST	MECHANICALLY CONTROLLED TOOL CABINETS <ul style="list-style-type: none"> Controlled access Limited automation Manual tracking Higher cost 	ENTERPRISE DIGITAL TOOL CONTROL SYSTEMS <ul style="list-style-type: none"> Fully automated tool tracking Functionality exceeds requirements Too expensive

DESIGN

WORK PROCESS AND SOLUTION DESIGN

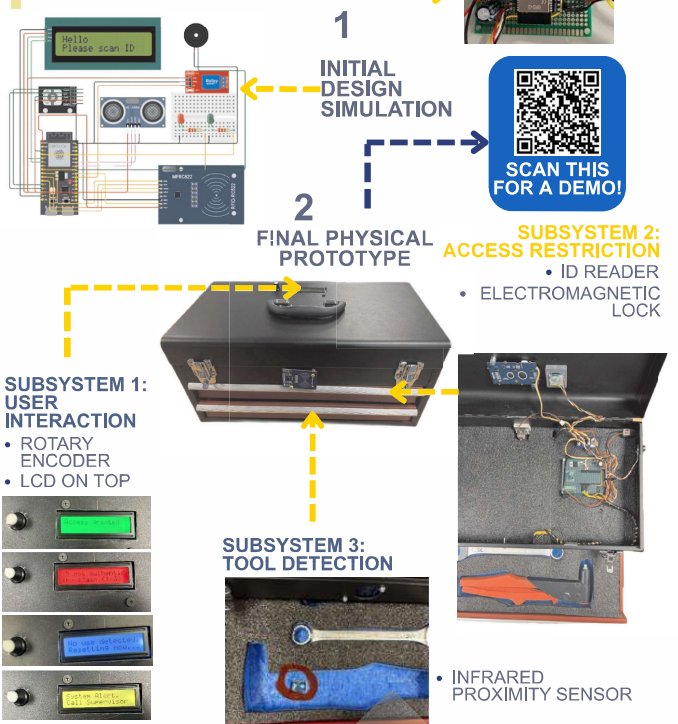
Block diagram shows: RFID access, microcontroller processing, tool detection, and user interaction with feedback.



IMPLEMENT

BUILDING THE PROTOTYPE

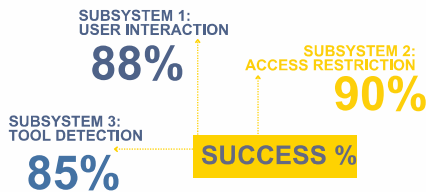
Subsystems were simulated, then integrated into a physical prototype with a soldered PCB.



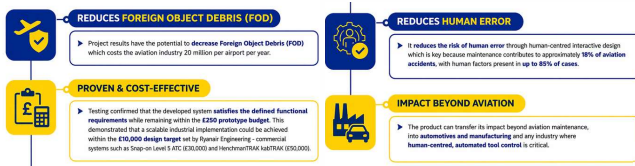
OPERATE

TESTING AND RESULTS

All project objectives were achieved, with all subsystems performing successfully in testing



FUTURE IMPACTS



NEXT STEPS

- Upgrade microcontroller
- Scale prototype up to large tool trolley

