A.E.R.I.A.L. AR Maintenance Assistant

Team BA^3:
Bailey Alex, Ariya Shah, Aidan Valeri, Armando Botiller

01

Problem Definition

What are the needs of the stakeholders?

Intelligent Machine Maintenance (PS 2.2)

Design and prototype an AR-based maintenance support tool tailored for Honeywell APU systems. Consider how your solution will:

- Reduce technician time-on-task
- Enhance training effectiveness
- Improve accuracy of part identification and selection
- Integrate with existing Honeywell documentation

Research and Stakeholder Info

- **APU methodology focuses on routine upkeep of the product.**
  - Emphasis on preventative maintenance rather than failure analysis.
- **Full disassembly of large products is required during maintenance.**
  - Smaller components cannot be accessed from borescopes.
- **Large amount of shadowing required to train technicians.**
  - Wastes time for both the trainer and the trainee.
- **Need for ease in finding part information quickly.**
  - Legacy manuals and spreadsheets can be difficult to navigate.
- **Components with different lifespans can be hard to keep track of.**
  - Provide a way to analyse the wear on components.

“How might we streamline maintenance and training procedures to create a more responsive, hands-on approach while minimizing labor costs”

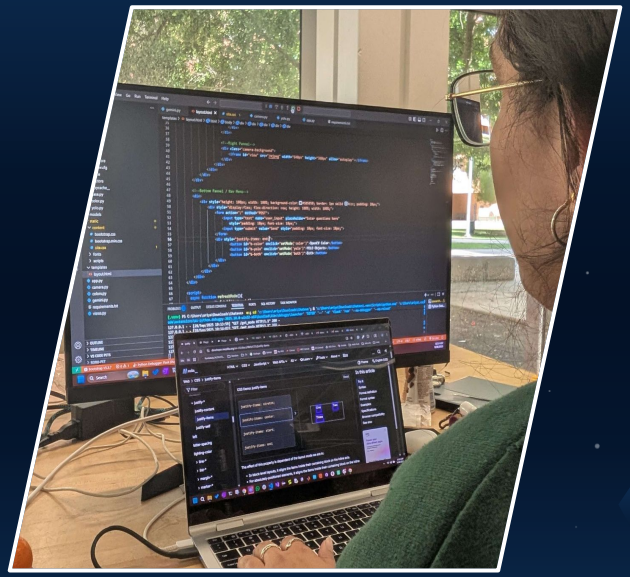
02

Design Solution

An innovative improvement upon both the Honeywell 360 Display and Honeywell Forge technologies.

Our Solution: A.E.R.I.A.L.

Augmented
Educational Repair for
Intuitive APU Logic



3-Part Solution

Part 1: 3D AR Simulation

Employs a hands-on, active learning approach to maintenance procedures, utilizing augmented reality (AR) to show the disassembly and reassembly of APUs in the most efficient way.

Part 2: World Understanding

A webcam provides failure analysis of UV dipped components to improve technician intuition while additionally serving as a method for active part identification, providing real-time data to the user.

Part 3: AI Integration

Gemini API is used to provide active feedback to the user, allowing trainees to ask questions and receive feedback in real time without the need to shadow an experienced technician or sort through thousands of papers.

Part 1: AR Simulation

- Designed to easily locate parts, part numbers, and other important information before disassembly.
- Provides a no risk practice opportunity for both new and experienced employees.

Part 2: World Understanding

- Utilizes the pre-existing Honeywell 360 Display and state of the art visual technology to assist with preventative maintenance and wear assessments.
- Combines visual information with custom algorithms to assist employees with any task.

Part 3: AI Integration

- AI, AR, and Computer Vision mixed with Honeywell's vast *Forge* database create the ultimate guide for learning.
- A.E.R.I.A.L. will be able to answer and questions, correct mistakes, and assist all new maintenance employees.
- Collates over 10,000 pages of information and specifications into one easy to navigate system for both trainees and experienced employees.

03

Value Generation

How will this solution create value for Honeywell?

$3,233,000,000

Revenue from Honeywell's **Servicing** Sales the last 3 months

Value Generation

01

Real-Time Info

Reduces the need for hard-to-access manuals.

02

Independence

Less labor costs during technician training.

03

Hands-On

3D visualization provides more than just text.

04

Improvement

Machine learning fuels ever-evolving software.

05

Warranty

Saves Honeywell money through void detection.

06

Applications

Can be used in any assembly, not just APUs.

Thanks!

Do you have any questions?

Special thanks to James Gold, Efaz Arian, and John Pagu,
Ly Vessels, K.C. Heun, and Bolatito Olowofela

Sources:

https://ieeexplore.ieee.org/abstract/document/7105054

https://www.academia.edu/41000578/Aircraft_Auxiliary_Power_Unit_APU_Condition_Monitoring

aerospace.honeywell.com

https://rotate.aero/media/kunena/attachments/936/767APUTroubleshooting.pdf

https://www.aviationhunt.com/airbus-a320-ata-49/#google_vignette