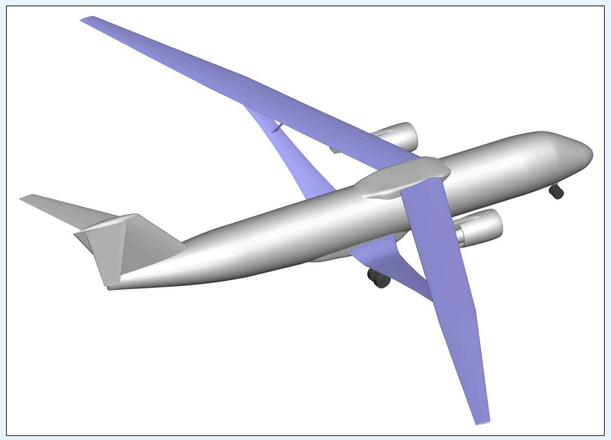
National Aeronautics and Space Administration

Aviary

Open-source software tool for optimizing next-generation aircraft designs

Challenge

- Need new aircraft analysis tools – next-generation vehicles need next-generation tools
- Existing aircraft design tools are limited in ability to provide meaningful trends for hybrid-electric & all-electric aircraft
- These tools struggle with design and analysis of unconventional vehicle concepts

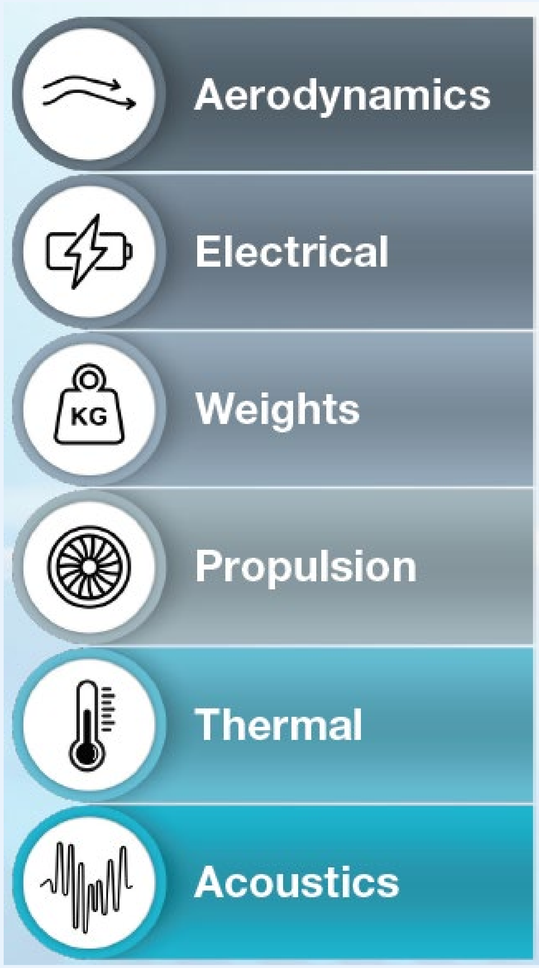


Successfully created a Transonic Truss-Braced Wing (TTBW) model using Aviary

SCAN HERE
or find and install Aviary through GitHub:
https://github.com/OpenMDAO/Aviary

Expected Impacts

- Make aircraft conceptual designs more efficient
- Build new tools with valid assumptions
- Potential to revolutionize aircraft analysis by allowing tight coupling/optimization



Example of disciplines that can be analyzed together using Aviary

Solution

- Deliver an expanded software tool that modernizes legacy design tools and enables multidisciplinary analysis and optimization of unconventional vehicles like the Truss-Braced Wing flight demonstrator X-66
- Leverage interactions between disciplines for overall vehicle efficiency gains
- Engage the community through open-source-release of the software to drive overall impact of Aviary

Results

- Deliver critical core component of the Model-Based Systems Analysis and Engineering framework used to assess benefits of Sustainable Flight National Partnership technologies
- Analyzes multiple disciplines simultaneously
- Integrates external tools and modular components
- Modernizes legacy design tools
- Enables optimization of conceptual designs and modeling of concept aircraft
- Builds off OpenMDAO open-source platform
- Leverages modernized methods for efficient optimization
- Provides accessibility for novice to expert users

Next Steps

- Work new challenge problems on a hybrid aircraft configuration with key stakeholders
- Improve Aviary based on community feedback.

Partners and/or Participants

- NASA ARMD, Transformative Aeronautics Concepts Program, Transformational Tools and Technologies
- NASA ARMD, Advanced Air Vehicle Program, Advanced Air Transport Technology
- NASA ARMD, Integrated Aviation Systems Program, Electrified Powertrain Flight Demo

IMAGINAVIATION

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