OBJECTIVES

The project seeks to provide a comprehensive automated CBM+ solution for VL aircraft by employing TEAMS Toolset for real-time system health monitoring and prognosis, thereby enabling the pilots as well as ground-support personnel to obtain crucial alerts that improve the operational uptime of the vehicle. The goal is to utilize existing TEAMS Toolset capabilities and develop new data-driven techniques, in conjunction with model-based approaches, within the TEAMS framework to perform Condition Based Maintenance of the VL platforms. This facilitates automated and real-time fault detection/diagnosis/prediction, Time-to-Alarm and Time-to-Failure estimation, and timely maintenance based on actively observed key sub-system performance parameters.

ACCOMPLISHMENTS

NOTABLE DELIVERABLES PROVIDED
- Held several discussions with NASA COTR and identified the S-92/S-76 platform as the appropriate VL platform for demonstration of the proposed CBM+ solution.
- Re-purposed a generic version of the TEAMS® Helicopter Transmission Model as the basis for the S-76/S-92 Helicopter model.
- Investigated the CONOPs of getting the aircraft data to ground and concluded that a practical approach was to simply post-process the Aircraft Data Files (ADF) offline
- Demonstrated the offline data processing mechanism that considers variable log (sample) rates of different parameters.

KEY MILESTONES MET
- Demonstrated feasibility of hybrid modeling approach combining dependency modeling techniques with data driven approaches
- Demonstrated capability to predict anomalies using the hybrid modeling approach
- Hosted periodic status meetings with the project COTR Paula Dempsey and NASA stakeholders.
- Created a list of Phase II Implementation tasks.

FUTURE PLANNED DEVELOPMENTS

PLANNED POST-PHASE II PARTNERS
- FAA’s NextGen program
- DoD’s Future Lift Vehicle (FVL) program
- US Air Force, US Navy, commercial aviation (e.g., Boeing, Airbus), automotive
- NORAD, Space Command ground segments, JSF, BMD systems
- LM’s Indago and KMAX, Sikorsky’s MATRIX unmanned helicopters
- Skunk Works P-791 hybrid airship

PLANNED/POSSIBLE MISSION INFUSION
- NASA’s long-duration missions in space science and exploration
- NASA’s Glenn Research Center is interested in Rotorcraft for emergency and military transport, power line monitoring, offshore oil servicing, or media service
- NASA’s next generation Mission Control Technology
- Hybrid/full electric systems with a vertical lift capability for civil missions

PLANNED/POSSIBLE COMMERCIALIZATION
- Y1 of Ph II: Seek Ph III support from a NASA prime contractor through acquisition programs or a commercial investor.
- Y2 of Phase II: Formalize Phase III or Phase II-E funding commitment of $150,000 over one year from Y1 source.
- Y1 of Phase II-E or Phase III: Sell site or additional licenses to NASA JSC, KSC and ARC & other prime contractors for the identified acquisition programs.

CONTRACT (CENTER) NNX16CC44P (GRC) SOLICITATION-PHASE SBIR 2016-I

SUBTOPIC A1.06 Vertical Lift - VL Measurement Techniques and Condition-Based Maintenance TA N/A

TRL 1 2 3 4 5 6 7 8 9 IN OUT