

**ANNEX
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AMES RESEARCH CENTER
AND
PURDUE UNIVERSITY
UNDER SPACE ACT UMBRELLA AGREEMENT
NO. 32991 / SAA2-403581
(ANNEX NUMBER ONE)**

ARTICLE 1. PURPOSE

This Annex shall be for the purpose of establishing a collaboration on battery modeling and experimental testing for aerospace applications between NASA Ames Research Center and the Department of Mechanical Engineering at Purdue University (Purdue). Purdue Department of Mechanical Engineering has expertise in advanced battery modeling and testing techniques. Many high-performance aerospace applications, which are typical for NASA, require high performance batteries with stringent requirements for high energy storage capacity, power, and safety. Such batteries are often not available commercially and must be designed for the specific application. Battery modeling will dramatically accelerate development of high-performance batteries and enable their associated engineering applications. NASA and Purdue will collaborate on battery modeling and experimental testing for NASA electric aircraft applications and others to be determined.

Throughout the term of this Annex, NASA will identify aerospace applications that require improvements in battery technology and will therefore benefit from battery modeling and testing to be performed at Purdue. NASA will provide 1) modeling expertise 2) experimental data and 3) application requirements to Purdue. NASA data and requirement specifications will serve as inputs to Purdue's models and will also help validate the model outputs. Similarly, Purdue will provide modeling data and experimental test data to be used as inputs and validation for NASA models. Both NASA and Purdue will contribute to joint publications and presentations resulting from the collaboration.

The battery modeling and experimental testing collaboration will result in new frontiers and unique research and development that can be beneficial to NASA in its future space missions, including potential use of the technology in lunar missions, and aeronautics applications. Purdue is interested in the collaboration to enhance in-house expertise and further its model development using inputs from NASA. Purdue can also benefit from advancing STEM development and expanding its research portfolio to better pursue new research opportunities.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113(e)).

ARTICLE 2. RESPONSIBILITIES

A. NASA ARC will use reasonable efforts to:

1. Identify NASA applications that will benefit from battery modeling and testing
2. Provide NASA battery modeling results and test data to Purdue Department of Mechanical Engineering
3. Perform further analysis utilizing data provided by Purdue
4. Contribute to publications and presentations resulting from the collaboration

B. Partner will use reasonable efforts to:

1. Provide Purdue battery modeling and testing results and data to NASA
2. Contribute to publications and presentations resulting from the collaboration

ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

Milestone	Estimated Completion Date
Identify NASA applications that will benefit from battery modeling and testing (NASA)	Six months after execution of this Annex
Provide NASA battery modeling results and test data to Purdue Department of Mechanical Engineering (NASA)	Four years after execution of this Annex
Provide Purdue battery modeling and testing results and data to NASA (Purdue)	Four years after execution of this Annex
Contribute to publications and presentations resulting from the collaboration (Joint)	Five years after execution of this Annex

ARTICLE 4. FINANCIAL OBLIGATIONS

There will be no transfer of funds between the Parties under this Agreement and each Party will fund its own participation. All activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of one year.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate document.

2. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate document.

3. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate document.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None

ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or five years from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

ARTICLE 7. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

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ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

Management Points of Contact

NASA Ames Research Center

Nahri Ahn
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Technical Points of Contact

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Purdue University

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ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

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ARTICLE 10. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

**NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
AMES RESEARCH CENTER**

BY: _____
Eugene Tu
Center Director

DATE: _____

PURDUE UNIVERSITY



BY: _____
Eric S. Lynch
Senior Contract Analyst

DATE: December 10, 2020

Digitally signed
by Eric S. Lynch
Date:
2020.12.10
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