May 11, 2016

Karlene Fine, Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

Dear Ms. Fine,

Packet Digital is submitting the enclosed grant application to request funding in support of the Renewable Energy Project, "Solar Soaring Power Manager" in the amount of $375,000. This funding will be used as a match for the twelve month project which will run from October 1, 2016 to October 1, 2017 and has a total budget of $1 million. Other partners in this project include the Naval Research Lab, ComDel Innovation, c2renew, Chiptronics, the Northern Plains Unmanned Systems Test Site, NDSU, and UND.

The development of a reliable Unmanned Aircraft System (UAS) powered by clean, renewable energy will have a very significant impact on North Dakota and the world over. The applications for this technology are nearly limitless, from agriculture to water management to pipeline monitoring.

If you have questions I can be reached at 701-365-4421 or terri.zimmerman@packetdigital.com.

This letter sets forth a binding commitment on behalf of Packet Digital to complete the project as described in the application. Thank you for our consideration.

Sincerely,

Terri Gunn Zimmerman
CEO
Packet Digital, LLC
201 N 5th St, Suite 1500
Fargo, ND 58102

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Renewable Energy Program

North Dakota Industrial Commission

Application

Project Title:

Solar Soaring Power Manager

Applicant:

Packet Digital, LLC

Principal Investigator:

Andrew Paulsen

Date of Application:

May 11, 2016

Amount of Request:

$375,000

Total Amount of Proposed Project:

$1,000,000

Duration of Project:

12 months - Oct 1, 2016 to Oct 1, 2017

Point of Contact (POC):

Terri Zimmerman

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701-365-4421

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terri.zimmerman@packetdigital.com

POC Address: 201 N 5th St. Ste 1500 Fargo ND

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ABSTRACT

Objective: Create a solar soaring power management system for Unmanned Aircraft Systems (UAS) to initially double fly times and ultimately provide unlimited endurance powered by solar energy. This will be achieved by harnessing solar energy with high-efficiency, flexible photovoltaics along with advanced power management algorithms. Packet Digital will create an advanced solar power management and distribution system (PMAD) combining flexible, high-efficiency power conversion circuitry to dramatically extend flight times in unmanned aircraft. A result will of this work will be a commercial extended endurance UAS.

Expected Results: This project will develop the most efficient solar cells, auto soaring, and power management algorithms to initially demonstrate doubled flight times and ultimately unlimited endurance in unmanned aircraft. Project expected results include:

- Develop a 40% efficient solar cell in a flexible solar array, optimized for a UAS wing
- Develop a high efficiency solar power management and distribution system
- Demonstrate extended flight time on a UAS constituting the basis for an “eternal” aircraft
- Develop a manufacturing plan for a commercially viable extended endurance UAS

Duration: Three-phase project: Phase I of 9 months, Phase II of 9 months, and Phase III of 12 months.

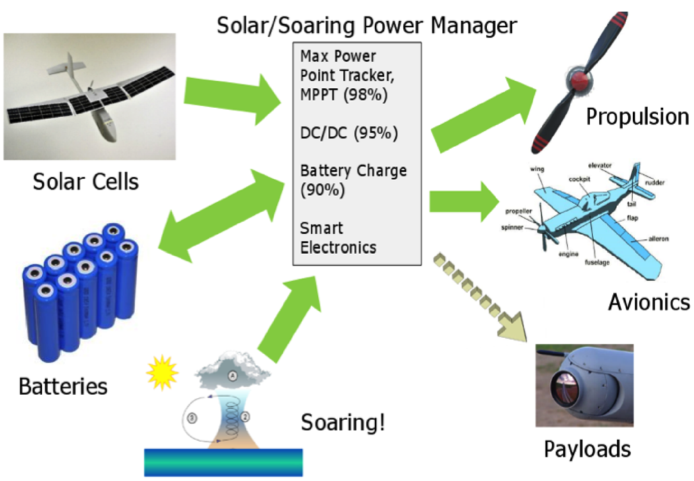
Total Project Cost: $1,010,000 Phase I ($500k REC, $260k Naval Research Lab, $250k Private Investor), $1M Phase II ($350k REC, $600k NRL, $50k PI), and $1M Phase III ($375k REC, $625k NRL).

Participants: Packet Digital LLC, Naval Research Lab (NRL), Chiptronics in Dunseith, ND, ComDel Innovation in Wahpeton, ND, the Northern Plains Unmanned Systems Test Site, c2renew in Fargo, ND, NDSU, and UND.

PROJECT DESCRIPTION

Objective: This research and development project will create a solar soaring power management system for Unmanned Aerial Systems to initially double fly times and ultimately provide unlimited endurance powered by solar energy. This will be achieved by harnessing solar energy with high-efficiency, flexible photovoltaics and advanced power management algorithms.

This product will optimize the power conversion from the solar array to the batteries, from the batteries to the electronics, and from the batteries to the propulsion motor. The power conversion circuitry will provide state-of-the-art high efficiency power while the microprocessor runs advanced algorithms for maximum power point tracking, and an optimized torque motor control to efficiently deliver power to the propulsion system. The conclusion of this work will include a cost effective commercial UAS manufactured in North Dakota.



Methodology: This project will incorporate classical systems engineering and rapid application development. Modeling of a UAS indicates that a 40% efficient solar cell combined with efficient soaring would enable continuous flight. Similarly, 22% efficient solar cells combined with efficient power electronics can enable "all day" flights that allow an operator to fly for a full shift. This project includes: solar cells, algorithms to maximize the solar energy, power management, and commercialization of the resulting UAS. The following summarizes the achievements for the Phase I and II efforts:

Phase I Achievements - Solar Cell Development: NRL achieved 32.4% efficiency under one sun with a flexible, inverted metamorphic solar cell. To achieve higher efficiency, next generation of transfer-printed stacked multi-junction solar cells were designed, grown, and developed consisting of Aluminum Indium Gallium Phosphorus, Aluminum Gallium Arsenide, and Gallium-Arsenide layers. An initial triple-junction solar cell grown on Gallium Arsenide, stacked onto a single-junction InP grown cell resulted in an efficiency of 33.8% under one sun and the device achieved a near record setting efficiency of 44.75% under concentrated solar illumination of 837 suns. A flexible array design was developed of these solar cells for mounting on the UAS wings. Geometries, mechanical, and electrical designs were completed and modifications to the SBXC airframe wings have been made to mount the solar cell arrays.

Soaring Algorithm Development Power budget models and the solar soaring algorithms were implemented for the SBXC airframe to extract the most solar energy during soaring maneuvers. Solar soaring finite state machine to handle the mode switching between motor operations for various stages of flight were created. Test flights were conducted to measure solar insolation with an airframe outfitted with a solar intensity sensor. Modeling of the power budget shows the solar powered aircraft, SBXC, should be able to fly in North Dakota on the winter solstice for approximately 14.0 hrs and on the summer solstice for approximately 26.2 hrs using solar photovoltaic and autonomous soaring techniques. Saving 50% airframe weight and adding 50% additional photovoltaic array area makes eternal endurance feasible.

Power Management Development The fast-tracking, high efficiency Maximum Power Point Tracker (MPPT), smart battery capable of in-flight charging by solar and cell balancing, and Power Management and Distribution (PMAD) system have been designed, assembled, and tested. Characterization is ongoing and initial results are as expected. The initial architecture and feasibility analysis of a UAS-specific solar ASIC has also been completed during Phase I.

Phase II Achievements -

Solar Cell Development Initial material growth runs consisting of 3 junction cells based on Gallium Arsenide (GaAs) stacked upon 2 junction cells based on Indium Phosphide (InP) have demonstrated efficiencies of nearly 37%. The next stage is to establish the full 6 junction cell using Gallium Antimonide (GaSb) bottom cells where efficiency of ~40% is expected. The solar arrays have also been designed and prototyped. NRL has established a design for flexible solar arrays that will serve as the top most layer of the UAV wing skin. Several prototype array structures have been built, and they are now in the process of being tested in the NRL lab, and in the NRL wind tunnel.

Updated Power System for Alternative Aircraft The power electronics have been adapted for the Botlink ER-1 aircraft. This is a more affordable and consumer friendly airframe than NRL's SBXC. Several alternatives for applying solar arrays to the wings are being evaluated for optimal flight and cost of manufacturing.

Hybrid Smart Battery Two technologies have been evaluated for the hybrid smart batteries. A Graphene battery which offer higher peak output power than standard Lithium polymer batteries was integrated into the smart battery and characterized. A hydrogen fuel cell system was also investigated and a path to implementation has been identified should a viable application arise. The smart battery was successfully flight tested during phase II.

Optimized Torque Motor Control An optimized torque motor controller has been designed and customized for the UAS. Initial evaluation showed improvements in efficiency and vibration. A custom printed circuit board is currently being fabricated for testing under the Phase II effort, which is still in progress.

Solar Soaring Algorithms Significant progress was made converting the solar soaring algorithms from a PC-based system to an on-board flight controller during phase II. However, given that the current FAA height restrictions (400') are not high enough (>1000') to extract significant energy from thermal updrafts, this technology will not be included in the phase III unless FAA regulations change, in which case it can be reinstated.

Testing: All the components are being assembled and test flights are expected this summer and fall.

Phase III Objectives:

Objective 1: Solar Wing Development

Task 1 – Integration of GaAs solar array wings. The NRL team has achieved 33% at the cell level and 27% at the solar-wing level for the GaAs solar cells. A material design and manufacturing process that will enable the solar arrays to constitute the upper most layer of the wing-skin has been established. The focus in Phase III will be incorporating the arrays into the airplane superstructure. This will be followed by extensive lab and flight testing.

Task 2 - Integration of lower cost solar cells for solar wings. NRL's high efficiency GaAs solar cells have industry leading efficiency, but will only be viable in markets that can tolerate the high price. Therefore, more modestly priced solar cells are needed to provide extended endurance to a broader market. Commercially available Si-based solar cells will be targeted. This task will include electrical testing and evaluating suitability for mounting to a UAS wing (i.e. flexibility, thickness, and weight). Prototype wings will be constructed and tested alongside the GaAs wings.

Objective 2: System Integration

Task 1 - Integrate solar wings, smart battery, MPPT, PMAD, and ESC. While the individual components of the extended endurance UAS have been tested and several components have been integrated for flight testing (e.g. PMAD and smart battery), this task will combine the entire system. Integration will be performed and documented with an end goal of efficient manufacturing.

Objective 3: System Testing

Task 1 - NRL flight testing. NRL will continue to outfit their SBXC's with solar wings, autonomous soaring, and Packet Digital's power electronics. Flights will be performed with both NRL's high efficiency GaAs solar cells, as well as lower cost, lower efficiency Si solar cells. Several flight tests are planned to further evaluate and refine the UAS platform. Flight tests will take place at Blossom Point (an NRL institution) and Aberdeen Proving Ground in Maryland, (an Army institution). The NRL team conducts fight testing from these two locations on a monthly basis.

Task 2 - Packet Digital flight testing. Packet Digital will flight test the ER-1 outfitted with solar wings, MPPT, smart battery, PMAD, and ESC. This will include the first solar powered flight for the ER-1 using custom designed solar wings by c2renew. Flights will take place in cooperation with the Northern Plains UAS Test Site. Information gathered from each flight will be used to refine the UAS platform.

Objective 4: Manufacturing Plan for Commercial UAS

Task 1 - Design manufacturing-friendly solar wings. c2renew of Fargo, ND will design a low cost manufacturing process for the composite wings with implanted solar cells. The wings will replace the stock wings from the ER-1 with solar wings of equal or better weight, strength, and aerodynamics. c2renew will manufacture the initial wings, but the manufacturing process will be transferable to a third party.

Task 2 - UAS Manufacturing. In order to support commercial sales of the solar UAV, a manufacturing plan will be established. Chiptronics has the facilities and resources to perform the electronics and airframe assembly, as well as shipping and handling. Packet Digital will work closely with Chiptronics to define the required plans, procedures, testing, and quality assurance programs. ComDel Innovations can provide airframe manufacturing.

Phase III Completion: Execute on system integrations and flight tests and establish a manufacturing plan for an extended endurance solar UAS.

Anticipated Results: Phase III will result in flight tested and manufacturing-ready extended endurance aircraft with a Packet Digital solar power system and wing mounted solar arrays.

Phase III Deliverables:

- Produce a solar cell covering the desired spectrum with 30-35% efficiency, with a target of 40%
- Perform multiple flight tests utilizing a solar enabled extended endurance UAS
- Develop a manufacturing plan for a commercially viable extended endurance UAS

Facilities: Development activities will occur at Packet Digital's facility in Fargo, North Dakota. Packet Digital is fully equipped for the design and development of the prototype circuitry defined herein. A full tool suite of computer-aided design software and laboratory equipment is in place for conceptual design, debug, and integration. For photovoltaic research, NRL has expertise in optoelectronic device modeling, design, growth, fabrication, and characterization. NRL maintains a III-V semiconductor growth and processing facility with three Molecular Beam Epitaxy (MBE) reactors as well as a state-of-the-art solar cell material and device characterization laboratory including solar simulators providing high spectral fidelity. NRL also maintains an extensive capability in the design, fabrication, and flight testing of UAS. Additionally, facilities providing test equipment at North Dakota State University are available through a professional relationship. Manufacturing facilities are available through Chiptronics in Dunseith, ND and ComDel Innovations in Wahpeton, ND. The Northern Plains UAS Test Site is headquartered in Grand Forks, N.D., and uses several UAS Test Ranges.

Resources: Packet Digital, with power management expertise and mixed signal ASIC design experience, will develop the battery charging and high efficiency power management solutions. NRL, with extensive UAS expertise, will provide the soaring algorithms and high-efficiency solar array. A commercially available bare airframe will be purchased and assembled at Chiptronics in Dunseith, ND. A relationship with c2renew of Fargo, ND has been established for the manufacturing of the solar wings. Packet Digital will partner with

NDSU and UND on testing and analysis of the aircraft flight performance. The Northern Plains Unmanned Systems Test Site will be utilized for flight testing and evaluation.

Techniques to Be Used, Their Availability and Capability: The solar cell development will require new techniques to achieve the project goals. New materials will be used for the cell fabrication in order to achieve the 40% efficiency believed to be required for unlimited flight. These materials will also be fabricated using new techniques to insure the flexibility required. Although these aspects of the solar cell development will be new, NRL and Packet Digital engineering teams believe, based on their experience, that a solution is possible. Should the resulting solar cells be too expensive for the broad commercial market, solar arrays based on lower cost and lower efficiency solar cells will also be designed. The Packet Digital team will develop specialized power algorithms to optimize the solar energy. The techniques to be used for the power management portion of the project will be well understood and familiar to Packet Digital.

Environmental and Economic Impacts while Project is Underway: This project is focused on using clean renewable solar energy providing a positive environmental impact as the aircraft will be flown for testing without using any fossil fuels. The economic impact will be significant with twenty to twenty-five persons being employed for the duration of the project.

Ultimate Technological and Economic Impacts: This project will expand the applicability of unmanned aircraft. Unlimited flight time and clean renewable power source will mean that these aircraft can be deployed to provide continuous surveillance for pipeline monitoring and environmentally sensitive areas. There is also great interest in utilizing UAS for precision agriculture for monitoring crop health and weed and moisture management. Also, unmanned aircraft can provide services such as Internet access to areas that lack the necessary infrastructure. This Internet access can be used for medical services, education, commerce and many other positive social and economic benefits.

NRL expects many benefits from this project including reduction in forces, increased troop safety, increased effectiveness of military operations, and others. These same benefits could help in the private sector as well, particularly where safety is a concern such as the oil and gas industry.

The solar cell and power management technology also has potential to improve any application that currently uses solar technology. The 40% efficient solar cell being developed is a great improvement over the most efficient solar cells today, which are around 33% efficient. The increased efficiency that is being proposed for this project could be used for homes, remote warning systems, traffic signals or any number of applications where a battery needs to be charged using solar energy.

Why the Project is Needed: Battery life on commercial UAS is extremely short, approximately 20 minutes, limiting applicability and uses. Significantly extending battery life and, ultimately, creating an eternal aircraft changes the entire industry, creating many new applications. A primary use for unmanned aircraft systems is surveillance; e.g. commercial monitoring of gas pipelines or agricultural crops or military surveillance over the ocean or remote areas, reducing risks for our soldiers. In any surveillance application, unlimited flight times are a huge benefit, realized in cost reductions and increased effectiveness. Time consumed returning for refueling is time taken away from doing assigned tasks. In many cases, where the task must not be interrupted, multiple aircraft are deployed in order to insure constant surveillance. Not only will this project reduce the number of unmanned aircraft needed for a particular task but the aircraft will use clean renewable energy rather than the fuels that are used today in extended flight applications.

STANDARDS OF SUCCESS

The project goal is to initially double fly times on a UAS and ultimately create unlimited flight endurance.

Project Deliverables:

- Deliver a 20% improvement in the efficiency of solar cell power, from 33% currently to 40% in order to provide enough solar battery power to enable unlimited flight
- Achieve power management with greater than 90% efficiency for typical loads, with a target of 95%, to extend battery life sufficiently to survive nighttime flight
- Innovative MPPT algorithm for extracting maximum charging capacity from the solar cells
- Develop a manufacturing plan for a commercial extended endurance solar UAS

The value to North Dakota: Current commercial fly times of UAS are approximately 20 minutes, making it impractical to utilize UAS for many applications. By developing this solar soaring power management to extend fly times and removing this limiting factor, UAS become more practical and applicable to many markets and users in North Dakota and globally including:

AGRICULTURE Crop monitoring (eg. disease, irrigation) Water absorption of soil Spraying to manage weeds and other pests	**ENVIRONMENTAL** Air quality management/control Wildlife monitoring and behavioral research Prairie and erosion monitoring
INDUSTRIAL Spill tracking Power line and infrastructure monitoring Runway inspection	**EMERGENCY RESPONSE, LAW** SWAT missions and narcotics sensors Law enforcement and border monitoring Monitoring surveillance of establishments
PIPELINE MANAGEMENT Leak detection Security	**COMMUNICATIONS** News and sports broadcasting Satellite augmentation systems
WATER MANAGEMENT Monitoring water levels, flood alerts	**CLIMATE MONITORING** Fire danger assessment

Packet Digital is already in discussion with a number of commercial partners including Google (Titan Aerospace), Singapore Aerospace, Microlink and Altavian. Packet Digital's management team brings over 40 years of experience in developing, incubating and commercializing new technologies. Packet Digital's CEO has extensive experience launching new products and services in global markets.

This research and development effort will bring the manufacture of solar UAS with the extended flight times to North Dakota manufacturing partners (c2renew, Chiptronics, ComDel Innovations). The local universities will assist in fabrication design, testing and analysis. Testing of the Solar Soaring UAS at the Northern Plains Unmanned Aircraft Test Site will create more visibility for the test site and North Dakota and this cutting edge solar technology will attract collaborating companies to the test site. This effort will preserve jobs and create new jobs in the research and development with twenty to twenty-five persons being employed for the duration of the project, with more added for the manufacture of the UAS, testing and analysis at the universities and the North Plains Unmanned Aircraft Test Site.

This North Dakota project will enhance the research and education in the area of solar cells utilizing new techniques to develop the most efficient solar cells in the market. Achievement of persistent, solar powered light will require advanced power management and peak power tracking electronics. Within this Renewable Energy Council project, the usage of a differential evolution or mutation methodology will be studied and researched. During the project, Packet Digital will work with both NDSU and UND.

BACKGROUND/QUALIFICATIONS

Packet Digital has developed power management integrated circuits and technology to extend battery life or reduce power consumption in a number of applications. Our patented On-Demand Power®

technology addresses the shortcomings of software-based power management by moving the control out of the microprocessor and placing the intelligence inside the power management integrated circuits (PMICs). One of the key differentiators of our technology is that it offers *active* power savings, meaning the circuitry does not have to be put into a sleep mode to save power. This is critical in UAS applications because of the importance of maintaining full functionality while in flight. With our technology, we have extended battery life 400% in wireless sensors, 40% in a portable radio for the military, and reduced power consumption by 20% in data center servers. We will bring our expertise in building power-efficient systems and intelligent power management algorithms to develop the most power-efficient UAS.

Modeling of a UAS indicates that a 40%-efficient solar cell, combined with efficient soaring, would enable continuous flight. The NRL has developed the most advanced solar cells demonstrating 33% efficiency. We propose to achieve the required the 40% efficiency by layering semiconductor materials with varying band-gaps in an attempt to most efficiently convert the broad solar photon spectrum.

Achievement of persistent, solar-powered flight will require advanced power management and maximum power point tracking (MPPT) electronics. The role of an MPPT is to adjust the load voltage of the solar array to maximize the power that can be extracted. This is a dynamic process that must respond to changes in the environment such as changes in solar insolation and array temperature. Packet Digital has also developed novel methods for achieving MPPT.

This project will be completed in three phases. The first phase is nine months in duration and involves the architecture and prototype of the power management circuitry, fabrication of flexible solar cells, and development of the soaring algorithms. Power conversion, solar MPPT conversion, and battery charging algorithms will implemented using discrete parts. Phase I included the integration of the discrete power management solution, solar cells and soaring algorithms into a test fixture.

Phase II of the project will be nine months in duration and will include increasing the efficiency of the UAS through use of a hybrid smart battery and more efficient motor control methods. Also in Phase II, the Phase I power system will be adapted to an alternative aircraft manufactured in North Dakota. Phase II will also include porting NRL's soaring algorithms to a generic microprocessing unit. The solar cell work will consist of improving the efficiency and flexibility of the cells by optimizing the materials and the substrate using the test results of Phase I. The soaring algorithm work will concentrate on nighttime flight. Phase II will conclude with the integration of the solar, soaring, and power solutions into a prototype UAS which will be used to demonstrate extended flight times.

Phase III will be twelve months in duration and will complete the project. All of the pieces of the project will come together to produce the complete unmanned aircraft system solution. The solar charging, soaring, and power management solutions will be integrated into the airframe. This completed UAS will undergo extensive testing at test sites in North Dakota and the Aberdeen Proving Grounds. The test flights will be used to refine the design to achieve the stated goal of unlimited endurance flights. The solar cell and soaring algorithm work will continue for the NRL team as they work on further enhancements to the design.

Management Team: Andrew Paulsen, Director of Advanced Technology for Packet Digital, a key leader in the initial development of PowerSage® technology. He leads the Advanced Power Management Team, developing new products and technology. Paulsen has extensive research, testing, and product development expertise in the power field. He has significant experience in solar-powered vehicles, battery charging, and motor controls from many years leading the electrical group of the NDSU solar racing team.

Terri Zimmerman, Packet Digital CEO, has over 20 years of experience developing, incubating, and commercializing new technologies. She has raised over $500 million in capital to launch new products and services in global markets. She has grown companies to significant revenues resulting in successful exits. She has been appointed to a state economic development board by the Governor of North Dakota.

Naval Research Lab: Dr. Dan Edwards has been PI on two prior autonomous soaring efforts and wrote his Ph.D. thesis on the topic. He has participated as an autonomous soaring subject matter expert for the Office of Naval Research, Army Research Lab, and industry partners. He has extensive experience with long-duration UAS acting as a key player for the 48-hour Ion Tiger Liquid Hydrogen fuel cell program.

Dr. Rob Walters has over 20 years of photovoltaic experience and is currently managing three solar cell development efforts and has a recent patent on novel multi-junction solar cell design. He also has extensive experience and expertise in fielding solar cell experiments, including five space experiments and an underwater solar experiment. He is executing a flexible solar array development project under Department of Defense funding.

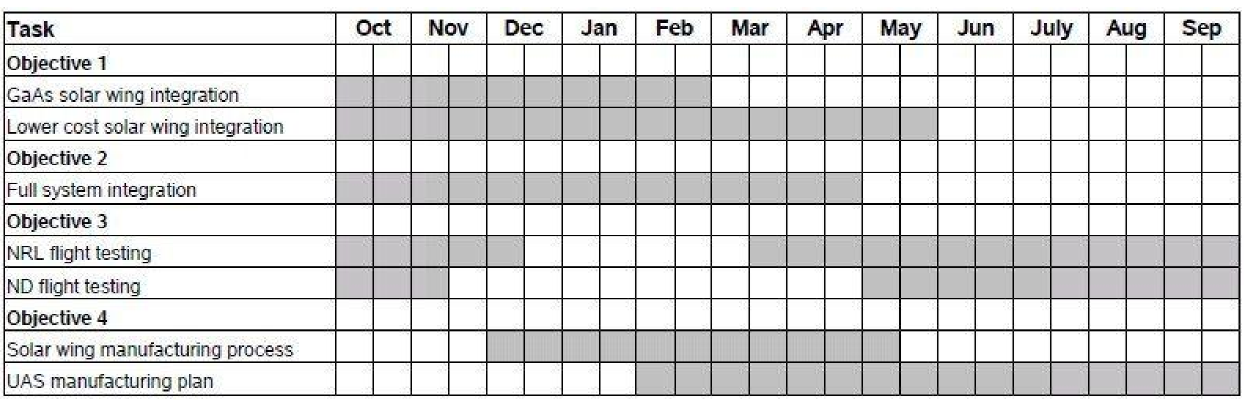
MANAGEMENT

Management Plan: Packet Digital will lead the effort with significant collaboration of NRL and support from c2renew, Chiptronics, ComDel Innovations, the universities, and the Test Site. Teams will work in parallel and interact directly as needed. Weekly status meetings will be held via teleconference, however, face-to-face meetings will be scheduled quarterly to ensure team cohesiveness. The development schedule and financial reports will be updated on a monthly basis. Major schedule items will include systems requirements definition, design and development activities, prototype development, integration and test, and final delivery.

Quality Assurance & Systems Engineering: Existing validated software and hardware will be leveraged as much as possible. A tailored systems engineering approach will be utilized for this development effort to efficiently execute the development while ensuring proper due-diligence is maintained. A risk management approach will be utilized including a matrix to track requirements that are deemed to have high risk.

TIMETABLE

The following table shows the project schedule for this phase. The timeline includes developing and testing discrete prototypes of the various systems as well as extensive lab testing and flight testing.



BUDGET

Project Associated Expense	NDIC's Share	Naval Research Lab Share	Total
Total Personnel Cost	$265,000[1]	$505,000	$770,000
Software and Materials	$110,000	$120,000	$230,000
Total	$375,000	$625,000	$1,000,000

1. Direct personnel costs plus indirect overhead and G&A (65%)

The $1,000,000 budget is based on estimates for the time, material and software for the tasks detailed above in the timeline. Above labor, material and software costs of $375,000 are estimated for the Renewable Energy Council Grant. Other partners have committed to fund 62.5% of the budgeted costs. NRL has committed matching funds of $625,000 for the twelve month period.

Personnel Detail. The technical managers are budgeted 6 engineer-months for project oversight and will be involved with architectural design, reviews, documentation, and design verification. The software team is budgeted 6 engineer-months for algorithm and software design. The hardware team is budgeted 15 engineer-months for power conversion prototype boards, schematic design, layout, building and testing boards and airframe integration and testing. The flight team is budgeted 6 engineer-months for airframe build, test flights, and analysis. Project management and technology review time is also including in the budget.

PATENTS/RIGHTS TO TECHNICAL DATA

Packet Digital reserves the right to file patents related to the intellectual property generated from this proposal and will work with legal counsel to determine if additional patents could be filed. Our power management algorithms and methodology are protected by our patent portfolio. We also have copyrights and our registered trademarks include On-Demand Power®, PowerSage®, and Packet Digital®.