



Stanford
Energy and Environment
Affiliates Program

Using Sensors and Big Data to Solve Environmental Challenges

The Stanford Woods Institute for the Environment and the Energy and Environment Affiliates Program Request Proposals from Stanford Faculty

The deadline for submissions is Monday, June 30th.

Introduction

The proliferation of sensors of all kinds is producing a wealth of data on a wide range of environmental phenomena. The techniques of big data analytics—originally developed for finance and social media—are being applied to this physical data. Extreme weather events and rising sea levels have made it clear that we must focus on adaptation to climate change, even as we continue to work on mitigation.

We believe that research and innovation at the nexus of sensors and big data can lead to new devices, techniques, applications, products, and services for addressing climate change and other important environmental challenges. There are potential entrepreneurial applications in diverse industries such as the environment, agriculture, transportation, infrastructure, energy, consumer technology, mobile apps, finance, health, the military, and governments.

Program Priorities

The purpose of this seed funding competition is to develop novel solutions and viable business models around the application of sensors and data analytics to climate change adaptation and other environmental challenges.

Sensors encompass low-cost devices like the ones found on smart phones and sophisticated laboratory-grade instruments. Deployments range from smart dust to portable sensors, remote sensing, and fixed installations. Communications technologies include ad hoc wireless networks, high-bandwidth links, data storage for upload at later times, and associated security considerations. Applications of mathematics, computer science, and statistics include computation, analytics, data visualization, and machine learning, often in the context of big data.

The focus on commercially sustainable models is a response to two major ideas. First, environmental problems such as climate change adaptation are problems of huge scale; that is, solutions must be deployed at large scale if they are to have an impact commensurate with the size of the challenge and the opportunity. Second, economic viability is the path by which these solutions can be self-sustaining and deployed without dependence on philanthropic donors. The paying “customer” for such solutions might be corporations, governments, other organizations, or individuals.

The Stanford Woods Institute encourages new interdisciplinary collaborations among faculty who have not previously worked together, including scholarly communities that have not been active in the Stanford Woods Institute to date. The technical fields described above are all potentially within the scope of this RFP.

Proposal Submission and Review Process

Applications should be submitted, with all materials combined into a single pdf, to Brian Sharbono, Program Manager, Stanford Woods Institute at sharbono@stanford.edu. **The deadline for submissions is Monday, June 30th.**

Proposals should include:

1. A well thought out research plan that is realistic about what results can be obtained within the budget limitations and projected time period.
2. A discussion of the potential to achieve climate change adaptation or other benefit at a significant scale if the ideas developed in the research are successful.
3. A description of the use of sensors and data analytics.
4. An explanation of the reasons why the proposed project is appropriate for seed funding and, if appropriate, why it differs from research funded already for the faculty member.
5. A description of the investigators' qualifications to carry out the proposed research. Prior work in the areas proposed is not required; however, an explanation of how the investigator's expertise can be applied toward such research should be provided.
6. A description of the interdisciplinary nature of the team, the contributions of each discipline, and how team members will operate as an integrated unit.
7. A description of the anticipated outcome of the project and an assessment of potential entrepreneurial opportunities or funding sources for future work based on the results of the project. If support for similar work is being requested or is already in hand from other sources, on campus or off, a listing of those proposals, amounts, and funding sources must be included.

Proposals will be evaluated by a committee of faculty with expertise related to the areas of proposed research but who are not involved in the proposed projects.

Project Funding and Duration

Expected seed funding for each proposed project is up to \$70,000 of direct costs. It is expected that projects will be funded for a period of performance of 9 months to 18 months.

The source of funding is gift funds, so no project may charge indirect charges (IDC). The budget should include only direct costs. The infrastructure charge (ISC) for the project funding will be paid directly by Stanford Woods Institute for the Environment and the Energy and Environment Affiliates Program.

The primary Principal Investigator (PI) must be a member of the Academic Council or Medical Center Line status in the School of Medicine at Stanford University.

Project Reporting

PIs of funded projects will be expected to prepare a final project report and presentations, and project PIs and students will be expected to participate in technical review sessions, workshops in related areas, and other activities that report on the research being performed. A financial report is also required.

Guidelines and Information for Proposed Research Projects

Project Description

The proposal should describe in clear terms (with minimal use of jargon) the problem to be addressed, project objectives, desired results, and research methods. If the research is an interdisciplinary effort, please describe how the various disciplines contribute. Describe how this project may evolve to create a new commercially viable business, including how it will create economic value and what types of entities (startup companies, large corporations, governments, etc.) are likely to establish such a business.

Proposal Format

Proposals are limited to five pages of description of the proposed research including any figures. Proposers are encouraged to be as concise in their exposition as possible. Proposals must be self-contained with no links to additional information. The details of the formatting are left up to individual authors, but the text, figures, tables, and references must fit within the five-page limit, fonts should not be smaller than 10 point, and margins must be at least one inch on all sides. The budget and budget justification are limited to an additional two pages. In addition to this, and not subject to the page limit, a brief background should be submitted for each Principal Investigator who will be associated with the proposed work, limited to one page per PI.

Proposal Review

The proposals submitted in response to this solicitation will be screened for relevance and then reviewed by a committee of faculty with expertise related to the areas of research but who are not involved with the proposed projects. The opinions of additional experts at Stanford or outside of it may be sought, with the requirement that the reviewer maintain the confidentiality of the proposed research. The members of the review committee will be asked to assemble a prioritized list of proposals received in response to this request for proposals that they believe should be funded if sufficient funding is available.

The objective of the review process is to identify high quality projects that are consistent with the goals of this solicitation. Reviewers will be asked to specifically address the following questions in their evaluations:

- Is the proposed research of high quality? What are the principal strengths of the proposed work? Are there weaknesses in the proposed research?
- Is the proposed work directly targeted to demonstrate the potential if the ideas developed in the proposal are successful?
- Are the investigators well qualified to carry out the research?
- Does the team represent an interdisciplinary collaboration and are all disciplines included in the proposed work?

- Where does the proposed research fit in the spectrum of work going on now in the research area?
- Does the research have high potential to generate commercial business opportunities or follow-on funding from external sponsors?
- Is the proposed budget and schedule reasonable?
- Should the proposed work be funded?

Please contact Brian Sharbono at sharbono@stanford.edu with any questions. Again, the deadline for submitting proposals is Monday, June 30th.

The Stanford Woods Institute for the Environment is the hub of interdisciplinary environment and sustainability research at Stanford University. The Institute is committed to helping produce solutions to the major sustainability challenges facing the world.

The Energy and Environment Affiliates Program is Stanford's corporate affiliates program for energy, environment, materials, chemistry, and sustainability. The EEAP facilitates relationships between corporations and faculty across the Stanford campus.