CITRIS and the Banatao Institute
Core Seed Funding Opportunities for 2019

Deadline: Thursday, January 31, 2019 at 5:00 PM (PST)
Weblink: http://bit.ly/CITRISSeed2019
Questions: seeds@citris-uc.org

CITRIS and the Banatao Institute create information technology solutions for society's most pressing challenges. Established in 2001, the Center for Information Technology Research in the Interest of Society (CITRIS) leverages the interdisciplinary research strengths of multiple UC campuses to advance the University of California's mission and the innovative spirit of California. The institute was created to shorten the pipeline between world-class laboratory research and the development of cutting-edge applications, platforms, companies, and even new industries.

We invite Principal Investigators at UC Berkeley, UC Davis, UC Davis Health, UC Merced, and UC Santa Cruz campuses to apply for seed funding that furthers CITRIS and the Banatao Institute research initiatives, strengthens connections among UC campuses, and catalyzes early-stage research that can lead to external funding.

Funded projects have attracted more than $60 million in follow-on support from federal, state, corporate, and private sources including the National Science Foundation, National Institutes of Health, Intel, Microsoft, Mellon Foundation, and the Bill & Melinda Gates Foundation.

View descriptions of prior awardees and projects:
http://citris-uc.org/core-seed-funding/#past-awards.

	2019 Core CITRIS Seed Funding
Area(s) of Interest	Health People and Robots Sustainable Infrastructures **New Initiatives for 2019:** Policy Lab The Future of Work Women in Technology
Total funds available	$600,000
Project amount	$40,000 to $60,000
Eligibility *CITRIS Campuses:* *UC Berkeley* *UC Davis* *UC Davis Health* *UC Merced* *UC Santa Cruz*	All applicants must have Principal Investigator (or exceptional PI) status on their campus. At least two PIs per proposal. Each from a different CITRIS campus.

Timeline

- **November 30, 2018:** Call for 2018 CITRIS and the Banatao Institute Seed Fund proposals will be announced online. CITRIS Newsletter (http://bit.ly/SubscribeCITRIS) and seed funding interest list (http://bit.ly/CITRISSeedInfo2019) subscribers will receive the RFP information by email.
- **January 2019:** Each CITRIS campus may host an information session for potential applicants. Dates and details will be posted on the Seed Funding webpage.
- **November 2018-January 2019**: Matchmaking and multi-campus team formation occurs among Principal Investigators. Complete the seed funding interest form for assistance with finding compatible co-PIs.

- **December 10, 2018:** Online application portal opens for submissions. Link to the portal will be posted on the Seed Funding webpage.
- **January 31, 2019 at 5:00pm PST: Applications are due online.**
- **March 1, 2019:** Applicants who received a Seed Fund Award in 2018 must submit a preliminary report on findings and results in order to be considered for a Seed Fund Award in 2019.
- **Mid-March 2019:** Awardees are notified.
- **April 1, 2019:** Performance period begins for 2019 Seed Fund Award projects.
- **June 30, 2019:** Final reports for 2018 Seed Fund Award projects are due.

Eligibility and Proposal Requirements

For the 2019 Seed Funding opportunity:

- To encourage multi-campus collaboration, each proposal must include at least two Principal Investigators, from at least two different CITRIS campuses: UC Berkeley, UC Davis, UC Davis Health, UC Merced, UC Santa Cruz.
- Collaborations between PIs on the main UC Davis campus and the UC Davis Health campus in Sacramento fulfill the above requirement.
- Projects are expected to further one or more of the CITRIS and the Banatao Institute Initiatives described below. Proposals that include applications of such technology in developing regions are welcome.
- Projects that use CITRIS research assets, such as the Marvell NanoLab and CITRIS Invention Lab are also encouraged.

Exclusions

- CITRIS Seed Funding may not be used for faculty salary or non-resident tuition.
- Principal Investigators may participate in a maximum of two proposals per application cycle and serve as Lead researcher on a maximum of one proposal per application cycle.
- Principal Investigators who have previously received seed funding must submit an online status report for the previous project(s) before being considered for a new CITRIS Seed Fund Award.

Evaluation Criteria

CITRIS Seed Funding proposals are evaluated according to the following criteria:

1. **Feasibility:** Can the stated goals be achieved within 12-18 months?
2. **Creates solution to a societal challenge:** Is the societal problem and its scale clearly identified? Will the proposed project help to address this challenge?

3. **Potential for follow-on funding:** Has this area of research been identified by federal agencies or other funders as an area of future investment? Will the CITRIS Seed Fund Award help the investigators make a stronger case for future external funding?
4. **Alignment with CITRIS research initiatives and the charter of the Banatao Institute:** Does the proposal further one or more of the CITRIS interest areas described below?
5. **Use of CITRIS and the Banatao Institute research assets** including the Marvell NanoLab, CITRIS Invention Lab, or other CITRIS-affiliated testbeds is encouraged but not required.
6. **Inclusion of pre-tenured faculty** is highly encouraged but not required.

Submission Instructions and Requirements

The online application portal can be accessed via the Seed Funding webpage. You can easily submit and manage your applications online when the portal opens on **December 10, 2018**.

We suggest that the Lead PI initiates the online application for each proposal team, using a campus email account. Any listed co-PI(s) will receive an automatic email link to log on and view or edit the joint proposal.

To help you prepare, please have the following information ready to complete the online application:

- ❏ Name, campus, home department, and CV link for each PI
- ❏ Project Title
- ❏ Abstract *(250 words max)*
- ❏ Brief narrative *(2-3 pages)* What problem does the proposal address? What new technology will be developed? Will the project apply existing technology in a novel way? If successful, what would be the impact of the new technology or application? What qualifications do the team members offer to address the challenge?
- ❏ Budget narrative with allocation of funds between campuses *(paragraph)*. Please include name and email of Research Administrator for each PI.
- ❏ Up to five references *(weblinks)*. These may refer to the challenge being addressed or to previous work that the PIs intend to build upon.
- ❏ Optional: upload a one-page .pdf or image file to illustrate the project.
- ❏ List of prior CITRIS Seed Awards (if any): PI names, year, project title.

CITRIS Seed Funding: 2019 Areas of Interest

1. **Health**
2. **People and Robots**
3. **Sustainable Infrastructures**

4. Policy Lab
5. The Future of Work
6. Women in Technology

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1. CITRIS Health

How can technology improve health care for aging populations?

The over-65 population is growing rapidly in the U.S., from 15 percent in 2015 to nearly 25 percent by 2060. CITRIS advances the well-being of older adults and family caregivers with enabling technology — including AI, sensors, robotics, and mobile tools. Working with UC Davis Health, CITRIS is developing technology-enabled solutions to achieve healthy aging in a digital world.

CITRIS Health focuses on developing transformative, scalable, and sustainable IT innovations to improve health and wellness. These technology-enabled solutions aim to improve the quality of care and health outcomes, while reducing healthcare costs. Current priorities address the primary drivers affecting health, including chronic disease, aging, and health behavior. Interdisciplinary projects should build upon the principal technology solutions of telehealth, sensors, mobile, cloud, informatics, and/or data analytics (AI/ML), with an emphasis on solutions that combine hardware and software. CITRIS Health is particularly interested in cutting-edge proposals that will 1) improve outcomes and services to persons with chronic disease at the patient, caregiver, provider, or system level as aligned with the aims of the thematic goals of Hospital to Home and Precision Health and/or 2) advance the field through innovative Health AI solutions.

http://health.citris-uc.org

Proposals solicited under CITRIS Health include (but are not limited to):

A. **Data analytics:** Integrating data analytics, particularly Artificial Intelligence (AI) or machine learning (ML), with clinical management and diagnostics. Linking sensor networks, patient-provided data and Electronic Health Record data with patient-provided data for chronic disease modeling or population precision health visualization. Diagnostic and monitoring software as a service solutions.
B. **Care management solutions:** Models for chronic care management. Evaluation and validation of human factors in chronic care. Advances in patient and provider engagement and communication. Services addressing access and disparities. Innovative and sustainable telehealth programs. Personalized nutrition and wellness.

C. **New platforms and sensors:** Tele-immersion, 3D visualization, population epidemiology visualization, virtual reality/augmented reality, wireless, telehealth and mobile devices. Clinical and laboratory digital devices. Passive and embedded sensors. Interoperable systems. Improvements in user interfaces.
D. **Integrated wireless, mobile and app-based solutions:** Game-based learning, behavior-change programs, disease management solutions, or social networking solutions for health improvement.
E. **Technology solutions for older adults and persons with disabilities:** Healthcare technology solutions for prevention, health promotion, and chronic disease management for older adults and persons with disabilities. Innovative technology solutions for informal and formal caregivers. Innovative solutions for the health care workforce.

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2. CITRIS People and Robots

How do we harness the power of AI and robotics to enrich human capability and experience?

The merging technologies of AI, robotics, sensing, and data science have the potential to touch all corners of society — creating a critical need for a people-centered approach to these powerful new tools. Counter to the dystopian futures many predict, however, CITRIS sees AI's potential to enrich human capability and experience.

The CITRIS People and Robots (CPAR) initiative currently includes 75 affiliated faculty and focuses on research in AI and Robotics applications that enhance humans rather than replacing them. Innovations in sensors, devices, networks, optimization, and machine learning have potential to reduce drudgery and improve human experience in healthcare, agriculture, manufacturing, transportation, safety, and a broad range of other applications in the interests of society. Achieving this requires sensitivity to human factors, rigorous theory evaluated on standard benchmarks or in user studies, and modular systems built on shared software toolkits. Multidisciplinary research is needed to investigate the basic and applied science for design of human-interactive systems and robust performance, addressing the inherent uncertainty in sensing, modeling, and actuation used for control, learning, and systems identification. This is particularly acute for non-convex, non-stationary, distributed, and heterogeneous systems operating with noisy sensors in the physical world that work with, around, and in support of humans. Recent developments in sequential non-convex optimization, model predictive control, and Reinforcement Learning hold promise for addressing these problems at scale.

http://robotics.citris-uc.org

Proposals solicited under CITRIS People and Robots include (but are not limited to):

A. **Human-Centric Automation:** New models, metrics, and algorithms for Human-Robot Interaction (HRI) and methods that safely incorporate humans into the learning and control loop.
B. **Bio-Inspired Robotics:** New algorithms/software and hardware inspired by biological systems.
C. **Deep Learning:** In the past year, Deep Learning has yielded surprising results in the Artificial Intelligence subfields of computer vision and speech recognition. Applying these ideas to Robotics will address challenges such as coping with time series, exploration, and credit assignment under delayed rewards.
D. **Cloud Robotics:** Cloud Computing and Distributed Memory can provide access to large datasets and clusters of remote processors to filter, model, optimize, and share data across systems to improve performance over time. New research is needed to explore how parallel processing and Big Data can enhance robotics.
E. **Internet of Things:** The number of Internet-connected devices now exceeds the global human population and is predicted to increase rapidly in the next decade. Many of these are passive sensors and new research is required to develop algorithms and system designs that can address security and network reliability at scale.

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3. CITRIS Sustainable Infrastructures

How can we apply emerging technology to support tomorrow's infrastructure?

Research in energy, water, transportation, and the built environment aims to ensure a sustainable future. This group examines smart cities, decarbonized mobility, resilience, energy storage, and grid connectivity, along with climate change mitigation. The California Institute for Energy and the Environment (CIEE) operates within this thrust.

The energy that lights and powers our buildings, the water we drink or wash with, and the transportation systems that move us and our goods are at the heart of vital societal infrastructures. These systems affect not only our personal wellbeing and productivity but also that of our planet. CITRIS and the Banatao Institute's research in sustainable infrastructures supports the development of information technologies related to improving the efficiency of our energy, water, and transportation systems and the intersections among them. The evolution of wireless sensors and smartphones have created opportunities to understand—in real-time—the behavior of critical infrastructures and ultimately manage such infrastructures more efficiently and effectively, including actions toward mitigating greenhouse gas emissions.

http://sustainable-infrastructures.citris-uc.org

Proposals solicited under CITRIS Sustainable Infrastructures include (but are not limited to):

A. **Integrated sensors** to communicate vast amounts of real-time information.
B. **Data management** to gather, process and direct information. Proposals involving applications of BTrDB (http://btrdb.io/) and XBOS (https://docs.xbos.io/) are encouraged.
C. **Advanced controls** to act on the information, thereby increasing the productivity and sustainability of energy systems.
D. **Energy generation, storage, and distribution** to develop and prove new information technologies and systems for energy-efficient generation, storage and distribution of energy, including through advanced electrochemical and other storage systems, integration of electric vehicles as grid storage (i.e., "vehicle-grid integration"), and to improve energy end-use and distribution system efficiency.
E. **Intelligent water infrastructures** that create a water monitoring system enabling any country, state, region, or city to:
    a. Manage and operate its water system more *efficiently*, *sustainably*, and *equitably*.
    b. Better meet the challenges created by *climate change*, *population growth*, and changing *demographics*. IT tools to meet these challenges could include innovative decision models, simulation models, and use of data analysis and visualization.
F. **Traffic management, mobility management (people and goods), and energy footprint of transportation** with a focus on information technology and tools to increase energy efficiency in transport.
G. **Unmanned Aerial Vehicle (UAV) technology and infrastructure** involving the design and use of UAVs — including new applications in health, transport, and infrastructure inspection.
H. **Carbon neutrality:** Information technology that supports UCOP's stated carbon neutrality goals. UC has pledged to become carbon neutral by 2025, aiming to become the first major university to achieve this benchmark.

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4. CITRIS Policy Lab

How do we build — and harness — technology that protects privacy, security, and democracy?

Launched in fall 2018, the new CITRIS Policy Lab supports interdisciplinary technology policy research and engagement to better ensure development and deployment of technology in the interest of society. While technology holds great promise to address society's most pressing challenges, ill-considered designs and premature deployments can lead to long-term negative social, political, and economic effects. In order to mitigate these risks

and better ensure the promotion of innovation that positively affects society, the CITRIS Policy Lab supports timely research on current and future technological capabilities and their implications for society. Reflecting its interdisciplinary approach, the CITRIS Policy Lab joins with partners from the public and private sectors to drive thoughtful policy research and engagement at local, state, national, and international levels. Activities will address core questions regarding the role of formal and informal regulation in promoting innovation and amplifying its positive effects.

The CITRIS Policy Lab supports research that addresses topical issues such as inclusive artificial intelligence, personal data privacy, digital access equity, and the influence of social media on democracy.

 http://citrispolicylab.org

Proposals solicited under the CITRIS Policy Lab include (but are not limited to):

A. **Computational Propaganda:** Algorithms, automation, and digital harassment campaigns are increasingly utilized to manipulate public opinion and attack vulnerable communities on social media. Proposals may seek to identify computational propaganda and digital harassment campaigns on social media and formulate innovative counter-approaches to mitigate these tactics.
B. **Inclusive AI:** While artificial intelligence holds great promise to address society's most pressing challenges, ill-considered deployments can perpetuate inequality and discrimination. We seek to support interdisciplinary research into the development and deployment of AI-enabled technologies that are fair, accountable, and trustworthy.
C. **Digital Inclusion:** In 2019, nearly half of the world's population will still not be connected to the internet. Proposals may support identification of innovative strategies for equitable deployment and adoption of broadband and ICTs in the United States and abroad.
D. **Democratic Innovations:** Effective digital tools support more inclusive democratic discourse, enable new models for participatory resource allocation and budgeting, and provide elected leaders with timely updates on the changing needs and priorities of their constituents. Proposals may seek to design and pilot interactive digital tools that foster greater inclusion in democratic processes.
E. **Disaster Risk Reduction:** New information and communication technologies (ICTs) can lead to more informed disaster risk reduction priorities and strategies, such as the use of crowdsourcing platforms that enable greater understanding of local disaster risk reduction strategies and use of high-performance computing and visualizations to better communicate disaster risks. We invite proposals that utilize new ICTs to inform disaster risk reduction strategies and policies in California and abroad.
F. **Digital ID Systems:** Nearly one-fifth of the world's population — an estimated 1.5 billion people — lack formal identification. Strategies from the public, private, and non-profit sectors to develop digital ID systems are increasing worldwide. We seek to support

research into the human rights implications of digital ID systems and formation of priority strategies to better ensure ethical design and deployment of digital IDs.

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5. The Future of Work

How will automation, intelligent tools and algorithms forever change the way we work?

This new thrust, launched in fall 2018, is a collaboration with the Work, Intelligent Tools and Systems (WITS) group and Berkeley Roundtable on the International Economy (BRIE). Exploring the intersections between technology, global prosperity, and the future of work, the group will examine how to shape the healthy development of societies and economies in the age of intelligent tools.

The Future of Work initiative at CITRIS comprises an interdisciplinary and international group of researchers from the fields of engineering and data science, economics, sociology, and political science. Through our connections with international institutions and stakeholders, we support ongoing dialogue and guide research, policy, and practice.

http://wits.berkeley.edu

Proposals solicited under The Future of Work initiative at CITRIS include (but are not limited to):

A. **Innovative research frameworks:** How quantitative and empirical methods can be used to design research questions and validate their findings.
B. **Case studies:** How companies deploy new technology tools, and how their approaches influence the character of jobs and the organization of work.
C. **Intelligent tools:** How the evolution of particular tools — e.g., AI, sensor networks, online platforms, additive manufacturing — can be expected to change strategies for work.
D. **Job creation and entrepreneurship:** The role of startups in the future of work and emerging technology. How social media platforms contribute to job discovery, recruiting, and retention, in traditional industries as well as emerging markets.

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6. Women in Technology

WOMEN IN TECH INITIATIVE
UNIVERSITY OF CALIFORNIA

How can CITRIS and UC foster a more inclusive workforce – from education to employment to leadership?

The Women in Technology Initiative at the University of California (WITI@UC) envisions a world in which women are proportionately represented and equitably compensated throughout the professional ranks in the tech industry and academia. To get there, we are preparing the next generation of technologists, supporting data-driven diversity research, and engaging corporate partners.

Launched in spring 2016 as a collaboration between CITRIS and the UC Berkeley College of Engineering, WITI@UC integrates research and action to address the technology industry's diversity challenge with the aim of increasing the persistence and success of women in technical fields. The initiative promotes the equitable participation of women in the tech industry as measured by career longevity, progression, pathways (both technical and leadership), and recognition.

The initiative leverages best practices and interdisciplinary research to guide our strategy in five key objectives: (1) Advocating the adoption of diversity metrics in the tech industry, (2) Cultivating leadership skills and professional acumen among women in engineering and computer science, (3) Increasing the visibility of female role models and facilitate mentorship of students and recent graduates, (4) Enhancing awareness of implicit bias and promoting effective interventions, and (5) Paving new pathways to technology careers. WITI@UC brings together faculty, staff, and students from a range of disciplines and multiple campuses to work in partnership with executives, board members, investors, entrepreneurs, and career technologists in the technology sector.

 https://witi.berkeley.edu/

Proposals solicited under the Women in Technology Initiative at CITRIS include (but are not limited to):

A. **Diversity Metrics:** Standardized metrics, methods and frameworks to document diversity and enable organizations to measure the current state of diversity within their ranks, track the effectiveness of programs to increase diversity, provide actionable insights, and set benchmarks.
B. **Women in Entrepreneurship:** Female startup founders face additional hurdles to form leadership teams and secure venture capital investment. Proposals may seek to study and analyze gender differences in entrepreneurship and startup investments, or propose interventions to mitigate such differences.
C. **Bridges to STEM:** Complex societal problems cannot be solved with engineering resources alone. Often interdisciplinary approaches are necessary, which can offer opportunities to diversify a research team. CITRIS welcomes proposals that create bridges between STEM and non-STEM disciplines to address issues that cannot be tackled with a purely technical solution.
D. **Telling Her Story:** Women's accomplishments in science and technology, especially contributions to a larger team effort, have often been overlooked in prizes, awards and

attributions. We invite proposals that use creative expression to document and elucidate women's contributions to advances in science and technology that may not yet have received the attention they deserve.