Vannevar Bush Faculty Fellowship

FY22 Webinar
12:00 PM EDT

Basic Research Office (BRO)
OUSD(R&E) or Office of the Under Secretary of Defense (Research & Engineering)

Webinar | Sept 15, 2021

Agenda & Webinar Etiquette

12:00 – 12:05: Overview

12:05 – 12:10: Introductions from the team

12:10 – 12:30: Program Overview

12:30 – 12:50: Program Philosophy

12:50 – 1:00: Q&A

- **This Webinar is recorded and will be uploaded to the DoD site at a later date.**
- **Mute your microphones during the webinar**
- **Hold questions till the Q&A session**
- **Put all questions in Chat.**
- **For technical difficulties during the meeting, contact:**
  - **703-610-2040 or cshelp@noblis.org**

Vannevar Bush (1890-1974)

Director of Office of Scientific Research and Development (OSRD) during World War II. First Presidential Science Advisor. Spearheaded the creation of NSF. Professor and Dean of Engineering at MIT. Founded a large defense and electronics company. Author of "Science, The Endless Frontier." (1945)

Strong (and successful) advocate for basic science, as the cornerstone to national security, health, economic progress, as well as cultural progress.

" [Basic research is] the pacemaker of technological progress". "New products and new processes do not appear full-grown…They are founded on new principles and new conceptions, which in turn are painstakingly developed by research in the purest realms of science."

It is in this spirit that the Vannevar Bush Faculty Fellowship program is designed.

Program Team

Dr. Bindu Nair
Director of Basic Research Office

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Program Announcement

The FY21 VBFF Funding Opportunity Announcement (call for proposals) can be found:

1. On www.grants.gov:

   Search for N00014-21-S-F007

2. On the ONR website:

   https://www.grants.gov/web/grants/view-opportunity.html?oppId=335368

3. On the registration website: https://dod-basicresearch.nvision.noblis.org/account/register

Program Overview

- Established in 2008 as National Security Science and Engineering Faculty Fellowship (NSSEFF).
- Run out of STEM Development Office for several years, then moved to the Basic Research Office in OUSD(R&E) in ~2014.
- Program name was changed in 2016.
- Currently sponsored by Dr. Bindu Nair, Director for Basic Research Office, OUSD(R&E).
- ONR manages the grants. The ONR program manager is Dr. Reginald G. Williams.

Largest single-investigator program in Department of Defense

Grant Information

- Tenured faculty at U.S. Ph.D.-granting educational institutions are eligible to apply
- Single-investigator research grants, although collaboration is encouraged
- US Citizens and Permanent Residents. Security clearance is not required to receive award
- Approximately 10 Fellows selected each competition.
- Fellows are expected to participate in DoD activities
  - Workshops, lab visits, program reviews, host DoD visitors at their site, serve on advisory panels, send students to lab internships

Past Competitions

*Open to all disciplines

Program pause

** Limited topic areas of importance to DoD.

Class	White papers	Fellows
2008*	358	8
2009	490	10
2010	678	11
2014**	132	10
2015	153	7
2016	185	15
2017	285	13
2018	265	11
2019	252	10
2020	238	8
2021	303	8

NSSEFF

VBFF

Program Goals

- Support “Blue Sky” curiosity-driven fundamental research
- Educate and recruit next generation researchers to DoD’s research enterprise
- Develop and sustain career-long association between Fellows and DoD
- Expose the university researchers and their students to DoD’s current and future challenges

Competition Process Overview

White Paper

Invitation

Recommendation Letters

Full Proposal

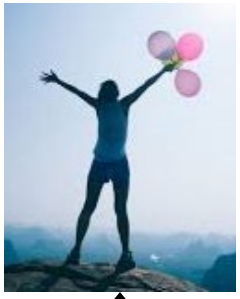
Panel

Panel

Recommendation

Director

Selection



Competition Process: Notes

- Panels consist of general technical experts in the DoD and other government agencies.
- Panels are built according to the research areas in the FOA, and consist of 5-8 people.
- In some cases, external reviewers are called for if panel chairs deem it desirable – those can be outside USG but sign NDA/COI
- Some proposals can be reviewed by more than one panel if they multi-disciplinary or at the intersection of two areas
- Invited full proposals must include CV, budget, 3 letters of recommendation (submitted separately) – see FOA for details
- Basic Research Office Director has final word on selection

Current DoD Research Areas of Interest

- Applied Math and Computational Science
- Network Science, Artificial Intelligence
- Cognitive Neuroscience
- Fundamentals of Bio-Engineering
- Quantum Information Science
- Electronics, Photonics and Quantum Materials
- Engineered Materials and Structures
- Other research fields with high potential
- ….and (almost) everything in-between…

PI **must** select which of those areas the white paper and proposal are addressing.

Research Areas of Interest: Notes

- Q: My research can be considered in two topics. What then?
- A: You must select a primary area, and can select a secondary.
  - Having more than one does not increase your chances
  - This is an indication to the panels, but the BRO has final say on which panels are reviewing submissions.
- Q: Does my research need to fit the topic descriptions?
- A: No. These are general descriptions of areas of interest, but they are not intended to provide any limitations on your creativity.
- Q: Is there a panel for the "Other" category?
- A: Ideas submitted to the Other are reviewed by appropriate experts according to the research proposed. Some of these may be already in existing panels.

Criteria for Success

- What kind of research is asked for?

"VBFF is oriented towards bold and ambitious "blue sky" research that may lead to extraordinary outcomes, such as revolutionizing entire disciplines, creating entirely new fields, or disrupting accepted theories and perspectives."

  - NOT near-term problems or incremental research
- What does DoD relevance mean?
  - NOT for a specific mission, platform, system
  - Think long-term. Use your imagination (future warfare?)
  - Is DoD the right funding agency?
- What qualifications and experience?
  - No pre-existing links to DoD required
    - you must build them during the award if you don't have them
  - You must be one of the "best" in the field
    - CV, publications, recommendation letters

Criteria for Success: Notes

- You must have an idea, and you must have a plan.
  - This includes a desire to work with the DoD, e.g. involve DoD Lab scientists, learn more about the DoD interests
  - This includes a plan to train a new generation of scientists in the field that you are creating or advancing
- This is a single-investigator program. No co-PIs! But…
  - Q: Collaborators are allowed. What is the difference?
    - A1: The ideas must originate from YOU
    - A2: YOU must plan and drive the research
    - A3: YOU must have most of the funds (if not all)

More on Program Philosophy

- VBFF versus other DoD programs (SI grants, MURI, Center of Excellence, In-House Research, etc.)

Higher challenges, longer duration, more funding	>>	Single-Investigator Grant (AFOSR, ONR, ARO): 3 yrs
Very broad set of scientific questions, topics.	>>	MURI: Targeted topics, variable year-to-year
Scientific breakthrough, revolutionary advances, far-term benefits	>>	DARPA: Specific technological problems, near-term benefits, milestones
Build next generation of academic researchers	>>	In-House: Maintain/Improve existing Lab S&T workforce
Constant refresh, sampling from the best in Academia	>>	UARC: Maintain excellence in specific, well-known field

More on Program Philosophy

Q: Why shouldn't the services individually or jointly run the selection and execution of the program so they can ensure appropriate coordination/integration with their other programs?

A: The oversight of OSD enables the long term, exploratory nature of the research projects, and identifies department wide needs.

Interactions between Fellows and DoD

- Fellows present their work at DoD-sponsored conferences.
- Fellows may serve on panels and participate in DoD program reviews.
- Fellows participate in workshops for OUSD(R&E)'s Basic Science Office to discuss future horizons in basic science.
- Fellows may collaborate with DoD researchers on joint projects.
- Trips for Fellows and their students to the 3 service labs (ARL, NRL, AFRL).
- Non-selectees – Occasionally, non-selectees are funded through regular OXR grants due to service specific interest in a modified version of some ideas.

Success Stories
Dr. John Rogers, 2009 VBFF Fellow

Looking back at Prof. John Rogers impact in electronics materials….

Northwestern University
VBFF Class of 2009

"The VBFF fellowship was a real game-changer for my programs. This funding mechanism is unique -- long-term, sustained commitments to the very best breakthrough ideas and the most promising scientists, all in the broader context of grand challenges in national defense. " **-John Rogers**

DARPA

Macroelectronics

(- 2009)

Science

Epidermal Electronics

(2009- 2011)

PATENTED PATENTED PATENTED

Transient Devices Designed to undergo programmable transformations

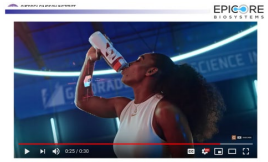
(2012-2013)

Netherlands

PNAS

SHARP

(2015)



SIBEL

(2018)

U.S. ARMY

BARDA

Deep tissue Biomechanics

(2021-)

Pre-fellowship 2009 — **Funded By DARPA**

Wins Fellowship — •Publishes Paper •1rst Cited Pubs - 3256

Rogers Patents research — •Cited in patents (59) •Cited in policy docs (2)

Clinical Trials — A Pilot Study of Seizure Detection in Neonates

Startup company founded (2015) — Post Doc Founds Spinoff

Transitioned in Army (2020) — New fundamental Questions 2021 and beyond)

(10 year span)

Technology transition of 2009 Research revealed new fundamental questions.

Success Stories
Prof. David Awschalom, 2017 VBFF Fellow

Quantum State Creation and Control in Scalable Two-Dimensional Systems for Information Processing and Sensing

University of Chicago

Prof. David Awschalom and his Team is Creating the Quantum Future

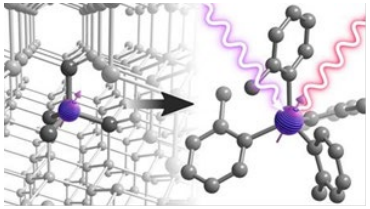
In the past 3 years, Prof. Awschalom has led:
79 high impact publications
4 patents
33 researchers
4 countries

VBFF Research led to 7 Awards

1. 2020, Institute of Metals Robert Franklin Mehl Award
2. (2021) Honorary Doctor of Science, Ohio State University
3. (2020 Argonne National Laboratory Board of Governors' Distinguished Performance Award Argonne National Laboratory Board of Governors' Collaborative Research Award (2020)
4. Clark Carroll Distinguished Lecturer, University of Rochester (2020, delayed 2021)
5. Crain's Business Tech Top 50 (2019)
6. Hendrik de Waard Lecturer, University of Groningen (2017)

Research Highlight 1:

Science 11 Dec 2020



Advancing the workforce

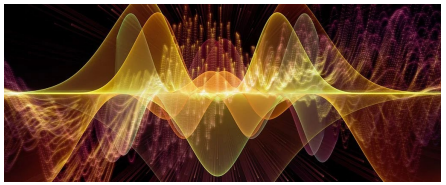
Challenge: Spin-bearing molecules in semiconductors are promising building blocks for quantum technologies. In molecular systems, optically addressable ground-state spins remained a challenge.

Discovery: He is the first to report a method to create tailor-made qubits by chemically synthesizing molecules that encode quantum information into their magnetic, or "spin," states.

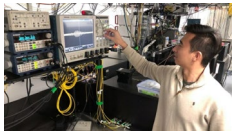
Applications: Opens a new area of synthetic chemistry. Additionally, their discovery has strong potential to lead to quantum systems that have extraordinary flexibility and control, and helping to pave the way for next-generation quantum technology

Research Highlight 2:

Science 18 Sep 2020



Next generation quantum scientists



Postdoctoral Researcher Kevin Miao

Challenge: Fundamental engineering challenges remain: quantum states need an extremely quiet, stable space to operate, as they are easily disturbed by background noise coming from vibrations, temperature changes or stray electromagnetic fields.

Discovery: Develop a new "decoherence" technique that allows quantum states to last 10,000 times longer than the previous record.

Applications: This a monumental discovery could turn various quantum technologies from potential to reality and help bring progress to numerous applications of DoD interest such as an unhackable internet or extremely powerful computers.

Important Dates for 2022 Competition

Schedule of Events		
Event	Date	Time
AcquTrak website opens for registration and submission	16 August 2021	
Deadline for Questions regarding White Paper and Documents*	01 October 2021	11:59 PM Eastern Time
AcquTrak website closes for registration	12 October 2021	11:59 PM Eastern Time
Deadline for submitting White Paper and supporting Documentation	15 October 2021	11:59 PM Eastern Time
Notification of Invitation for Full Proposal	17 December 2021	
Deadline for Questions regarding Full Proposal and Documentation*	21 January 2022	11:59 PM Eastern Time
Deadline for submitting Full Proposal and supporting Documentation	04 February 2022	11:59 PM Eastern Time
Notification of Award	04 April 2022	
Start Date of Grant	01 June – 30 September 2022	

* Approximate dates

In Summary

The VBFF is about….

You

Challenge

Exploration

Vision