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

Distribution Statement A: Approved for public release. Distribution is unlimited.
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

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Director of Basic Research Office

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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

<table>
<thead>
<tr>
<th>Class</th>
<th>White papers</th>
<th>Fellows</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008*</td>
<td>358</td>
<td>8</td>
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<tr>
<td>2009</td>
<td>490</td>
<td>10</td>
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<tr>
<td>2010</td>
<td>678</td>
<td>11</td>
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<tr>
<td>2014**</td>
<td>132</td>
<td>10</td>
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<tr>
<td>2015</td>
<td>153</td>
<td>7</td>
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<tr>
<td>2016</td>
<td>185</td>
<td>15</td>
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<td>2017</td>
<td>285</td>
<td>13</td>
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<td>2018</td>
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<tr>
<td>2019</td>
<td>252</td>
<td>10</td>
</tr>
<tr>
<td>2020</td>
<td>238</td>
<td>8</td>
</tr>
<tr>
<td>2021</td>
<td>303</td>
<td>8</td>
</tr>
</tbody>
</table>

*Open to all disciplines

Program pause

** Limited topic areas of importance to DoD.
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
• 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.
• 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.)

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

Northwestern University
VBFF Class of 2009

DARPA
Macroelectronics
(- 2009)

Epidermal Electronics
(2009- 2011)

Funded By DARPA

Wins Fellowship

Publishes Paper
1st Cited Pubs - 3256

Rogers Patents research

Cited in patents (59)
Cited in policy docs (2)

Netherlands
Transient Devices
Designed to undergo programmable transformations

PNAS

SHARP

Clinical Trials
A Pilot Study of Seizure Detection in Neonates

SibEL

Startup company founded (2015)
Post Doc founded Spinoff

Deep tissue Biomechanics
(2021-)

Technology transition of 2009 Research revealed new fundamental questions.
Research Highlight 1:
Quantum State Creation and Control in Scalable Two-Dimensional Systems for Information Processing and Sensing
University of Chicago

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:
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 un hackable internet or extremely powerful computers.

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)
6. Hendrik de Waard Lecturer, University of Groningen (2017)
## Important Dates for 2022 Competition

### Schedule of Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Time</th>
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<tbody>
<tr>
<td>AcquTrak website opens for registration and submission</td>
<td>16 August 2021</td>
<td></td>
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<tr>
<td>Deadline for Questions regarding White Paper and Documents*</td>
<td>01 October 2021</td>
<td>11:59 PM Eastern Time</td>
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<tr>
<td>AcquTrak website closes for registration</td>
<td>12 October 2021</td>
<td>11:59 PM Eastern Time</td>
</tr>
<tr>
<td>Deadline for submitting White Paper and supporting Documentation</td>
<td>15 October 2021</td>
<td>11:59 PM Eastern Time</td>
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<tr>
<td>Notification of Invitation for Full Proposal</td>
<td>17 December 2021</td>
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<tr>
<td>Deadline for Questions regarding Full Proposal and Documentation*</td>
<td>21 January 2022</td>
<td>11:59 PM Eastern Time</td>
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<tr>
<td>Deadline for submitting Full Proposal and supporting Documentation</td>
<td>04 February 2022</td>
<td>11:59 PM Eastern Time</td>
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<tr>
<td>Notification of Award</td>
<td>04 April 2022</td>
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<tr>
<td>Start Date of Grant</td>
<td>01 June – 30 September 2022</td>
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* Approximate dates
In Summary

The VBFF is about....

[Images and text discussing the concepts of Challenge, Vision, and Exploration]