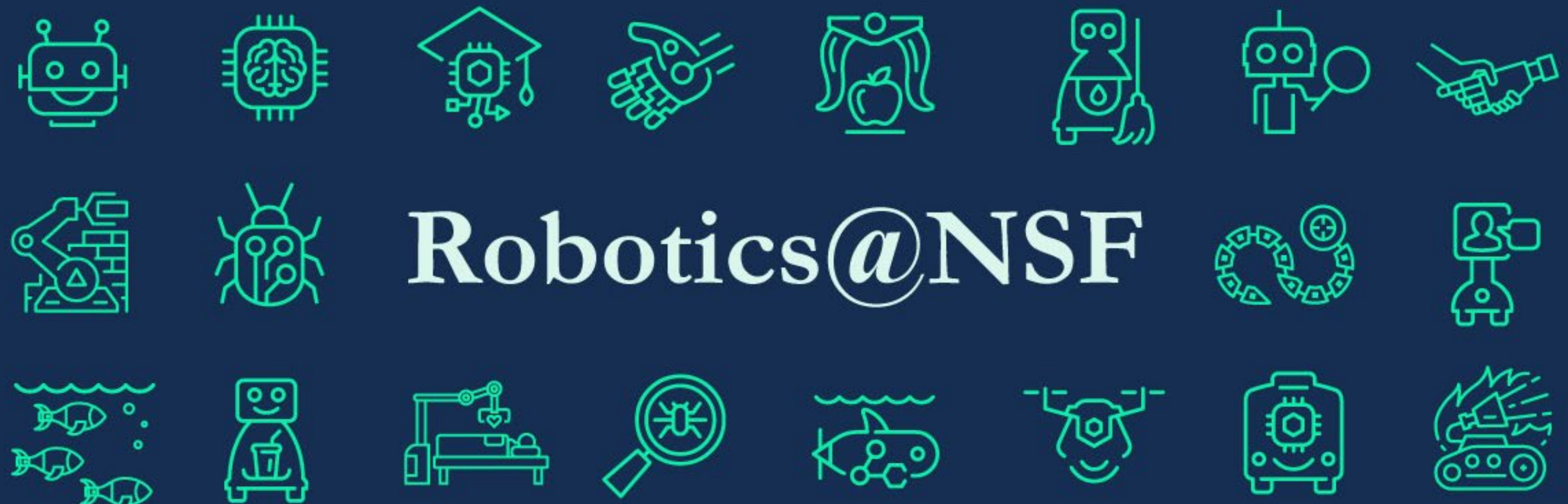


# Sunsetting of NRI: Guidance for Researchers

June 2, 2022

# Robotics@NSF

- **Sunsetting of the NRI: Guidance for Researchers**
- **Foundational Research in Robotics (FRR)**
  - Program Description
  - Proposal Preparation and Proposal Handling
  - Categories & Budget Guidance
    - Unsolicited, CAREER, Research Initiation
  - International Partnerships
- **Robotics-Related Programs**

# Sunsetting of NRI: Guidance for Researchers

NSF announced the sunset of the National Robotics Initiative 3.0: Innovations in Integration of Robotics program

https://www.nsf.gov/pubs/2022/nsf22081/nsf22081.jsp

Over the 12-year lifetime of NRI, NSF and its federal NRI partners have invested over $250 million in over 300 pioneering research projects innovating robots to enhance human safety, productivity, and independence

# Sunsetting of NRI: Guidance for Researchers

NSF remains committed to supporting and growing a thriving robotics research community

The Foundational Research in Robotics (FRR) program will now provide a single home for foundational research in robotics across NSF

FRR welcomes proposals on a broad spectrum of foundational research in robotics, including the topics of collaborative robotics and integration in robotics that were previously supported by NRI

# Sunsetting of NRI: Guidance for Researchers

The NRI program was distinguished by a unique collaboration among multiple federal agencies

The FRR program will continue this tradition and, in accordance with the NSF priority on building partnerships across the federal government, will strategically expand to new agencies

Through these partnerships, the FRR program will provide opportunities for researchers to pursue projects across agency missions

These partnerships will be announced through future Dear Colleague Letters and regularly updated on the FRR program website

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# Foundational Research in Robotics (FRR)

https://beta.nsf.gov/funding/opportunities/foundational-research-robotics-frr

- Core Program
- Created in August 2020
- Jointly managed by the Directorates for Engineering (ENG) and Computer and Information Science and Engineering (CISE)
- All proposals are handled as part of a single unified program, irrespective of the division that initially receives the proposal

- **ENG**
  - CMMI – Irina Dolinskaya, Jordan Berg, Siddiq Qidwai, Greg Formosa
  - ECCS – Zhengdao Wang, Don Wunsch
- **CISE**
  - IIS – Erion Plaku, Juan Wachs
  - CNS – David Corman, Ralph Wachter
  - CCF – Peter Brass

# FRR: Broad Focus on Foundational Research

- The focus of the FRR program is on foundational advances in robotics
- Robotics is a deeply interdisciplinary field, and proposals are encouraged across the full range of fundamental engineering and computer science research challenges arising in robotics
- FRR supports research on robotic systems that exhibit significant levels of both computational capability and physical complexity

# FRR: What is a Robot?

For the purposes of this program, a robot is defined as **intelligence** embodied in an **engineered construct**

- Here **intelligence** includes a broad class of methods that enable a robot to solve problems or to make contextually appropriate decisions and act upon them

- Here an **engineered construct** exhibits appropriate levels of physical complexity to enable the robot to sense and move within, or substantially alter, its working environment

# FRR: Where should projects focus?

- Projects may focus on a distinct aspect of intelligence, computation, or embodiment
- Research is encouraged that considers inextricably interwoven questions of intelligence, computation, and embodiment
- Meaningful experimental validation on a physical platform is encouraged

# FRR: What is responsive?

Is there a **robot**?

- The focus of the project should be a robot or a class of robots as defined in the program description

Will a robot gain a **new** or **significantly improved** capability?

- The goal of the project should be to endow a robot or a class of robots with new and useful capabilities or to significantly enhance existing capabilities

Is robotics **essential** to the *intellectual merit* of the proposal?

- The intellectual contribution of the proposed work should address fundamental gaps in robotics

# FRR: Before submitting a proposal

- Potential investigators are strongly encouraged to discuss their projects with an FRR Program Officer before submission

- Send white paper (one to two pages) to robotics@nsf.gov
  - Project overview
  - Intellectual merit
  - Broader impacts
  - Suitability for FRR (answers to the three questions)

- For any questions/clarifications: email robotics@nsf.gov

# FRR: How are proposals handled?

- All proposals are handled as part of a single unified program, irrespective of the division that initially receives the proposal
- Submitted proposals are queued and paneled on a rolling basis
- Each panel is managed by two PDs: one from CISE and one from ENG
- Each panel consists of a mixture of reviewers with CISE and ENG backgrounds
- Panel outcomes are discussed by the entire FRR working group
- Recommendation decisions are made by the entire FRR working group
- Each awarded project has been co-funded by CISE and ENG

# FRR: Categories

- Unsolicited Proposals (no deadlines)
- CAREER Proposals (deadline: July 27, 2022)
- Research Initiation
  - CISE Research Initiation Initiative (CRII) (deadline: Sep 19, 2022)
  - Engineering Research Initiation (ERI) (deadline: Oct 11, 2022)

# FRR: Categories : Unsolicited

- Unsolicited Proposals (no deadlines)

**FRR Budget Guidelines & Project Durations**

*FRR does not have any explicit budget or duration limits, however the proposal must convincingly articulate that the requested budget is commensurate with the scope and potential contribution of the project*

- Typical unsolicited projects are approximately $150K-250K per year
- Typical unsolicited projects are  3-4 years in duration

*FRR does not explicitly exclude proposals with higher budgets and/or up to 5-year duration*

# FRR: Categories : CAREER (July 27, 2022)

- General CAREER Webinar on April 22, 2022: https://www.nsf.gov/news/news_summ.jsp?cntn_id=300464&org=NSF&from=news
- FRR CAREER Webinar on April 26, 2021: https://beta.nsf.gov/funding/opportunities/foundational-research-robotics-frr/announcements/robotics-webinar-career-pis

**FRR Budget Guidelines & Project Durations**

- Duration is exactly 5 years
- Budget is between $500,000 and $600,000
- Typical budget includes support for a graduate student, PI (at least 15 days/year), travel, publications, and some materials

# FRR: Categories : Research Initiation

**CISE Research Initiation Initiative (CRII) [Sep 19, 2022 : $175,000 for 2 years]**

- CRII seeks to award grants intended to support research independence among early-career academicians who specifically lack access to adequate organizational or other resources
- The CRII program seeks to provide essential resources to enable early-career PIs to launch their research careers
- This funding opportunity also aims to broaden the engagement of investigators in CISE research and therefore is limited to investigators that are either
    1. affiliated with an Institution of Higher Education that is not a “very high research activity” R1 institution or
    2. non-profit non-academic institutions

# FRR: Categories : Research Initiation

**Engineering Research Initiation (ERI) [Oct 11, 2022 : $200,000 for 2 years]**

(ERI) program will support new investigators as they initiate their research programs and advance in their careers as researchers, educators, and innovators

This funding opportunity aims to broaden the base of investigators involved in engineering research and therefore is limited to investigators that are not affiliated with “very high research activity” R1 institutions

**Webinars:**

June 1, 2022: 2:00pm-3:00pm EDT

July 13, 2022: 2:00pm-3:00pm EDT

# FRR: International Partnerships

- NSF and U.S.-Israel Binational Science Foundation (BSF) (NSF 20-094)
- US-Ireland-Northern Ireland R&D Partnership (NSF 20-064)
- NSF Engineering - UKRI Engineering and Physical Sciences Research Council Lead Agency Opportunity (ENG-EPSRC) (NSF 20-510)
- NSF collaboration with Czech Science Foundation (GACR) (NSF 21-111)
- NSF and the Natural Sciences and Engineering Council of Canada (NSERC) Collaborative Research Opportunity (NSF 22-031)
- Joint U.S.-India funding opportunity (NSF 22-040)

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https://www.nsf.gov/robotics

**Robotics-related programs**

Advancing Informal STEM Learning (EHR/DRL/AISL)
Cyber-Physical Systems (CPS)
Disability and Rehabilitation Engineering (ENG/CBET/DARE)
Discovery Research PreK-12 (EHR/DRL/DRK-12)
Dynamics, Control and Systems Diagnostics (ENG/CMMI/DCSD)
Energy, Power, Control, and Networks (ENG/ECCS/EPCN)
Future of Work at the Human-Technology Frontier: Core Research (FW-HTF)
Human-Centered Computing (CISE/IIS/HCC)
Industry-University Cooperative Research Centers (IUCRC)
Innovation Corps (I-Corps) Teams Program (TIP)
Innovative Technology Experiences for Students and Teachers (EHR/DRL/ITEST)
Law and Science Program (SBE/SES/LS)
Mind, Machine and Motor Nexus (ENG/CMMI/M3X)
Partnerships for Innovation (TIP)
Perception, Action & Cognition (SBE/BCS/PAC)
Research on Emerging Technologies for Teaching and Learning (RETTL)
Robust Intelligence (CISE/IIS/RI)
Science and Technology Studies (SBE/SES/STS)
Science of Learning and Augmented Intelligence (SBE/BCS/SL)
Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) - America's Seed Fund
Smart and Connected Health (SCH)

# Robotics-Related Programs

## Robust Intelligence (CISE/IIS/RI)

The Robust Intelligence (RI) program accepts research proposals aimed at contributing deeper understanding and new insights in and across the disciplinary areas outlined in the RI program description. The RI program no longer accepts proposals whose principal research focus is on robotics. Proposals to RI may involve robots as platforms for evaluation and demonstration of the applicability and broader impacts of RI claims. Proposals that focus primarily on the embodiment of intelligent systems should now be submitted to the FRR program

## Human-Centered Computing (CISE/IIS/HCC)

Robotic-related proposals may be of interest to the HCC program if they focus on general contributions to human-technology interfaces rather than specifically on advances to human-robot interaction. HCC may also be more appropriate than the FRR program when investigators employ off-the-shelf robotic technology in order to study human behavior.

# Robotics-Related Programs

## CISE Community Research Infrastructure Program [June 23, 2022]

CCRI funds the development of CISE community infrastructure that enables research in CISE core disciplines. The infrastructure will enable CISE researchers to advance the frontiers of CISE research

- **Planning** – implement planning activities to develop a full CCRI proposal
  - max $100K for 1.5 years
- **Medium** – develop community research infrastructure and user services
  - max $2M/3 years [New or Enhance/Sustain (ENS)]
- **Grand** - develop significant new testbeds and platforms with associated user services and community engagement and outreach
  - max $5M/5 years

# Robotics-Related Programs

## Smart and Connected Health (SCH)

SCH welcomes robotics related proposals that use established robotics techniques to accelerate the development and integration of innovative computer science and engineering approaches that would support the transformation of health and medicine. SCH does not fund proposals for assistive technology that addresses a person's quality of life, but not health per se.

## Disability and Rehabilitation Engineering (ENG/CBET/DARE)

The DARE program supports fundamental engineering research that will improve the quality of life of persons with disabilities through the development of new technologies, devices, or software; advancement of knowledge regarding normal or pathological human motion; or understanding of injury mechanisms. DARE welcomes proposals where established robotic systems are used to contributed to the improved quality of life of persons with disabilities. Areas of particular interest are neuroengineering and rehabilitation robotics.

# Robotics-Related Programs

## Cyber-Physical Systems (CPS)

The CPS program advances the science of engineered systems that are built from, and depend upon, the seamless integration of computation and physical components. Research proposals that advance the general science of CPS should be submitted to the CPS program, even if testing is on a robot or with a robotic system. Conversely, if a proposal is specific to a robot or class of robots, then the proposal should be submitted to the FRR program

## Dynamics, Control and Systems Diagnostics (ENG/CMMI/DCSD)

The DCSD program supports fundamental research in dynamics, including topics of modeling, analysis, diagnostics, and control. DCSD proposals must clearly articulate a primary intellectual contribution in at least one of these areas. DSCD may be an appropriate program if the proposed research objectives represent fundamental contributions to the field of dynamics and control, with robotics included primarily as a possible application area or validation platform.

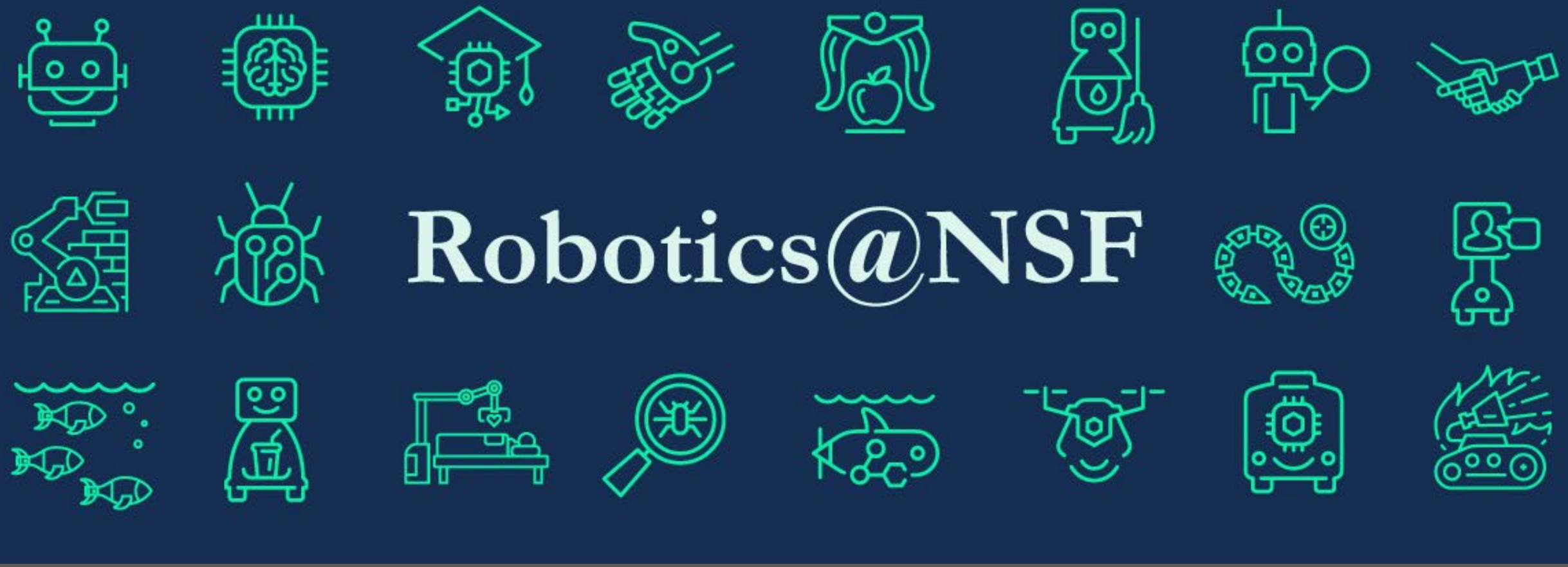
## Mind, Machine and Motor Nexus (ENG/CMMI/M3X)

The M3X program supports fundamental studies of bidirectional dynamic interactions between humans and intelligent machines. Interactions between humans and robots are within the scope of M3X, however the focus of an M3X project should be on emergent behavior arising from dynamic interactions, rather than on advances in robotic capabilities.

# Robotics-Related Programs

## Future of Work at the Human-Technology Frontier: Core Research (FW-HTF)

The FW-HTF program supports convergent research to advance the human-technology partnership, in the context of work, workers, workplaces, education and reskilling, and the emerging socio-technological landscape. FW-HTF projects may incorporate robotics research in the context of work. However, FW-HTF projects must embody a convergent research perspective incorporating social and economic analysis, as well as study of worker perspectives and quality of life.




# Thank you!

**robotics@nsf.gov**