



**Technology Transfer for Defense  
Annual Newsletter 2024**

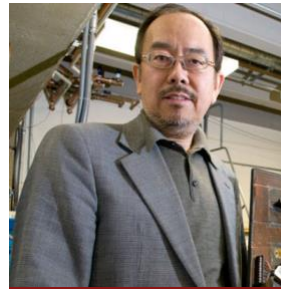
# Director's Note

Dear Stanford Community,

As we close out another remarkable year, we are pleased to present the 2024 **Technology Transfer for Defense (TT4D)** Annual Review.

**TT4D develops solutions and strategies for defense innovation by:**

- Transitioning academic technologies from the lab to the marketplace and transitioning emerging technology products into defense capabilities.
- Developing technology partnerships between government, academia and industry to support technology transitions between sectors.
- Increasing awareness of defense-related research and technology across campus.
- Strengthening relationships with the defense industry.
- Facilitating dual-use technology commercialization and entrepreneurial activities.



**Faculty Director**  
Fu-Kuo Chang



**Program Director**  
Jeff Decker



**Sr. Program Manager**  
Nilay Papila

During this last year, TT4D continued to play a pivotal role in bridging the gap between academia and defense, transitioning innovative technologies into operational solutions that address national security challenges. Reflecting on this year's achievements, we need to highlight the successes coming out of the **Hacking for Defense® (H4D)** course, which national security challenges tackled this year focused on geopolitics and energy. Also pivotal to this year's TT4D success were groundbreaking defense-energy projects and the growing collaboration with the Department of Defense (DoD), industry and academic partners. We have been working on a total of 14 research projects with a combined budget of \$4M, including two new projects in 2024 with a budget of nearly \$800k. Additionally, we secured a \$4.1M grant for transitioning research into Department of Navy capabilities in 2024, complementing previous funding of \$6M for technology transfer coordination.

We are especially excited about our advancements in energy-related defense research, such as hybrid energy systems and lightweight structural batteries, which align with emerging DoD priorities. These efforts represent the future of defense innovation and we look forward to scaling them in the year ahead.

Thank you for your continued support. We look forward to working together in 2025 to advance defense innovation.

A handwritten signature in black ink, appearing to read 'Jeff Decker'.

**Jeff Decker, PhD**

TT4D Program Director and H4D Course Co-Instructor  
Precourt Institute for Energy, Stanford University



# RESEARCH: TT4D Program Highlights

## Designing Resilient Microgrids: An Energy-Storage Centric Approach

**PI:** Prof. Simona Onori, Energy Science & Engineering

**Sponsor:** DoD Office of Naval Research (ONR) NEPTUNE Program



Military operations increasingly rely on tactical microgrids to ensure energy resilience and mission success in dynamic environments. Lithium iron phosphate (LFP) batteries offer promising opportunities to enhance the performance and sustainability of military energy systems. This research investigates the integration of LFP batteries into military microgrids, focusing on optimization and addressing key challenges related to battery aging and state estimation.

The goal is to develop a reliable state estimation system for lithium-ion battery energy storage (LIB ESS) systems, utilizing both physics-based and data-driven models. This system will support real-time state-of-charge (SOC) and operational state-health (OSH) estimations, improve battery performance, and increase the resilience of US Navy microgrids.

## Next-Gen AI Accelerators for Spatially Aware Autonomous Naval Systems

**PI:** Prof. Subhasish Mitra, Dept: Electrical Engineering/Computer Science

**Sponsor:** DoD Office of Naval Research (ONR) NEPTUNE Program

In response to the demand for more powerful computing systems in AI applications, Prof. Mitra and his team are developing edge AI accelerators. These accelerators aim to overcome the memory wall challenge faced by conventional approaches, particularly as AI applications move to remote edge devices. By leveraging on-chip non-volatile memory technologies like RRAM, the main goal is to provide 10-100x system-level Energy-Delay Product benefits over current commercial hardware, addressing the Navy's needs for enhanced capabilities in unmanned vehicles, advanced manufacturing, robotics and smart cameras.



## TT4D PARTNERS



# TEACHING: H4D Course (MS&E 297)<sup>1</sup>



Hacking for Defense® (H4D) is a college/university course founded in 2016 by Steve Blank, Joe Felter, and Pete Newell. The course is now taught at more than 70 colleges and universities worldwide and on three continents. The course has had more than 2,000 students through the program, all working towards solving defense and intelligence problems. Nationwide, the course has validated more than 520 defense and intelligence problems, of which 312 have been adopted by the defense sponsor. More than 25 different branches of the government sponsor the course problems. The program has been so successful that it has had 18 of its solutions funded by the government and created 70 startup companies.

At Stanford University, the original home of the H4D course, the class has worked with 64 teams from across Defense and Intelligence communities and its students have conducted more than 7,000 interviews with Defense Department stakeholders, which has incubated 22 companies now working in the Defense Market. These companies that have come out of the Stanford H4D program have raised more than \$250 million in venture capital and are founded by the next generation of American business leaders. The H4D teaching team includes Steve Blank, Joe Felter and Steve Weinstein, with industry masters Pete Newell and Jeff Decker. Course advisors are Sally Benson, Tom Byers, Arun Majumdar, John Mitchell and William J. Perry.

H4D has created  
**70 startups** since 2016.

While H4D is a course, it is also a process of thinking. It is biased towards action and the process consists of developing solutions, not by guessing or brute force, but by iterative, experiment-based, validated learning and then deploying those solutions to the people who need them the most.

## The process is informed by four fundamental questions:

- What is the core problem the Defense Department organization is trying to solve?
- Who needs the problem to be solved?
- What, exactly, do they need to solve it?
- How can the solution be delivered to the people that need it?

You can read about this year's Stanford teams and the problems they tackled in our year-end [H4D Substack Blog](#). Some of the nation's toughest problems posed by sponsoring agencies included the U.S. State Department, FBI, Space Force, European Command (EUCOM), In-Q-Tel, Area Sentiment Assessment Central Command, J39 Information Operations Division at USCENTCOM, the Defense Innovation Unit (DIU), the Office of the Secretary of Defense Commanders and the Agency Directors' Staff. Groundbreaking student team solutions were presented at a final H4D event that featured keynote speaker General H.R. McMaster (Lt. Gen., U.S. Army, Retired, and former National Security Advisor) as a special guest.

<sup>1</sup>["What is Hacking for Defense?"](#)

# Featured Events

## 1. Panel Discussion and H4D Book Launch Event | Tuesday, November 12, 2024



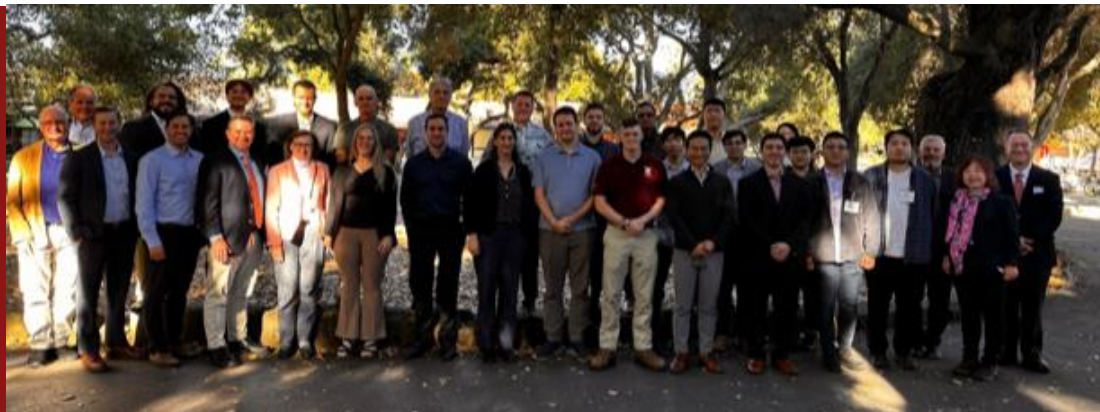
*Salvador Badillo-Rios, PhD Senior Associate, National Security Innovation Capital*



*Jeff Decker, Steve Blank, Andrew Powell, Jamie Porchia, Jeff Fields*

Stanford University hosted a dynamic panel discussion on “Transforming Defense: Innovation in National Security” and book launch celebrating the release of **“The Hacking for Defense® Manual”** by Jeff Decker. Esteemed panelists included H4D co-founders Steve Blank, Joe Felter, Jeff Decker, H4D alumni and CEO of Learn to Win Andrew Powell, Air Force Lt. Col. Jamie Porchia, FBI special agent Jeff Fields, and Maria Tranquilli with the Common Mission Project. The discussions focused on harnessing innovation to address national security challenges, cultivating talent in the defense industrial base, and the transformative impact of the H4D program. This event highlighted the critical collaboration among academia, government, and industry to tackle pressing national security issues.

## 2. ONR NEPTUNE Review Meeting at Stanford | November 6–7, 2024



Entrepreneurship (NEPTUNE) review meeting. This two-day event brought together principal investigators, researchers, and stakeholders to discuss ongoing research aligned with the National Defense Strategy (NDS). Attendees explored strategies to transition university-developed technologies into defense and commercial applications through presentations, collaborative sessions with Office of Naval Research (ONR) representatives, and networking opportunities to foster partnerships.



### 3. Wharton Aerospace Conference | October 17, 2024



Jeff Decker participated in a panel discussion at the Wharton Aerospace Conference in Washington, DC, along with Maria Tranquilli of the Common Mission Project and Alexander Gorelik, with Taft Law's Government Contracts. The event united leaders from academia, industry, and government to address national security challenges, including the growing talent gap in the defense industrial base. Jeff shared insights on Stanford's H4D program and the TT4D initiative, emphasizing cross-sector collaboration and education to prepare future defense innovators. His presentation underscored Stanford's pivotal role in translating advanced research into actionable defense solutions. Every attendee at the conference also received a signed copy of Jeff's new book *The Hacking for Defense Manual*.

### Carnegie Mellon class asks students to 'hack' government bureaucracy

### 4. Hacking for Defense Guest Lectures | September 9, 2024, Carnegie Mellon University, December 4, 2024, UC San Diego

As part of the Hacking for Defense programs, Jeff Decker delivered guest lectures at Carnegie Mellon University on September 9 and UC San Diego on December 4, promoting innovation and collaboration in solving critical national

security challenges, as well as introducing the classes to the new H4D textbook, "The Hacking for Defense Manual," written by Decker. The visit also included an interview with Pittsburgh National Public Radio station WESA-FM, which headlined their story "Carnegie Mellon class asks students to 'hack' government bureaucracy."

### 5. ONR Navy Undersea Research Program (NURP) Review Meeting | June 5-6, 2024, Penn State University

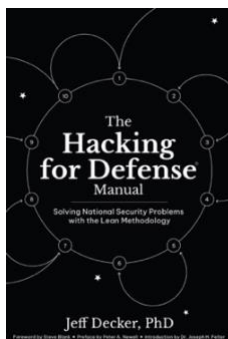
NURP university researchers participated in the annual NURP review meeting at Penn State University, presenting advancements and aligning projects with Navy priorities to enhance undersea capabilities.

### 6. NURP and NEPTUNE Mission Model Canvas Workshop | Tuesday, April 4, 2024 and Tuesday, October 16, 2024

Stanford hosted two virtual *Mission Model Canvas Workshops* for the Navy Undersea Research Program (NURP), and the second one for the Naval Enterprise Partnership Teaming with Universities for National Entrepreneurship (NEPTUNE), providing a practical framework to align academic research with DoD mission needs.

## Publications

1. **[The Hacking for Defense Manual: Solving National Security Problems with the Lean Methodology](#)**  
By Jeff Decker, 2024



2024 saw the launch of the first official textbook for the more than 70 H4D classes taught around the world and written by Dr. Jeff Decker. *The Hacking for Defense® Manual* is now available on Amazon. This comprehensive guide to innovation for national security is an invaluable resource for students, entrepreneurs and innovators tackling national security challenges. Drawing on his extensive experience as the program director of the Hacking for Defense (H4D) course and managing director of the Technology Transfer for Defense (TT4D) program at Stanford University's Precourt Institute for Energy, Dr. Decker provides a detailed roadmap for using Lean LaunchPad techniques to address complex government problems.

2. **[Shining a Light on the Defense Department's Industrial Base Problems](#)**, Jeff Decker, *The Strategist*, Vol 7, Iss 1 Winter 2023/2024 | 75-88
3. **[Understanding the Defense Department's Industrial Base Problems](#)**, Jeff Decker, Noah Sheinbaum, and Marshall Kosloff, *War on the Rocks*, March 23, 2024
4. **[The U.S. Navy Collaborates with Colleges and Universities to Transition Cutting-Edge Capabilities to the Fleet](#)**, *SeaPower*, August 28, 2024

## Blog Posts

1. [TT4D: Getting Defense Department Grants](#)
2. [TT4D: Tech Transfer for Defense's 4-Step Guide to Winning Defense Department Research Funding](#)
3. [TT4D: How to Find Existing Research Broad Agency Announcements](#)
4. [TT4D: Contacting the Program Manager and Seeking Feedback](#)
5. [Technology Transfer for Defense: Leveraging the Heilmeyer Catechism: A Blueprint for Effective Project Framing](#)
6. [TT4D and Researchers Looking for Government Financing \\$\\$\\$: Prepare and Submit Your Application](#)
7. [TT4D: Maximizing Your Event's Impact with Army Conference Support](#)
8. [TT4D: Where Defense R&D Money Comes from and Why it Matters](#)
9. [Frequently Made Mistakes in Research Proposals: What to Avoid for Success](#)
10. [Technology Transition and Research: Using Defense Department Research Categories and Technology Readiness Levels in Your Research Proposals](#)
11. [TT4D Can You Help YOU Secure DoD Research Funding](#)



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