NATIONAL DAYS OF ACTION
NO KILLER DRONES! NO SPY DRONES!
TUESDAY, MAY 6, NOON – 2:00 PM

MIT MAIN ENTRANCE, 77 MASSACHUSETTS AVE., CAMBRIDGE

Spread the word and join us.

Eastern Massachusetts Anti-Drone Network & Women's International League for Peace and Freedom

Contact: Info@justicewithpeace.org, UJP: (617) 332-9016

Thousands of innocent people have been killed by U.S. drones. We will read the names of victims and speak out against the new forms of warfare and the surveillance state. We are gathering at MIT, a major center of drone research.

Drone Research: The Little-known Collaboration between Academia and the Pentagon

The U.S. spends nearly **$600 billion** annually on defense: five times that of China and twelve times that of Russia. A large chunk of the pie - more than **$80 billion -** is spent on research and development (R&D) for new weapons that cost billions of dollars to develop, which are often obsolete before they are fielded.

A quarter century after the end of the Cold War, the spending exceeds levels reached during the height of the super power confrontation. For example, the highest R&D budget ever was less than $70 billion in constant 2010 dollars during the defense build-up under President Reagan's "Star Wars" program compared to the $80-billion now. The rationale for spending huge sums of money for military research to maintain technological superiority over a Communist enemy no longer exists. Yet, the paradigm has not changed due to the overwhelming influence of the "military-industrial complex" over our political system that President Eisenhower warned about in his farewell address in 1961.

Most major universities depend heavily on the Pentagon to support their research in physical sciences, engineering, mathematics, and computer science and to train future scientists by supporting graduate students in these fields. The Pentagon spends about **$3 billion** annually for university research accounting for the following shares of the total expenditure:

- Electrical Engineering 72%
- Mechanical Engineering 75%
- Metallurgy and Materials Science 35%
- Mathematics and Computer Science 30%

It also supports university research in other fields such as social sciences albeit to a lesser extent.

According to the National Science Foundation, MIT and Harvard are among the top 20 recipients of the Pentagon research funds. MIT's strong connection to the Pentagon earned it the nickname "Pentagon on the Charles" during the Vietnam War. The list includes Johns Hopkins, Stanford, Cornell, U Penn, Michigan, Wisconsin, and Penn State.

The primary vehicles the Pentagon uses for funneling research funds to universities are the Defense Advanced Projects Agency (DARPA) and the services research arms like the Air Force Office of Scientific Research (AFOSR) and the Office of Naval Research (ONR).

Pentagon-funded Research at MIT

MIT received $128-million from the Department of Defense in 2013 for on-campus research, which makes the Pentagon the No.1 sponsor of on-campus research. MIT also receives an additional $900 million annually from the Department of Defense to operate the MIT Lincoln Laboratory, which conducts classified research on missile defense systems, cyber security, sensors, intelligence, and surveillance, including unmanned systems. Lincoln Lab is a Federally Funded Research and Development Center sponsored by the U.S. Air Force.

Unmanned Aerial Systems Research at Universities

The technology for unmanned aerial systems, commonly known as "drones," is highly complex. Although defense contractors manufacture the killer drones like the Predator or the Reaper, many of the underlying technologies are developed at our finest universities. A few examples:

MIT

MIT is one of the top research universities in the world specializing in science, engineering, and life sciences. Many of its departments and research centers contribute to advancing military drone technology.

Computer Science and Artificial Intelligence Laboratory (CSAIL): CSAIL is the heart of MIT's research on robotic systems with strong links to the Pentagon. In 2011, CSAIL cosponsored an off-campus workshop with the office of the Assistant Secretary of Defense for Research and Engineering (ASDRE). According to the public version of the workshop report the goal was to set "future directions for selected topics in computer science." Twenty-three academics, industry professionals, and department of defense officials attended. The workshop focused on research that is critical to the Pentagon priorities, for example, autonomous systems and cyber physical systems.

Victor Zue, Delta Electronics Professor of Electrical Engineering and Computer Science at MIT, who led the workshop, wrote in the preamble of the report the following.

"The Department of Defense has been a primary sponsor of computing research since the inception of the field, and the warfighter has been a primary beneficiary of that research. America's national security is inextricably linked to advances in computing…"

The Robot Locomotion Group in CSAIL has a five-year multi research initiative to develop a bird-sized drone that could fly fast - a long-standing DARPA objective. The project includes researchers from Carnegie Mellon University, Harvard, MIT, New York University, and Stanford University, all involved in drone research.

Aerospace Controls Laboratory (ACL): Researches topics related to autonomous systems and control design for aircraft, spacecraft with emphasis on "decision making under dynamic uncertainty."

Laboratory for Information and Decision Systems: Focuses on autonomous vehicles and mobile cyber physical systems.

Other Universities

Drone-related research is also conducted at many other universities across the U.S. including Johns Hopkins, University of Southern California, and Carnegie Mellon.

Carnegie Mellon University in Pittsburgh, PA, has set up a Robotics Institute, which is a major participant in the DARPA robotics program. The university has also established an off-campus National Robotics Engineering Center that can apply basic research to developing hardware for commercial or military systems. For example, it is developing an Autonomous Navigation System (ANS) for the military's Future Combat Systems.

Other Boston-area schools that are conducting drone research include **Worcester Polytechnic Institute and Northeastern University**.

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