



About Northeastern



Pioneering the Wireless **Internet of the Future**

Founded in 1898, Northeastern is a global research university and the recognized leader in lifelong learning powered by experience.

Our world-renowned experiential approach empowers our students, faculty, alumni, and partners to create impact far beyond the confines of discipline, degree, and campus.

Our locations—in Boston; the Massachusetts communities of Burlington and Nahant; Charlotte, North Carolina; the San Francisco Bay Area; Seattle; London; Toronto; and Vancouver—are nodes in a growing global university system that expands opportunities for collaborative, solutions-focused research and flexible, student-centered, lifelong learning.

Northeastern's comprehensive array of undergraduate and graduate programs—on campus, online, and in hybrid formats—lead to degrees through the doctorate in nine colleges and schools. Among these, we offer more than 140 multidisciplinary majors and degrees designed to prepare students for purposeful lives and careers.



Contact us

Institute for the Wireless Internet of Things at Northeastern University

435 Interdisciplinary Science
and Engineering Complex
360 Huntington Avenue
Boston, MA 02115
northeastern.edu/wiot

Tommaso Melodia, Institute Director

Dr. William Lincoln Smith Professor of
Electrical and Computer Engineering

Fiona Morgan, Program Manager

617-373-4897
f.morgan@northeastern.edu

**Northeastern
University**



**Institute for the Wireless
Internet of Things**
at Northeastern

The future is **wireless**

At Northeastern University's Institute for the Wireless Internet of Things, we're driving advances in systems and networks to transform how people connect, communicate, and thrive worldwide.

This is our vision for the next-generation Internet of Things: a continuum of untethered objects and devices, all interacting with people and the environment in ways that are exponentially faster, more efficient, and more secure.

Our research priorities

- **Artificial intelligence and machine learning for wireless systems**
- **5G and 6G wireless systems**
- **IoT business models for tomorrow's industries**
- **Smart and connected implantable medical devices**
- **Smart cities and oceans**
- **Unmanned aerial vehicles for civil and national defense**

The Northeastern difference

In our quest to create autonomous, networked systems that operate even in challenging, uncertain, and extreme conditions, we innovate by collaborating. To attract the best ideas and perspectives, our institute:

- **Forges partnerships with academia, government, and industry**
- **Attracts distinguished faculty and exceptional students**
- **Provides world-leading, experience-powered education through the doctoral level**

Our **capabilities** are unmatched

Institute faculty offer interdisciplinary expertise, with strengths in:

- **Communication and networking**
- **Sensors and energy harvesting**
- **Data analytics and machine learning**
- **Security and blockchains**

Northeastern's unique facilities include:

- **Arena**, an open-access, wireless testing platform featuring 24 software-defined radios and 64 antennas in a ceiling-mounted grid, with the scale and computational power to foster the development of new technologies in the crowded sub-6 GHz 5G spectrum bands, as well as new applications of AI and machine learning to wireless systems
- **Colosseum**, the world's largest radiofrequency channel emulator. Developed by the U.S. Defense Advanced Research Projects Agency, the Colosseum will enable the building and testing of intelligent, autonomous, collaborative wireless technologies for military and commercial use. This "electronic arena" can mimic, in real time, tens of thousands of R-F channel interactions among hundreds of wireless devices within a square kilometer. Through AI, radios that weren't designed to work together can now learn to do so by optimizing the limited capacity of the electromagnetic RF spectrum.
- **Expeditionary Cyber and Unmanned Aerial Systems R&D Facility**, an indoor-outdoor laboratory with an anechoic chamber/Faraday cage and 150'x200'x60' netted area for testing unmanned aerial and ground technologies, antennas, and navigation and communications equipment

Our research **solves** global problems

Leading-edge projects tackle challenges from data insecurity to chronic diseases, energy scarcity, disaster response, and threats to national security.

Radiofrequency machine learning. We're harnessing AI to develop wireless devices that can learn to share the RF spectrum optimally, in real time—and that can distinguish legitimate IoT devices from spoofer.

Blockchain. While blockchain technologies ensure that digital transactions remain transparent and verifiable to all parties, these systems require vast amounts of energy. We're harnessing AI to enhance their efficiency for use in IoT systems.

Intrabody medical systems. For patients with chronic diseases, we're devising tiny sensors and actuators that transmit power and data using unconventional wireless techniques that are safer, more secure, and more energy-efficient.

Unmanned aerial and underwater IoT networking. Our goal is to enable drones and other technologies to synchronize their sensing, communications, and movement autonomously, and to learn to foil adversaries by listening to the wireless spectrum and continuously changing their modes of communication.

PAWR: Innovation in powering IoT. We're the project office for Platforms for Advanced Wireless Research, a \$100-million public-private partnership that aims to find new ways to power IoT by building city-scale testbeds for advanced wireless technologies and digital ecosystems.