
This fiscal year, global events tugged at, twisted, and transformed the essence of those three words—words which Northeastern’s culture of innovation are built on. Through a relentless global pandemic and continuous disruption of higher education, the Center for Research Innovation (CRI) has remained agile and resilient, while celebrating and fostering the ingenuity of the university’s robust research network.

In a year filled with unexpected challenges and profound change, the CRI leveraged the diversity of thoughts and ideas within the university, launching a number of new programs that empower our researchers to realize their potential, successfully prosecute a record number of patents, and continue addressing our world’s great challenges.

However, we will not hang our hat on a single successful year. We will apply our grit and wisdom toward what’s to come. This year solidified that we are agile and resilient—and thrive when challenged. We will continue pushing forward in this manner and eagerly await what the future has in store for the Center for Research Innovation.

Ted Werth
Director of Entrepreneurship

Ted Werth
INGENUITY REQUIRES PROTECTION

INTELLECTUAL PROPERTY
CELEBRATING A YEAR OF UNPRECEDEDENTED GROWTH

The Center for Research Innovation serves as the nexus of innovation and impact, providing Northeastern researchers the ability to address society’s challenges through the commercialization of their boldest ideas.

Protecting Northeastern innovation positions technologies for maximum economic and social impact.

119 210 76

INVENTION DISCLOSURES PATENT APPLICATIONS GRANTED PATENTS
up 37% from FY19 up 13% from FY19 up 47% from FY19

LIGHTNING IN A BOTTLE
Ever since President Joseph E. Aoun announced Northeastern’s ambitious academic plan in 2016, the CRI has grown exponentially. The excitement around the university’s research imperatives caused a significant increase in patents issued—Northeastern innovators have been awarded 196 patents, with 76 granted in FY2020 alone.

FIVE YEARS IN THE TOP 100
Since its inception in 2010, the National Academy of Inventors has published a list of the top 100 universities to have been granted U.S. utility patents from around the world. From 2015–2019, Northeastern has held a place on this top 100 list.

PATENTS ISSUED
INVENTORS AWARDED PATENTS

BOUVE COLLEGE OF HEALTH SCIENCES

- SPIRO PAVLOPOULOS
- RAYMOND BOOTH
- NIKOLA ZYVONIK
- MICHAEL MALAMAS
- MANSOOR AMIJI
- KUMARA SUBRAMANIANI
- GANESH SINGH THAKUR
- ALEXANDROS MAKRIANNIS

COLLEGE OF ENGINEERING

- ZHENYUN QIAN
- YUNG JOON JUNG
- YUN RAYMOND FU
- VIANNIS LEVENDIS
- TOMMASO MELODIA
- THOMAS WEBSTER
- RIFAT SIHANI
- REBECCA CARRIER
- RANDALL ERB
- PURNIMA BATILAL-MARRIS
- NICOL MCGRUER
- MING WANG
- MATTEO RINALDI
- MARVIN ONABAJO

COLLEGE OF SCIENCE

- SWASTIK KAR
- SRINIVAS SRIDHAR
- SLAVA EPSTEIN
- SANJEEV MUKERJEE
- ROBERT HANSON
- NEEIL JOSHI
- MICHAEL POLLASTRI
- MENI WANNU
- LATIKA MENON
- KE ZHANG
- JONATHAN TILLY
- HEATHER CLARK
- DORI WOODS

COLLEGE OF ENGINEERING (CONTINUED)

- MAHSID AMIRABADI
- LAURA LEWIS
- JOSE ANGEL MARTINEZ-LORENZO
- JEFFREY RUBERTI
- HANCHEN HUANG
- GREGORY ROWALSKI
- EDMUND YEH
- EDGAR GOUCHE
- DOBRAS AUGUSTE
- CRISTIAN CASSella
- CONSTANTINOS MAVROIDIS
- CHARLES DIMARZIO
- CARLOS HIDROVO CHAVEZ
- CAREY RAPPAPORT
- BRADLEY LEHMAN
- AUROOP GANGULY
- AHMED BUSNAINA
The purpose of Invented Here! is to celebrate New England innovators, along with their inventions and stories. Through this program, the Boston Patent Law Association (BPLA) transforms the nation’s relationship with science and technology, and provides educational opportunities that inform the public of these fascinating projects.

REBECCA CARRIER
PROFESSOR, CHEMICAL ENGINEERING

LAB:
ADVANCED DRUG DELIVERY RESEARCH LABORATORY

EXPERTISE:
DRUG DELIVERY, INTESTINAL ENGINEERING, MICRO BIOME-HOST INTERACTIONS, MUCOSAL TRANSPORT, TISSUE ENGINEERING

PATENT SPOTLIGHT:
DEVICE FOR CONTROLLED APICAL FLOW IN CELL CULTURE INSERTS
JEFFERY RUBERTI
PROFESSOR, BIOENGINEERING

EXPERTISE:
TISSUE ENGINEERING OF LOAD-BEARING MATRIX (BONE, CORNEA),
BIOREACTOR DESIGN, MULTI-SCALE MECHANOBIOCHEMISTRY, STATISTICAL
MECHANICS, ENERGETICS MICROSCOPY, HIGH-RESOLUTION IMAGING,
BIOPOLYMER SELF-ASSEMBLY

PATENT SPOTLIGHT:
MECHANOCHEMICAL COLLAGEN ASSEMBLY
BARBARA LEE WASZCZAK
PROFESSOR, PHARMACEUTICAL SCIENCES

EXPERTISE:
- Electrophysiology
- Neuropharmacology
- Neurobiology
- Behavioral Neuroscience
- Neurobiology and Brain Physiology
- Neurophysiology
- Neurodegeneration
- Neurodegenerative Diseases
- Cellular Neuroscience
- Immunohistochemistry

PATENT SPOTLIGHT:
- Methods for delivery to the central nervous system of nucleic acid nanoparticles to treat central nervous system disorders
InnoEd is where Northeastern innovators learn from experts about protecting intellectual property, launching startups, and commercializing technologies.

102 Faculty, Students, and Staff Attended Events

COLLEGES REPRESENTED
- Bouve College of Health Sciences
- College of Engineering
- College of Professional Studies
- College of Science
- College of Social Sciences and Humanities
- D’Amore-McKim School of Business
- Khoury College of Computer Sciences
- School of Law

CRAFTING INVINCIBLE DISCLOSURES
INVESTOR INSIGHTS
IP DISCOVERY SESSION
IP FOR ENTREPRENEURS
INGENUITY IS AMPLIFIED THROUGH APPLICATION
GapFund360 catalyzes state-of-the-art technologies, advancing Northeastern innovation through prototyping, validation, and industry input.

GapFund360 awarded over $600,000 to initiatives that represent BCHS, COE, COS, and KCCS—generating five spinouts.

**Phase I Awardees**

**HYPOXIA-INDUCING CRYOGELS: A HASSLE-FREE AND LOW-COST HYPOXIC CELL CULTURE SOLUTION**
SIDI BENCHERIF, THIBAULT COLOMBANI, ZACHARY ROGERS

**PHYSICS-INFORMED NEURAL NETWORK PLATFORMS FOR TARGETED DESIGN AND MANUFACTURING OF SOFT MATERIALS**
SAFA JAMALI, MOHAMMADAMIN MAHMOOZDARZAQCHELOU

**A-EYE: A NANOTECHNOLOGY AND AI-ASSISTED ARTIFICIAL CONE CELL CAPABLE OF COLOR AND SPECTRAL RECOGNITION**
SWASTIK KAR, SARAH OSTADABBAS, DAVOOD HEJRAZI

**SCANDROP TECHNOLOGY FOR PRECISION SINGLE-CELL ANALYSES OF CANCER IMMUNOTHERAPIES**
TANIA KONRY, GIOVANNI UGOLINI, SAHELI SARKAR

**PRODUCTION OF CHEMOTHERAPEUTIC DRUGS FROM THE PERIWINKLE PLANT**
CAROLYN LEE-PARSONS

**AI-POWERED WIRELESS NETWORK OPERATING SYSTEM**
TOMMASO MELODIA, SALVATORE D’ORO, LORENZO BERTIZZOLI, LEONARDO BONATI

**Phase II Awardees**

**CONTACTLESS WIRELESS ENERGY TRANSFER: ANYWHERE, ANYTIME CHARGING SURFACES**
KAUSHIK CHOWDHURY, YOUSOF NADERI, UFUK MUNCUK, KAI LI, JERRY GU

**UNIQUELY ENGINEERED NONTOXIC MN-FERRITE SUPERPARAMAGNETIC NANOPARTICLES FOR MAGNETIC RESONANCE IMAGING**
VINCENT HARRIS, PARISA ANDALIB

**BATTERY-LESS INFRARED SENSOR TAGS FOR RELIABLE OCCUPANCY SENSING (BISTROS)**
MATTEO RINALDI, ZHENYUN QIAN, SUNGHO KANG

**New Program Spotlight**

**PRIMED FOR LAUNCH: THE SPARK FUND**

In late 2020, The Center for Research Innovation will launch the Spark Fund, an evergreen fund dedicated to investing in technologies from Northeastern’s colleges, institutes, and research centers. This platform provides innovators the resources to catapult their early-stage ventures and the critical tools to push their research toward commercial success.
VENTURE CREATION

In FY2020, the CRI played an integral role in the introduction and development of 12 transformational businesses—a significant jump from the seven launched last year.

FOUNDRERS AND SPINOUTS

Albert-László Barabási ........................................ Foodome
Carolina Mattsson .............................................. Nomix Life Sciences
David Medina ..................................................... Syncell Biotechnology
Jose Martinez-Lorenzo ........................................ MatrixSpace
Ke Zhang ........................................................... pacDNA
Kim Lewis ......................................................... Daros
Leila Deravi ........................................................ SeaSpire
Raymond Fu ......................................................... Ainnovation Labs
Tania Konry .......................................................... NeorahDX
Thomas Webster ............................................... Interstellar Therapeutics

STARTING A COMPANY IS COMPLEX. ACCELL360 SIMPLIFIES.

Launched this year, Accell360 offers a comprehensive suite of vetted resources corresponding to each phase of the research-based venture life cycle. These resources empower Northeastern innovators to realize the commercial potential of their technological discoveries.

1. BASIC RESEARCH
2. USE-INSPIRED RESEARCH
3. PROOF-OF-CONCEPT
4. PRE-SEED
5. EARLY STAGE INVESTMENT
6. GROWTH
The world runs on wireless devices—cell phones, laptops, and tablets are everywhere. These days, being connected on the go seems to come as naturally as breathing. Unfortunately, wireless devices do not run endlessly. There are some options for wireless charging, but many of these devices are limited to a single device or are specific to a single type of device, thus providing little advantage over wired chargers. Using advances in device detection and wireless transmissions, DeepCharge has developed novel technology that puts wireless charging above all other competition. Using high-tech multi-hop transmitters and smart AI software, DeepCharge can turn entire surfaces into charging stations capable of supporting multiple devices with different hardware, providing simple and seamless charging without wires. With DeepCharge, charging a smartphone is as simple as putting it on the table. This kind of simplicity is what humans look for today.
Commercializing technologies via industry licenses and Northeastern spinouts impacts the home, the workplace, and the commons—generating tangible solutions fostering health, safety, and sustainability.

| TECHNOLOGIES LICENSED | 11 |
| LICENSES AND OPTIONS | 8 |
| IN LICENSING REVENUE | $570,094 |
RESILIENCE AS RESPONSE TO COVID-19

INGENUITY IS TRANSMUTED THROUGH AGILITY
COVID-19 REPURPOSED RESEARCH

Even in the face of one of the most daunting public health crises this generation has seen, Northeastern innovators refused to back down, developing new testing methods and pivoting their research toward solving the most pressing healthcare challenges.

**ISCENT**
Breath-based testing for COVID-19 and other medical conditions

**NEORAHDX**
Novel accurate and rapid COVID-19 testing

**TRANSVERSAL THERAPEUTICS**
Saliva-based testing for COVID-19 and other medical conditions

**[NAME PENDING]**
Breath-based testing for COVID-19
RISE is the premier showcase for Northeastern’s impact-oriented research community. With the rapid onset of COVID-19, the RISE team made a bold decision to transform RISE into a virtual event: charting new territory before virtual events became the “new normal.” Students, faculty, staff, university leadership, RISE Judges and Sponsors embraced this challenge with resilience and creativity. Armed with ingenuity and determination, the pivot proved a groundbreaking success enabling a truly global celebration of the university’s accomplishments.

BY THE NUMBERS

RISE PRESENTATIONS ....................... 343
RISE PRESENTERS .......................... 800+
RISE JUDGES .............................. 159

PRESENTATIONS BY COLLEGE

BCHS ........................................ 118
CAMD ........................................ 29
COE .......................................... 78
COS .......................................... 71
CPS .......................................... 18
CSSH ......................................... 13
DMSB .......................................... 5
KCCS .......................................... 13

AWARDS
RISE ........................................ 59,500
COLLEGE & DEPARTMENT-BASED ..... 16,000
TOTAL AWARDED TO STUDENTS ....... 25,500
Viral testing has received significant attention with the rise of the COVID-19 pandemic. A fast-acting test that can be deployed in remote locations can make the difference between containing an outbreak or widespread infection. NeorahDX has developed a diagnostic test kit for detecting COVID-19 that does not require capital equipment to produce accurate results. The test kit uses a colorimetric design making it easy for technicians to determine test results at the site where the sample was taken. The versatile and fast-acting nature of NeorahDX’s design brings rapid testing capabilities to places where they are needed most.