

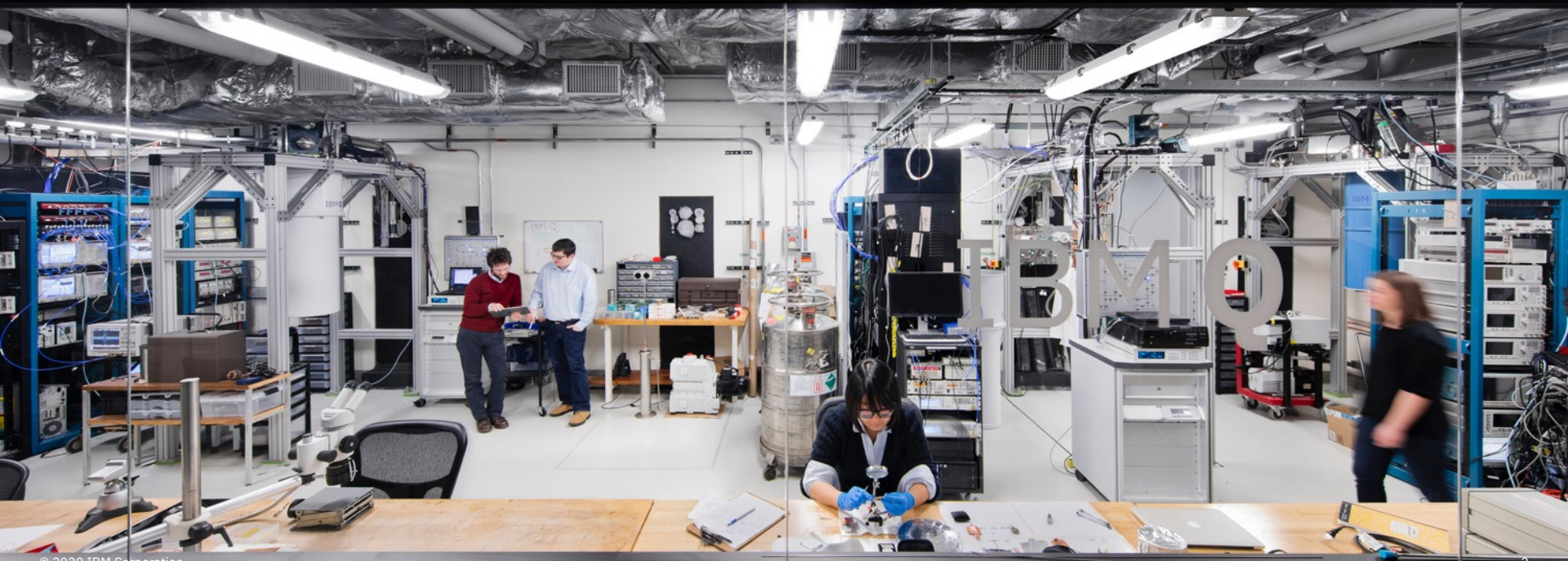


University Collaborations through IBM Center for Advanced Studies (CAS)



IBM Cloud

IBM has a network of Centers for Advanced Studies (CAS) which specializes in high touch collaborative partnerships with universities



CAS centers around North America define the university relations strategies in their local communities



Serves as an integration point for IBM university relations activities - though never as a gatekeeper or inhibitor - as well as “one-stop shopping” for the many IBM university relations programs

Specializes in support of high touch university collaborations – while creating a university environment conducive for IBM-academic partnerships, including recruiting.

Serves as a matchmaker between IBMers & faculty/students, as well as between IBMers pursuing similar goals on campus

CAS Team

Dr. Andy Rindos
CAS Program
Director



RTP CAS



Naeem Altaf
Austin CAS,
Distinguished
Engineer



Jeb Linton
D.C. Area CAS
Chief Architect



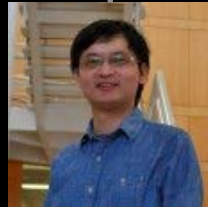
Ron Majumdar
Chicago CAS
Architect



Blain Dillard
Ops Manager
PM



Dr. Anand Singh
Assoc. CAS Prog.
Dir., CA CAS,
Architect



Dr. Xianqing Yu
Architect



Dr. Young Oh
Quantum,
Architect



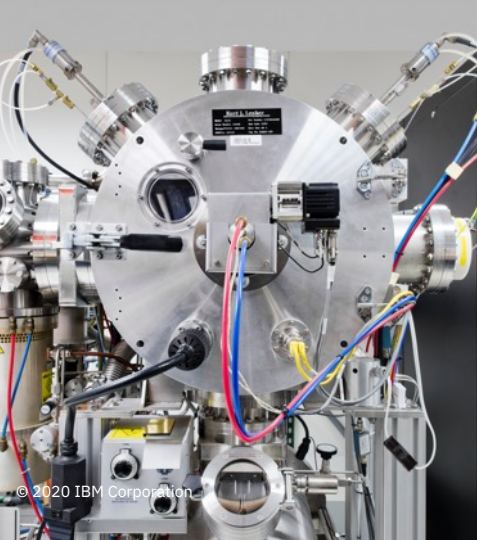
James Jushchuk
Data Science,
Developer

CAS INTERNS

Coming soon: Boston CAS.

The US centers coordinate closely with CAS Canada Lab (Ottawa, Toronto), CAS Alberta (Edmonton) and CAS Atlantic (Fredericton).

CAS engagements are tailored partnerships with universities which address critical research and technology needs



EDUCATION


Conduct on-campus events (hackathons, workshops) and educational programs (including bootcamps and traditional curricula)

SUPPORT

CAS works directly with faculty and students, using Faculty Awards, Academic Initiative cloud accounts and other IBM university relations programs to support educational activities

PROJECTS

Establish research and educational projects (traditional faculty-driven, senior design / capstone) with faculty and students around key IBM technologies, including Watson, Analytics, IoT, Cloud, IBM Q, Hyperledger, and Blockchain



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EDUCATION

The CAS team can engage in a variety of methods to deliver tailored educational experiences to faculty and students alike

Hackathons

Hackathons give students opportunities to collaborate intensively on specific projects such as Watson or data science, while IBM experts coach and facilitate



Guest Lecturer / Speaker

IBM can arrange for guest lecturers in university courses involving topics ranging from data science to blockchain to AI.


Additionally, we can provide subject matter leading speakers for conferences and seminars.

Workshops & Training

We can connect you with the documentation and training you need to jumpstart your and your students' learning experiences using IBM technology.

This can be in the form of ½ or 1-day workshops or informal 1-on-1 consultation.





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SUPPORT

The CAS team can help enable no-cost or low-cost cloud access for research or course use, as well as other tangible support for students and researchers



Cloud Access

With IBM Cloud access, faculty and students can benefit from the same secure and advanced Watson, data science, and cloud resources IBM customers use - at a fraction of the cost, or in some cases, no cost at all.

Letters of Support

IBM is proud to lend our academic endorsements to qualified research proposals for grants and funding.

We are willing to partner with you in many ways in your journey inventing the future through your research endeavors.

Internships / Co-op Assignments

IBM is always looking for top talent to add to our team. Your students may apply for paid internships and co-op assignments which gives both IBM and student the opportunity to know one another, possibly leading to fulltime employment post-graduation.

The IBM Cloud for Education

was developed to address academic customer requests for an on-demand managed cloud service providing numerous required features & capabilities used in classroom instruction, research & other education business processes.

Currently established as a distributed VCL-based cloud within SoftLayer datacenters in Dallas, Toronto, Singapore & Amsterdam, its native IaaS capability can deliver a wide variety of IBM software-based server images.

Through its flexible API-driven plug-ins, it can burst out to any public cloud solution, as well as connect to many IBM SaaS-based cognitive & analytic services – as well as our quantum computing emulators and programming tools.

Based on the **Apache Virtual Computing Lab (VCL)** open source cloud management software, currently being used by many universities & colleges across the world.



With connectivity to major educational and research high-speed backbones (such as those managed by CANARIE & Internet2) and federated identity management support (allowing access using InCommon, Canadian Access Federation, etc.), faculty and students can use their university-issued credentials to access IBM Academic Cloud services from multiple datacenters around the world.

It can also be installed as a hybrid solution, providing a cloud management stack for on-premise resources within a customer datacenter, while providing inherent burst-out capability to IBM public cloud services.

IBM University Awards

Our Mission

IBM University Awards support basic research, curriculum innovation, and educational assistance in focus areas that are fundamental to innovation in the 21st Century and strategic to IBM's core business.

Open Collaborative Research Awards*

Supporting open collaboration between IBM and academia to accelerate innovation and benefit the world at large

Faculty Awards*

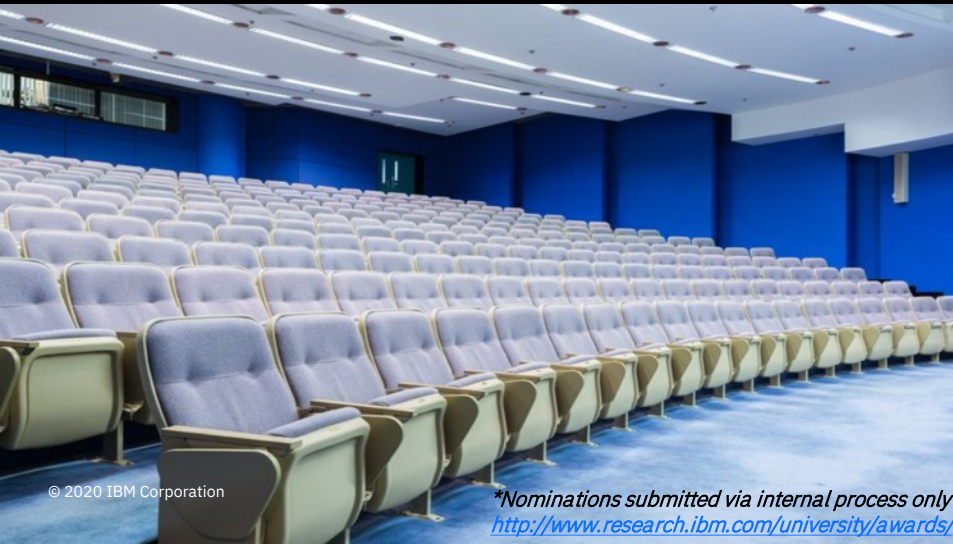
Fostering collaboration between academia and IBM

Shared University Research Awards*

Promoting research collaboration between IBM and academia in areas of mutual interest

PhD Fellowship Awards

A competitive program recognizing exceptional PhD students at leading research institutions, typically within 2 years of receiving their PhD degree



University Delivery Services (UDS)

The UDS uses capstone, special projects, special topics & other courses or workshops to train students & faculty on various IBM technologies, software/services & applications (Watson, Cloud, Blockchain, etc.).

The best are hired as interns, co-ops, or supplementals to fulfill traditional IBM services engagements.

Public / Private

IBM would work to engage its existing customers in such services engagements, while the university could work to engage its existing corporate and government partners

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Ecosystem Goals

- Ecosystem w/ university & industry/government
- Engage local businesses in supporting university activities & research
- Recruitment & grow talent pipeline for region's employers

Partnership

While some work can be provided by IBM, we would ideally partner with the university to pursue services engagements that require IBM skills, products & services

IP Considerations

- Goal is that any generated IP would be owned by end customers
- On-campus work facilities may assist with protecting IP



IBM Academic Initiative

Established in 2005, the IBM Academic Initiative allows and encourages faculty, students and researchers at accredited academic institutions to leverage IBM tools, courses, and other resources in the classroom.

Our mission is to enable students to graduate with direct hands-on experience on "industrial strength" tools that will help them in their chosen career.

Harness the power of IBM. Get easy no-charge access to the tools you need to develop the next great thing. Enjoy powerful technical and strategic resources from IBM. Jump right in with cloud access to powerful services and the most prominent open-source computer technologies or take advantage of hands-on resources that will teach you about data and analytics, Internet of Things, and security.



Types of assets we provide

Cloud Access - Enhanced access to the IBM Cloud and select cloud-based resources and applications, such as the Watson APIs and IBM Q Experience

Software - Access to the same software used by our commercial customers leading to practical training for today's jobs

Courseware - Faculty access to the same courses delivered to our enterprise customers for inclusion in part or whole into existing and new curriculum

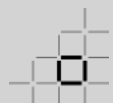
More info: ibm.biz/academic



IBM Cloud



Watson



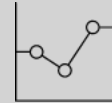
Blockchain



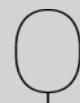
Internet of Things



Red Hat



Data Science



Quantum



Security

IBM Skills Academy

The IBM Skills Academy is a training and certification program that is designed to bridge the skill gap between the university and industry for both students and educators.

Online Courses

Self-paced virtual courses and courseware

Classroom Training

Instructor-led training in a classroom environment

Hands-on Labs

Do exercises through our cloud environment

Digital Badges

A Digital Badge is a cross-industry digital recognition of technical skills which can be shared on your social and professional networking sites, as well as your digital signature.

Badge Levels

Four levels of badges distinguish achievement




IBM Career Paths

IBM Career Paths have been designed based on relevant market research and valuable insights of industry experts. The curricula provides up to 50 hours of learning and is supposed to be done ideally on top of the regular academic program.

More info: <http://www.ibm.com/services/weblectures/meap>

Find Your Career Path and Start Earning Your First Badge





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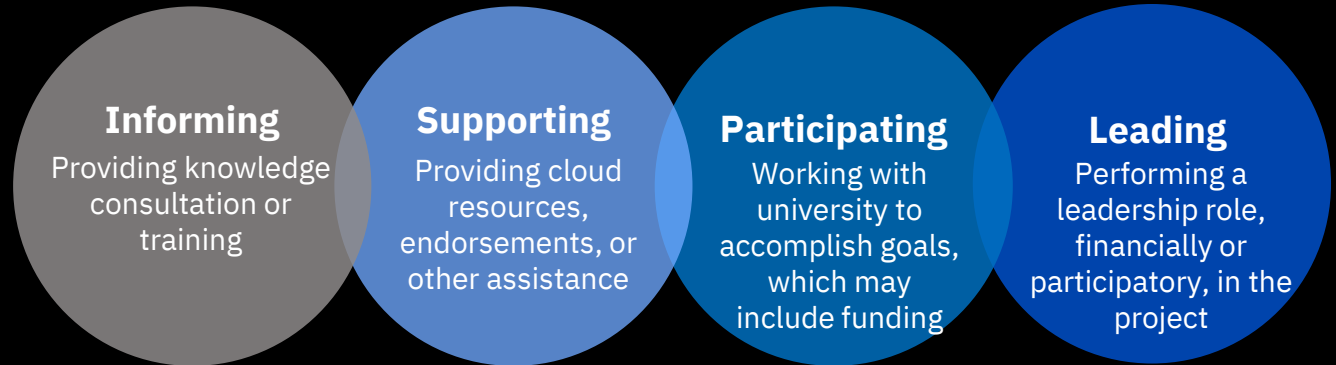
PROJECTS

Ultimately, when you succeed, we succeed. Our goal is to see IBM technology come to life in the hands of talented researchers and students seeking to make a difference in their fields of study.



Engagement Models

We engage with you in whichever manner best suits your specific needs, and hybrid engagements are common



EXAMPLES:

CHIP, Almost all projects

Watson-in-the-Watt, Almost all projects

Guiding Eye Dog, Antimicrobial Research

Quantum Hub

Guiding Eye Dog

Problem Statement

Training guiding eye dogs can cost up to \$50k per dog, which is exacerbated due to the low success rate for dogs completing the entire process. Researchers seek to identify dogs earlier in the training process which will ultimately pass or fail the program.

Summary of Research

Using IBM IoT and AI technology – a smart collar, the IBM Hybrid Cloud and Watson analytics - researchers have developed a methodology to identify trainee puppies. Movement, sound, and environmental data is collected about trainee puppies. Then the data is analyzed and matched against historical patterns for known results.

Media

[Building a Better Guide Dog](#)

[Artificial intelligence helps determine which puppies can serve the blind](#)

[How Watson is Helping More Puppies Become Guiding Eyes for the Blind](#)



Partner

NC STATE UNIVERSITY

Dr. Alper Bozkurt, Professor
Dr. David Roberts, Assoc. Prof.

Department of Electrical and
Computer Engineering

*“Our aim is to get as much
quantified and objective
information as possible.”*
-- Professor Alper Bozkurt

IBM Technologies

- Internet of Things (IoT platform, cloud apps such as nodeRed, etc.)
- IBM Hybrid Cloud (storage, structured & unstructured database, IBM-managed Kubernetes cluster, etc.)
- Watson Studio, Watson Machine Learning, Watson Natural Language Understanding, etc.

IBM Center for Advanced Studies

- Provided and managed IBM Cloud resources
- Employed a PhD student intern
- Sponsored IBM faculty award
- Assisted with infrastructure and data pipeline design

CHIP – CHain Integration Pilot

Problem Statement

Retailers accept as “business as usual” a certain level of product loss along the supply chain, be it from theft, damage, human or machine error. Sources cite this as a multi billion-dollar problem.

Summary of Research

CHIP will integrate product data streams from various stakeholders into a blockchain framework, creating a common record of information jointly shared by trade partners that will enable end-to-end visibility and data-driven decision making throughout the value chain.

Partner

"The problem we've had for the last 15 years is we've had no reliable way to send that data from partner to partner because all it takes is one vendor in the supply chain to corrupt or lose that data and the whole thing falls apart."

-- **Justin Patton**,
Director of RFID Lab



IBM Technologies

- IBM Blockchain Platform
- IBM Hybrid Cloud (IBM-managed Kubernetes cluster, storage, logging, availability and performance monitoring service, Cloudant database, Python & nodeJS cloud apps, etc.)

Media

[Auburn University partners with 21 retail supply chain stakeholders on blockchain project](#)

[Retail Blockchain Deep Dive: Supply Chain](#)



IBM Center for Advanced Studies

- Provided and managed IBM Cloud resources
- Connected Auburn with IBM Blockchain Platform development team for consulting services
- Provided consulting services for setting up cloud infrastructure
- Delivered workshop on cloud and Blockchain

Data Science Course Support

Problem Statement

University of North Carolina's Kenan-Flagler Business School wanted to design and offer a senior level undergrad data science course that would serve as a multi-disciplinary experience for both business and computer science majors. They asked for support from IBM.

Summary of Solution

IBM CAS offered support by providing both technology access and data science platform jump-start training for professors designing the course. Course will provide opportunities for non-CS majors with domain expertise to work together with CS majors with I/T expertise.

Partner



Dr. Daniel Ringel, Assistant Professor of Marketing

Dr. Jack Snoeyink, Professor of Computer Science

Note: Within hours after registration opened, all seats were full, with a long waitlist!

IBM Technologies

- IBM Hybrid Cloud (virtual server, GPUs, object storage, etc).
- Watson Studio (Jupyter notebooks, Python)



IBM Center for Advanced Studies

- Provided and managed IBM Cloud resources
- Provided jump-start Watson Studio training for professors designing course
- Will provide environment for students to use during data science course
- Will provide guest lecturer for one or more classes
- Will provide resources for data science research

Antimicrobial Resistance (AMR)

Problem Statement

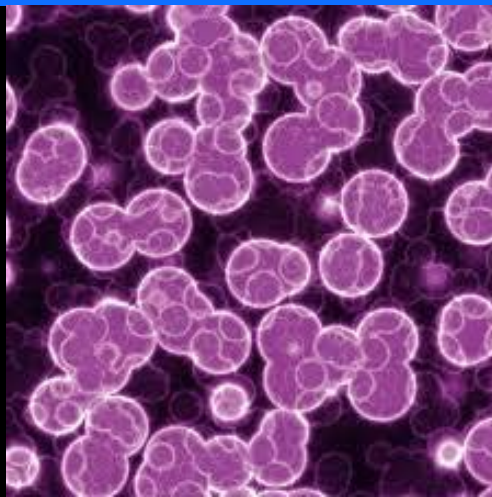
Sponsored by the World Health Organization, the Global Antimicrobial Resistance Surveillance System (GLASS) is being developed to support the global action plan on antimicrobial resistance. The aim is to support global surveillance and research in order to strengthen the evidence base on antimicrobial resistance (AMR) and help informing decision-making and drive national, regional, and global actions.

Summary of Solution

IBM CAS supports NC State and its education partners through the development of technology related to data repository & management, visualization, AI-based insights, and expert systems.

Media

[Global Antimicrobial Resistance Surveillance System \(GLASS\)](#)



Partner



Dr. Paula Cray

Department Head, Population Health and Pathobiology

Dr. Shivaramu Keelara Veerappa

Research Assistant Professor, Population Health and Pathobiology

IBM Technologies

- IBM Hybrid Cloud (compute, GPU, storage, structured & unstructured database, Weather Company data, IBM Cognos, etc.)
- Watson Studio, Watson Machine Learning, Watson Knowledge Studio, Watson Discovery Services, Watson Assistant, Watson Analytics

IBM Center for Advanced Studies

- Provided tool for data refinement, cleaning & visualization
- Correlation between weather and AMR data
- Deliverables include ontology for AMR text data analytics, expert system for salmonella
- Data lake & data repository for AMR research
- Providing tools and resources for genomic analysis
- Presented sessions with partnering countries (Ecuador, Senegal, Ghana) and World Health Organization
- Multiple letters of support for research grant proposals
- Supported IBM faculty awards

Watson-in-the-Watt

The Watson in the Watt (WitW) program enables AI education and research applications within the broader Clemson Community with a focus on Watson and other IBM Cloud services. Since its beginning in late 2017, this program has worked intensively with over 50 students from 18 majors to support research projects with faculty from 20 academic departments. By connecting Watson-equipped students to researchers, campus leaders and industry partners, the program creates meaningful educational and professional opportunities for students while promoting new knowledge discovery, the growth of campus initiatives and business development.

Partner



Dr. Hudson Smith, Research Associate, Analytical Systems and Applications

Dr. Kuang-Ching Wang, Professor of Electrical and Computer Engineering

IBM Technologies

- IBM Hybrid Cloud (Object storage Kubernetes, IBM app engines, databases, Weather Company data, IoT)
- Watson (Visual Recognition, Discovery, Natural Language Understanding, Natural Language Classifier, Natural Language Processing, Knowledge Studio)

Media

[IBM Watson Partnership Overview](#)

[IBM Watson in the Watt](#)



Project Sampling (dept)

- AI-Powered Measurement of Lung Cancer Lesions ([Biomedical Data Science](#))
- Analysis of Agricultural Drone Images with Watson Visual Recognition ([Agricultural Sciences](#))
- Giving Voice to Holocaust Survivors and Liberators with IBM Watson ([English](#))
- Leveraging AI for Qualitative Analysis Research at Scale ([Education](#))
- Preserving Veterans History with IBM Watson ([History](#))
- Virtual TA for Introductory Accounting ([Accounting](#))

Note: Some projects are in collaboration with local businesses using IBM technology

IBM Center for Advanced Studies

- Multiple faculty awards granted over past 3 years
- Two interns employed by IBM supporting WitW projects
- Held weekly collaboration meeting for brainstorming, updates, and consulting
- Provided and managed IBM Cloud resources
- Participated in 3 project demonstration workshops at Clemson
- Coordinated IBM business & technical exec leadership visits with Clemson

IBM Q-Hub

Problem Statement

IBM Q Network is a community of Fortune 500 companies, academic institutions, startups and national research labs working with IBM to advance quantum computing. We are committed to accelerating and scaling quantum computing by partnering with industries and fostering a growing ecosystem. Hubs within IBM's network are critical for accelerated learning, skills development and the global rollout of quantum computing.

Summary of Solution

NC State builds the leadership in quantum computing, attracts talented faculty, students and funding from government and industry. Industry partners gain access to talent and research resources and IBMQ to become quantum-ready through education and exploration of applications that matter to their business. IBM establishes a user pool of IBM Q and talent pipeline aligned with local and regional market needs.

Partner

NC STATE UNIVERSITY

Dr. Patrick Dreher, Chief Scientist, Research Professor, Computer Science & Physics

Dennis Kekas, Associate Vice Chancellor, Partnerships & Economic Development

Dr. Dan Stancil, Executive Director, Department Head, Electrical & Computer Engineering

Dr. Mladen Vouk, Vice Chancellor for Research and Innovation



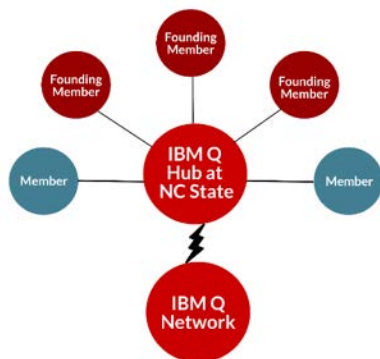
"Our researchers and students will work with IBM scientists, engineers and consultants to further explore and advance quantum computing."
-- **Dr. Alan Rebar**, Vice Chancellor for Research and Innovation (ret.)

Media

[NC State Named First University-Based IBM Q Hub in North America](#)

[IBM Q Hub at NC State](#)

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IBM Technologies

- IBM QISKIT Tools (Aer, Aqua, Ignis, Terra)
- IBM Q Experience Platform
- IBM Q Devices (5, 16, 20, and 53 qubit devices)
- IBM Q Education - Online

IBM Center for Advanced Studies

- Quantum research collaboration with faculties
- Technical supports for implementing quantum algorithms using Q simulators and quantum devices
- Developed Q curriculum for hands-on workshops
- Authored IEEE conference papers & spoke at seminars
- Employed a PhD student intern

Cognitive Telescope Network (CTN)

Problem Statement

Astronomical Transient Events are hard to capture using telescopes since monitoring these events and finding a suitable telescope in the world that can effectively take a picture of the event is not trivial. Gravitational Wave events detect large regions in the sky that can only be covered by multiple telescopes to take a picture of the region. As a result, a lot of the scientific research on transient follow up is lost.

Summary of Solution

CTN creates a network of telescopes across the world including large, mid-size and smaller telescopes with amateurs and universities. By monitoring events published by research facilities on transients, e.g. Gravitational Waves, Gamma Ray Bursts, Supernovas, etc. telescopes can be autonomously triggered to take pictures of the region based on Weather and Light Conditions, Position of the Telescope, Availability of Filters, etc.

Partners



Dr. Shane Larson, Northwestern University, Astronomy, CIERA

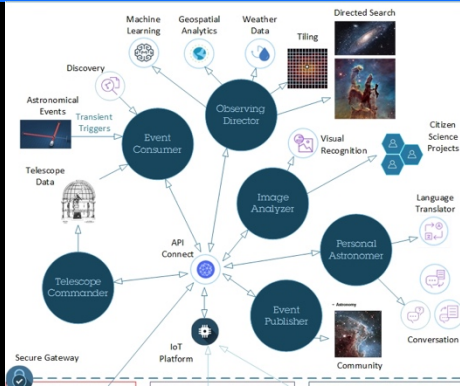
Dr. Rachana Gupta, NC State University, Electrical Computer Engineering

Dr. Anupama Ginge, Western Sydney University, Computer Science

Dr. Jeff Terry, Illinois Institute of Technology, Physics

Media

<https://ibm.biz/asset-ctn>



IBM Technologies

- IBM Visual Recognition
- IBM Watson IoT Platform
- IBM Weather Data
- IBM Watson Conversation
- IBM Watson Translation

IBM Center for Advanced Studies

- Provide Coaches and Mentors to guide development
- Provide infrastructure and expertise
- Developing placement algorithm for tiling
- Developing the Safety algorithm for connecting telescopes by mapping 3D space around it
- Chatbot for Astronomy Assistant
- Cataloging Astronomical Images

Neuro-Electro-Chemical Transmitter Analytics Research (NECTAR)

Problem Statement

Measurement of the changes of the mood and behavior of individuals is difficult to determine unless various aspects of the individual is studied at great lengths over time.

Summary of Solution

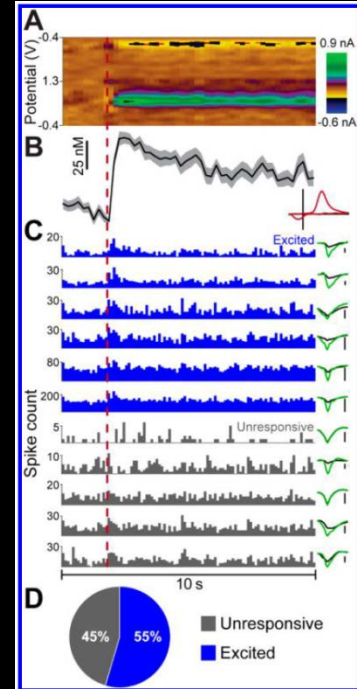
NECTAR co-relates and analyses multiple neuro, electro and chemical transmitters for mood and behavioral changes of an individual, e.g. Dopamine, Serotonin, Oxytocin, etc. indirectly based on the research available as well as activities like interactions with Social Media and Calendar. By representing data to the individual in a comprehensive manner, self-correcting measures may be taken.

Partners



Dr. Stephen Cowen, University of Arizona, Psychology

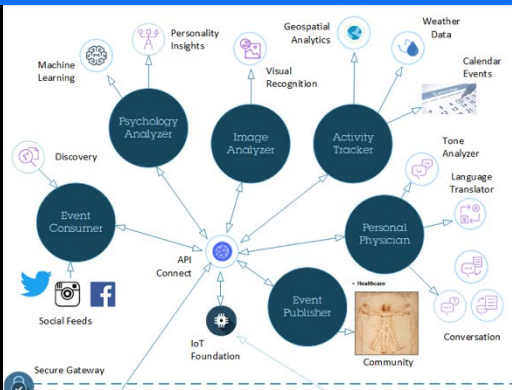
Dr. Sambit Bhattacharya, Fayetteville State University, Computer Science



Media

<https://ibm.biz/asset-nectar>

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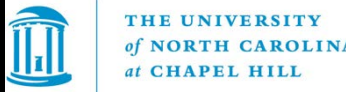
IBM Technologies

- IBM Visual Recognition
- IBM Watson IoT Platform
- IBM Personality Insights
- IBM Watson Conversation
- IBM Watson Translation

IBM Center for Advanced Studies

- Provide Coaches and Mentors to guide development
- Provide infrastructure and expertise
- Visual Recognition of facial expressions and research into micro-expressions
- Monitoring Social Media accounts and analysis by Personality Insights
- Building algorithm for multi-variant machine learning

CAS Influence



Summary

The IBM Center for Advanced Studies is ready to engage with you. Your faculty. And your students.

Bootcamps

Bootcamps for key IBM technologies (e.g., Watson/AI, blockchain, quantum computing, etc.)

Curriculum Support

Education embedded in traditional curricula (e.g., senior design/capstone projects; special topics/special projects courses on say Watson; projects or examples in program required or elective course).

IBM Cloud

IBM Cloud and delivered services providing needed research and education platforms.

Interns, Co-ops

Embedded interns/traditional supported research projects.



In-Class

In-class speakers, or seminars