2023 IEEE/ACM TCF Information Technology Professional Conference (TCF-ITPC)

Program Book

Date: Friday, March 17, 2023
Time: 8:30AM to 5:00PM
Location: Armstrong Hall at TCNJ

Sponsors:

Princeton / Central Jersey Chapter of the IEEE Computer Society

Princeton Chapter of the Association for Computing Machinery

IEEE Region 01 - Northeastern USA

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Conference Committee

Conference Chair:	Michael Redlich
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TCF Chair	Al Katz

Thank you to our Sponsors, Speakers, Volunteers and Participants

Also, thank you to the Trenton Computer Festival and The College of New Jersey

Conference Logistics

Dear Participants,

Welcome to the **2023 17th Annual IEEE/ACM Information Technology Professional Conference at TCF**!

We have an exciting program this year and are looking forward to seeing you.

Schedule:

The ITPC Conference program schedule may be found in this program book and posted on our website.

Our conference presentations are scheduled to at **begin at 9:00 AM** and **conclude by 5:00 PM** on **Friday, March 17, 2023**.

Registration and Check-In:

In-person registration, check-in and continental breakfast will **open at 8:00am**.

Presentations:

All three tracks will be presented in-person and live-streamed via the ITPC website and shown here:

- Track 1 – Applications Development
- Track 2 – Computer Security | Cybersecurity | Application Development
- Track 3 – Artificial Intelligence | Deep Learning | Education

Facilitated Networking Session:

As has been tradition in the past, there will be a facilitated networking session during the lunchtime hours for all speakers and attendees to introduce themselves.

Keynote Address:

Financial fraud and cyberscams are not just fearful topics featured in late-night infomercials. In the first half of 2022, U.S. Consumers reported a record $3.56B lost to online fraud (a 50% increase from the same period in 2021), with nearly 800,000 such complaints provided to the Federal Trade Commission. Imposter scams represented the highest percentage of these reported cases, with more than 361,000 filings, totaling $1.33B in losses.

Cyberscams have become so pervasive that Amazon issued a warning message in December to all of its customers. This briefing session by Dr. Rebecca Mercuri will examine various financial fraud methods, including check fraud (paperhanging, floating, kiting), and identity theft. Ways to protect yourself and your business will be suggested.

This session will be held from **1:00 PM to 2:00 PM** in Armstrong 154.

Trenton Computer Festival (TCF):

The **47th Annual Trenton Computer Festival** will also be a in-person event scheduled for Saturday, March 18, 2023 between 9:00am and 5:00pm. This year's theme is **The Future of Electric Vehicles**. The program includes over 50 panel sessions, workshops, tutorials, demonstrations, educational events and a Flea market. For more information, please visit the TCF website.

TCF Keynote:

The TCF keynote speaker will be Lee Goldberg, author of "**Green Electronics**" and a Contributing Editor of Electronic Design Magazine, who will be presenting "**Evolving EVs**." There will also be an EV Car Show with the opportunity to test drive EVs (weather permitting).

Posted Presentations:

Speakers who have provided a PDF copy of their slides will Some of the presentations may be posted on the TCF ITPC website.

Thank you for your participation,

Michael Redlich
Conference Chair

IEEE Information Technology Professional Conference

Program Schedule

Time (EST)	Track 1 Application Development Armstrong Hall 144	Track 2 Computer Security | Cybersecurity/Application Development Armstrong Hall 154	Track 3 Artificial Intelligence | Deep Learning | Education Armstrong Hall 148
8:00am	-- REGISTRATION AND CONTINENTAL BREAKFAST --		
9:00AM	Creating Bug-Free Embedded Code: Programmers, Tools or ChatGPT? presented by **Bill Wong**		AI-Powered Machine Programming: The Future of Software presented by **Kory Becker**
10:00AM	Use Legacy Software Like a Pro presented by **Dennis Mancl**	Are You a Polyglot? Creating the Same API in Three languages: GoLang, Python, and JavaScript presented by **Clark Cole** , **Kovit Nisar** and **Michael Luis Santos**	Multimodal Deep Learning With An Application To Folk Art Recommendation presented by **Haimonti Dutta**
11:00AM	Building Modern Data Streaming Apps presented by **Timothy Spann**	Wireless Security Risks: Historical Through 2023 Hardware Trojans and International Mobile Subscriber Identity-Catchers presented by **Joe Jesson**	Studying Doctoral Degrees in Artificial Intelligence, Cybersecurity, Quantum Computing: Why? presented by **Don Hsu**
12:00PM	-- LUNCH BREAK --		
1:00PM	-- KEYNOTE ADDRESS --		
2:00PM	~~Using a Finite State Machine in Large-Scale System Migration~~ ~~presented by~~ ~~**Anoop Harhare**~~	Financial Cybersecurity: Your Retirement Investments Aren't As Secure As You Thought presented by **Cody Hofstetter**	Bitcoin, Blockchain, Cryptocurrency: Crashing to Zero? presented by **Don Hsu**
3:00PM	Getting Started with Jakarta NoSQL and MongoDB presented by **Michael Redlich**	Modernize your APIs with GraphQL presented by **Aditya Gidh**	Functional Reactive Computing in Education presented by **Enzo Alda**
4:00PM	IoT with MQTT via GoLang presented by **Chandra Guntur**	Building a React App from Scratch presented by **Michele Payne**	Infinite Monkey Selfies: Intellectual Property Protection for Generative Artificial Intelligence Creations presented by **Fred Wilf** and **Josh Waterston**

9:00 AM Sessions

Creating Bug-Free Embedded Code: Programmers, Tools or ChatGPT?

By Bill Wong
Track 1 – Applications Development

Programmers want their code to do the right job but that is harder than most people think. It is critical these days given the level of connectivity that most applications encounter, even those designed for embedded applications. Applications for critical and safety environments like automotive, medical and avionics have methodologies that must be followed to deliver solutions that meet certain requirements.

There are many ways to improved code quality and reduce the number of errors in a program. Compilers help. Languages like Rust and SPARK force programmers to provide more detail that compilers can check. We even have artificial intelligent tools looking over our shoulders with tools like Copilot and ChatGPT. All this, and more, will be discussed during this session.

About Bill Wong:

Bill Wong is Senior Content Director with Endeavor Business Media and Editor of Electronic Design. He was the first Director of PC Labs with PC Magazine. He earned a Bachelor of Electrical Engineering at the Georgia Institute of Technology and a Masters in Computer Science from Rutgers University.

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Track 2 – Computer Security | Cybersecurity | Application Development

AI-Powered Machine Programming: The Future of Software

By Kory Becker
Track 3 – Artificial Intelligence | Deep Learning | Education

Are you ready for the future of software development? In this presentation, we'll explore the cutting-edge techniques and historical foundation behind self-programming artificial intelligence (AI). From evolutionary computation to abstract syntax trees and genetic algorithms, you'll learn how computers are gaining the ability to write their own programs.

Whether you're a beginner or intermediate level programmer with a basic understanding of IT, this presentation is for you. Don't miss out on the opportunity to learn about program generation techniques like Programming by Example, GitHub Copilot, and ChatGPT. Join us for an enlightening journey into the world of self-programming AI.

About Kory Becker:

Kory Becker is a Senior Software Developer for **Bloomberg LP**. With a background in artificial intelligence and machine learning, she is the author of "**Building Voice-Enabled Apps with Alexa**" (2017 Bleeding Edge Press).

She has developed award-winning software products that have been featured prominently in publications like **PC Magazine**, **PCWorld**, **USA Today**, **Consumer Reports**, **Apple iTunes**, and **Google Chrome**. Her research has been referenced by leading sources, including **Google Brain**.

You can find her articles on **Primary Objects** and social media presence on **Twitter** and **GitHub**.

10:00 AM Sessions

Use Legacy Software Like a Pro

By Dennis Mancl
Track 1 – Applications Development

Most software developers spend a lot of time on bug fixes, modifications, and extensions of existing software systems. "Greenfield" software development is one thing, working with existing legacy software is another. Professional programmers develop a number of useful strategies to build applications based on existing code: leveraging legacy software.

This talk will outline some key practices in code reading, encapsulation, and refactoring to extend old applications code.

About Dennis Mancl:

Dennis Mancl is a New Jersey-based software process and software design expert. He worked for many years at AT&T, Lucent, and Alcatel-Lucent, where he was involved in object oriented designs, design patterns, software architecture, and agile development practices for over 20 years. Dennis has M.S. and Ph.D. degrees in computer science from University of Illinois.

Are You a Polyglot? Creating the Same API in Three languages: GoLang, Python, and JavaScript

By Cole Clark, Kovit Nisar and Michael Luis Santos
Track 2 – Computer Security | Cybersecurity | Application Development

As software developers, we typically use the tools we feel most comfortable with, but when it comes to backend APIs, there's a ton of languages, libraries, and tools to choose from. It's important to be able to identify the benefits of each language to determine what is best for our use case.

In this talk, we'll compare the advantages and disadvantages to creating an API in three popular languages along with their runtime environments: GoLang, Python (using Flask) and JavaScript (using Node.js).

About Cole Clark:

Cole Clark is a full stack software engineer for IBM Research located in Yorktown Heights, NY. During his three years at IBM, Cole has been a part of the Apps@Research team that focuses on developing applications for use within IBM Research. As a full stack engineer, Cole has worked on many components of these applications, but has primarily focused on backend development and DevOps.

Cole holds a Master of Science in Computer Science from Northeastern University and a Bachelors in Management Information Systems from the University of Delaware.

About Kovit Bisar:

Kovit Nisar works as a Software Engineer within the Apps@Research team in IBM Research. He is currently in IBM for 5+ years and has worked for Amdocs for three years. In his role at IBM, Kovit designs architectural solution and implements full stack solutions.

Kovit holds a Masters of Science in Computer Science from Northeastern University.

About Michael Luis Santos:

Michael is a Software Engineer at the IBM Research Apps Development Team with experience in software engineer designing, developing, testing, and delivering offerings using leading edge and/or proven technologies.

Michael specializes in backend systems (databases, Elasticsearch), APIs and API Development (REST or GraphQL), cloud (containerization, Kubernetes, OpenShift) and AI.

Multimodal Deep Learning with An Application to Folk Art Recommendation

By Haimonti Dutta
Track 3 – Artificial Intelligence | Deep Learning | Education

In the real world, information can be recorded and stored in multiple modalities. Images often have titles and tags associated with them, songs have lyrics and music to go with them, and videos contain audio-visual signals and inputs from visual, auditory and haptic pathways. Each modality has different statistical properties and useful representations can be learned by combining them and developing joint representations that better represent the data. Deep generative models – models in which distributions can be parameterized by deep neural networks – are often used to model multimodal data. They have been shown to make good inferences by considering heterogeneity and statistical properties of the data.

In this talk, I will first discuss popular deep generative models such as Restricted and Deep Boltzman Machines, Auto-encoders and Variational Auto-Encoders that are extensively used for multimodal learning. Next, I will present recent findings on multimodal learning in an art conservation project involving performing artists who paint scrolls and sing about them.

About Haimonti Dutta:

Haimonti Dutta is an Associate Professor in the Department of Management Science and Systems at the State University of New York at Buffalo, NY. She is also a core faculty member of the Computational and Data Enabled Science and Engineering Program at UB. Prior to her current appointment, she served as an Assistant Professor at UB and an Associate Research Scientist at the Center for Computational Learning Systems at Columbia University, NY where she headed the Scalable Analytics Research Group.

Her research broadly focuses on machine learning, distributed optimization, large scale distributed and parallel mining, and probabilistic inference. The federal government and several industry partners have generously supported her research including the National Science Foundation, National Endowment of Humanities, American Institute of India Studies, Amazon Web Services, EMC, Mathworks Inc, Epilepsy Research Foundation and the Consolidated Edison Company of New York.

11:00 AM Sessions

Building Modern Data Streaming Apps

By Timothy Spann
Track 1 – Applications Development

In this session, I will show you some best practices I have discovered over the last seven years in building data streaming applications including IoT, CDC, Logs, and more.

In my modern approach, we utilize several Apache frameworks to maximize the best features of all. We often start with Apache NiFi as the orchestrator of streams flowing into Apache Pulsar. From there we build streaming ETL with Spark, enhance events with Pulsar Functions for ML and enrichment. We build continuous queries against our topics with Flink SQL.

About Timothy Spann:

Tim Spann is a Principal Developer Advocate in Data In Motion for Cloudera. He works with Apache NiFi, Apache Pulsar, Apache Kafka, Apache Flink, Flink SQL, Apache Pinot, Trino, Apache Iceberg, DeltaLake, Apache Spark, Big Data, IoT, Cloud, AI/DL, machine learning, and deep learning. Tim has over ten years of experience with the IoT, big data, distributed computing, messaging, streaming technologies, and Java programming.

Previously, he was a Developer Advocate at StreamNative, Principal DataFlow Field Engineer at Cloudera, a Senior Solutions Engineer at Hortonworks, a Senior Solutions Architect at AirisData, a Senior Field Engineer at Pivotal and a Team Leader at HPE. He blogs for DZone, where he is the Big Data Zone leader, and runs a popular meetup in Princeton & NYC on Big Data, Cloud, IoT, deep learning, streaming, NiFi, the blockchain, and Spark.

Tim is a frequent speaker at conferences such as ApacheCon, DeveloperWeek, Pulsar Summit and many more. He holds a BS and MS in Computer Science.

Wireless Security Risks: Historical Through 2023 Hardware Trojans and International Mobile Subscriber Identity-Catchers

By Joe Jesson
Track 2 – Computer Security | Cybersecurity | Application Development

Joseph discusses wireless security beginning with WWII enigma code interception and decryption methods along with the heroes and heroines who worked around the clock to save the allied nations. The cold war, following WWII, introduced additional risks and new challenges and, by example, wireless security failures, ease of wireless packet intercept, and a list of encryption methods with inherent security defects. Finally, wireless risks present in 2023 are shown as security aircraft, ship, automotive, and military cases aircraft, and ship examples.

IMSI-catcher is a telephone eavesdropping device used for intercepting mobile phone traffic and tracking location data of mobile phone users. A "fake" base station may be installed in a building, state police trunk, or UAVs and balloons (!) and targeted cell phones acquired, tracked and logged. This mapping and the service provider's real towers is considered a man-in-the-middle (MITM) attack.

However, sophisticated attacks may be able to downgrade 3G and LTE to non-LTE network services - which do not require mutual authentication - and calls intercepted. State-of-the-art 5G cellular security technology and the identified risks of base-station's dynamically changing protocols, hardware BTS trojans, and group cellids and location interception challenges are highlighted. Originally presented at a Rutgers IEEE dinner, a professor commented it would be a sleepless night after hearing the risks outlined!

About Joe Jesson:

Joseph Jesson is CEO of RFSigint Group, a wireless sensor platform IP and SOC supply-chain advisory company, and currently consults with private corporations on wireless sensor networks (LPWAN narrowband digital technology). Joe has 25+ years of experience in designing and implementing - through production - IoT wireless sensors and embedded systems and was awarded General Electric's Innovation prize, the Edison Award, in 2007. Joe was awarded over 15 patents, published in the IEEE IoT Journal, and engineered and tested wireless TEMPEST-shielded secure systems. He currently serves as IEEE Princeton LIFE Affinity Group Chair.

Studying Doctoral Degrees in Artificial Intelligence, Cybersecurity, Quantum Computing: Why?

By Donald Hsu
Track 3 – Artificial Intelligence | Deep Learning | Education

Artificial Intelligence (AI) started in 1957. After 66 years, it is a key marketing buzzword for Amazon, Apple, Google, Facebook, IBM, Microsoft to sell their products, why? Cybersecurity is a branch of Computer Science, many Universities started offering a Master or PhD program. Quantum Computing, a field that includes Physics, Math, Electrical Engineering, Computer Science, is a booming new field. Managers, entrepreneurs, founders, lined up to pursue Doctoral Degrees, why?

This talk deals with the answers on the growth of these three fields in research, commercial applications, jobs, careers. Topics are AI, machine learning, deep learning, Python, internet of things, Qubit, quantum mechanics, Schrodinger cat, quantum space cybersecurity application, and many more.

About Donald Hsu:

Donald Hsu, PhD, is a Professor at **Dominican College**, Dissertation Chair at **University Phoenix**, and President of the **Chinese American Scholars Association** (CASA).

He trained/taught 70 subjects - Accounting to Unix 14,000+. His clients and students work at Amazon, Apple, AT&T, Bank of America, Facebook, Goldman Sachs, Google, IBM, JPMChase, Mercedes Benz, Microsoft, Morgan Stanley, New York Presbyterian, Oracle, Salesforce, Siemens, Sony, Toyota, UPS, Verizon and other Global 500 firms.

CASA ran 28 successful E-Leader conferences in Asia and Europe.

He traveled to 90 countries in Africa, Asia and Europe for international business. Don's LinkedIn profile contains 9,000+ partners/clients and 266 public recommendations.

1:00 PM Keynote Address

The Weird World of Financial Fraud & Cyberscams

Financial fraud and cyberscams are not just fearful topics featured in late-night infomercials. In the first half of 2022, U.S. Consumers reported a record $3.56B lost to online fraud (a 50% increase from the same period in 2021), with nearly 800,000 such complaints provided to the Federal Trade Commission. Imposter scams represented the highest percentage of these reported cases, with more than 361,000 filings, totaling $1.33B in losses.

Cyberscams have become so pervasive that Amazon issued a warning message in December to all of its customers. This briefing session will examine various financial fraud methods, including check fraud (paperhanging, floating, kiting), and identity theft. Ways to protect yourself and your business will be suggested.

About Rebecca Mercuri:

Rebecca Mercuri, Ph.D. is the founding President of Notable Software, Inc. where her focus is on cybersecurity, digital forensic investigations, and expert witness services. Projects have included: contested elections, criminal defense, standards and vulnerability assessments, copyrights and patents. Her Ph.D. is from the University of Pennsylvania's School of Engineering and Applied Science, where her thesis, "Electronic Vote Tabulation -- Checks and Balances" led to her being asked to submit testimony in the Bush v. Gore 2000 election controversy, and has been hailed as one of the "**Dissertation Ideas that Changed the World**."

Dr. Mercuri is well-recognized for her many decades of research and advocacy in Computer Science, and was recently recognized as a Distinguished Contributor of the IEEE Computer Society. She frequently comments on election technology and other cyber topics in her Twitter feed, **@notablemercuri**, and is a frequent author for Communications of the ACM, with links to many of her **earliest writings on voting**. Additional information about Rebecca can be found **here**.

An avid educator, Dr. Mercuri has held full-time positions at Drexel University, Bryn Mawr College, The College of New Jersey, and Drew University. She also served as a post-doctoral research fellow at Harvard University's Kennedy School of Government and the Radcliffe Institute. Currently she is the Director of the **M.O.R.E. Project**, a grant-funded IEEE initiative intended to increase the numbers of non-males and youth in amateur radio -- details on how to participate as a trainer or student may be found on the **website**.

2:00 PM Sessions

Using a Finite State Machine in Large-Scale System Migration

By Anoop Harhare
Track 1 – Application Development

System migrations are often complex and involve a lot of developer resources, planning and sometimes unintended downtime resulting in loss of revenue and developer productivity.

Implementing the migration using a Finite State Machine (FSM) splits the whole process into finite states, plan the various states of migration and their interactions, automate the whole process with appropriate manual intervention and reduce ad-hoc decision making and manual inputs. This results in a controlled, low risk migration process.

About Anoop Harhare:

Anoop is a Senior Software Engineer working for Bloomberg LP with about 16+ years of Software Development experience in development of large-scale, revenue critical back-end systems.

Financial Cybersecurity: Your Retirement Investments Aren't As Secure As You Thought

By Cody Hofstetter

Track 2 – Computer Security | Cybersecurity | Application Development

This presentation covers a brief overview of how our current financial systems came to be; the security (or lack thereof) found within our financial institutions, and what an individual should look for to safeguard the security of their investments. The information provided pertains to every individual that participates in our economy and allows the entire audience to leave the presentation with practical, immediately applicable knowledge. In addition, we will cover the presently available and upcoming federal and state tax credits/rebates for assisting purchasers of EVs.

About Cody Hofstetter:

An entrepreneur at heart, Mr. Hofstetter's background is originally in finance and he has been forming and buying companies since the age of 19. As Founder and CEO, the two projects occupying the majority of time include his IT/Cybersecurity firm and Wealth Management Financial Advisory firm. The cybersecurity business is specialized in enterprise security training and red teaming while the advisory firm focuses on creating, growing, and maintaining personal and generational wealth for clients to live the lifestyles of their dreams.

Some of his other current and past ventures include owning a finance/day-trading firm, a community focused healthy restaurant, being a national speaker, certified personal trainer, lyricist and songwriter for several musicians, TV series, and films in addition to acting credits as well. If you'd like to hear about more endeavors, have a specific question, or hope to work together come talk to me at our next event.

Bitcoin, Blockchain, Cryptocurrency: Crashing to Zero?

By Donald Hsu

Track 3 – Artificial Intelligence | Deep Learning | Education

Steve Wozniak Apple Co-Founder believes Bitcoin is better than gold. There are only 21 million Bitcoins being mined, the price is highly volatile from $17,000 to $66,000. This talk will discuss Bitcoin, Cryptocurrency, Ethereum, Blockchain technology, digital transaction, mining in China, software wallet, security issues, payment providers, major US or European banks adopting Bitcoin, investment options, venture capital firms, risk, benefits, volatility, academia research and industry trends. FTX collapse, Biance CZ and other main players are still around? No one knows the answer.

Don will provide specific examples of investing in bitcoin and other cryptocurrency.

About Donald Hsu:

Donald Hsu, PhD, is a Professor at **Dominican College**, Dissertation Chair at **University Phoenix**, and President of the **Chinese American Scholars Association** (CASA).

He trained/taught 70 subjects - Accounting to Unix 14,000+. His clients and students work at Amazon, Apple, AT&T, Bank of America, Facebook, Goldman Sachs, Google, IBM, JPMChase, Mercedes Benz, Microsoft, Morgan Stanley, New York Presbyterian, Oracle, Salesforce, Siemens, Sony, Toyota, UPS, Verizon and other Global 500 firms.

CASA ran 28 successful E-Leader conferences in Asia and Europe.

He traveled to 90 countries in Africa, Asia and Europe for international business. Don's LinkedIn profile contains 9,000+ partners/clients and 266 public recommendations.

3:00 PM Sessions

Getting Started with Jakarta NoSQL and MongoDB

By Michael Redlich
Track 1 – Applications Development

The **Jakarta NoSQL** specification defines a set of APIs to provide a standard implementation for most NoSQL databases. Considered "one API for many NoSQL databases," Jakarta NoSQL supports the four types of NoSQL databases: column family, document, graph and key-value.

This presentation will provide an introduction to the Jakarta NoSQL specification, **Eclipse JNoSQL**, the compatible implementation to the specification, a brief overview of all four NoSQL database types followed by a demonstration of a MongoDB application built with Jakarta NoSQL.

About Michael Redlich:

Michael Redlich is a Senior Research Technician at ExxonMobil Research & Engineering in Clinton, New Jersey (views are his own) with experience in developing custom scientific laboratory and web applications. He also has experience as a Technical Support Engineer at Ai-Logix, Inc. (now AudioCodes) where he provided technical support and developed telephony applications for customers.

Mike's technical expertise includes object-oriented design and analysis, relational database design and development, computer security, C/C++, Java, Python, Matlab and other programming/scripting languages. His latest passions include MicroProfile, Jakarta EE, Helidon, Micronaut and MongoDB.

Mike has been an active member within the Java community for the past 20 years. He founded the Garden State Java User Group (formerly the ACGNJ Java Users Group) in 2001 that remains in continuous operation. Since 2016, Mike serves as a Java community news editor for InfoQ where his contributions include monthly news items, technical writing and technical reviews. Mike has co-authored nine (9) articles with Barry Burd for Java Boutique (now jGuru). He has presented at venues such as Oracle Code One, Emerging Technologies for the Enterprise (ETE), Trenton Computer Festival (TCF), TCF IT Professional Conference, Philly Java Users Group, Princeton Java Users Group and Capital District Java Developers Network. More recently, Mike has contributed to open source projects and participates on the leadership council of the Jakarta EE Ambassadors.

Mike holds a Bachelor of Science in Computer Science from Rutgers University.

Modernize your APIs with GraphQL

By Aditya Gidh

Track 2 – Computer Security | Cybersecurity | Application Development

Have you been on slow internet connections and been frustrated that some things partially work while you're excruciatingly waiting on a data heavy API call to load? Data access performance is highly important and an overlooked aspect of web development. Data performance and reducing data round trips in relational data directly impact user experience.

GraphQL was created to make requesting nested and potentially-cyclical data simpler without the need to have specialized endpoints. GraphQL is more agnostic to how the "server" stores the information, it is a self-service approach where API developers can create a flexible, open-ended data access medium that end users can consume as they wish.

This session will focus on a modern full-stack architecture that leverages GraphQL to facilitate client- server communications implemented with **Node.js**.

About Aditya Gidh:

Aditya Gidh is from Boston, Massachusetts where he works as a Software Engineer within the Apps@Research team in IBM Research. These apps are used regularly by 3,000+ researchers in 12 labs across 6 continents. Adi enjoys problem solving right from the word go. He often finds himself getting into the crux of the problem and loves collaborating and developing creative solutions..

Adi holds a Masters of Science in Information Systems from Northeastern University, and a Bachelors in Information Technology from the University of Mumbai. During his eight year tenure at IBM, Adi has worked across a wide array of business units focusing on UXR, Full Stack Development, DevOps engineering in product teams, and customer facing sites.

In his free time, Adi enjoys working on his food blog: **Hangry Tummy**. He is also an avid runner and is pursuing to develop his photography skills.

Functional Reactive Computing in Education

By Enzo Alda

Track 3 – Artificial Intelligence | Deep Learning | Education

We show, with a live demonstration, how a functional reactive computing environment can be used effectively in programming education. Part of the presentation is an experience report describing still ongoing experiments started early last year, aimed at modernizing a Programming 101 course for engineers. These experiments are testing ideas presented at last year's ITPC.

Exploiting the commonality of simple expressions across most languages, we manage to build a multi-paradigm education experience centered on programming language concepts, rather than language specific details. Our results show better student engagement and confidence. A new curriculum is already taking shape as a consequence of this work.

About Enzo Alda:

Enzo Alda is the founder of Lakebolt Research, a firm focused on end-user computing. He formerly held roles at technology startups and large organizations like Oracle, Bloomberg and Google. Mr. Alda conceived and implemented the engine that powers real-time calculations in the Bloomberg terminal.

Before coming to the United States, Mr. Alda was lecturing courses in compiler construction and programming language design. He holds degrees in Software Engineering, Computer Science and an MBA. Mr. Alda joined the IEEE in 1999.

4:00 PM Sessions

IoT with MQTT via GoLang

By Bill Brutzman
Track 1 – Applications Development

Go is a relatively new programming language which complies to super-fast light-weight run-time executables.

MQ Telemetry Transport (MQTT) is a lightweight Publish-Subscribe protocol well suited to IoT (Internet of Things) applications.

There will be a demo of a "digital twin" rotating factory flywheel that sends (publishes) heart-beat counts from an Arduino microcontroller (running **TinyGo**) to an "edge" Windows computer running a GoLang "Message Broker" that sends flywheel machine status to a cloud MySQL database viewed via a secure **Kendo UI** JavaScript web-app.

Features of Go will be highlighted together with a walk-thru of the MQTT Go code.

About Bill Brutzman:

Bill Brutzman holds a BSEE from NJIT. Bill's first job was as an Equipment Engineer at Sperry/Unisys on Long Island NY, working on radio and gyro equipment and software, US Navy Trident submarines. Later, re-casting as a Network Engineer, and then, database and software development.

Since 2001, Bill has been with **HK MetalCraft Manufacturing Corporation**, a 40-person metal-stamping company, in Bergen County NJ, doing business-system software development, ERP, SQL, and Analytics.

Bill is a member of ACM and does side projects, such as **astroSimpatico**, a personality characteristics related to the Zodiac.

Building a React App from Scratch

By Michele Payne
Track 2 – Computer Security | Cybersecurity | Application Development

React is a JavaScript library for building user interfaces. When creating a react application there are several configuration and setup options that are required to allow your code to compile and build successfully.

This live-coded, hands-on tutorial will demonstrate how to set up and configure a react application without using a predefined boilerplate. Michele will walk you through setting up an application from scratch.

This is a beginner tutorial; no React experience is needed.

About Michele Payne:

Michele Payne is a Senior Frontend Developer and Iteration Manager for IBM Research's Apps@Research group located in Yorktown Heights, NY.

Michele's experience includes designing, developing, testing, and delivering applications using leading edge technologies. Michele specializes in frontend application development using JavaScript, Sass and React.

Infinite Monkey Selfies: Intellectual Property Protection for Generative Artificial Intelligence Creations

By Fred Wilf and Josh Waterston
Track 3 – Artificial Intelligence | Deep Learning | Education

The **Infinite Monkey Theorem** states that an infinite number of monkeys with an infinite number of keyboards would eventually generate the complete works of William Shakespeare. A more recent, and far more limited test of this theorem involved a professional photographer named **David Slater** providing several great apes with access to his cameras. The photographer sold copies of the resulting monkey selfies, which in turn generated a great deal of discussion and a few court cases over the question of who owned the copyrights in the selfies.

In the past year, the issue has shifted from monkey-created works to generative AI works. Who owns the rights to works and inventions created in whole or in part by a computer program? Who will speak for the monkeys? And will chatbots speak for themselves?

About Fred Wilf:

Fred Wilf is the managing partner of **Wilftek LLC**, a technology and intellectual property law firm.

Fred has been working with the information technology industry for over 30 years and is a long-term contributor to the **Trenton Computer Festival**.

About Josh Waterston:

Josh Waterston is of counsel to Wilftek LLC, where he practices privacy law as part of his larger practice in technology and intellectual property law. Josh has over 20 years of experience as an attorney.