48th Annual

Trenton Computer Festival

The Oldest Personal Computer Show in the World
The College of New Jersey

2024 PROGRAM

Talks & Forums **Saturday, March 16 - 9:00 am to 5:00 pm ET** **Talks/Forums start at 10:15 am** **Vendor Faire - 9:00 am to 3:00 pm**	**In-Person Admission: $15 (advance), $20 (at door).** Children under 12 Free; Free Parking & Wi-Fi Free One-Way Zoom Streaming through: www.TCF-NJ.ORG
TCF Banquet **Saturday, March 16 - 6:30 pm** **Requires Advance Reservations ($45, email Al Katz: alkatz@tcnj.edu by March 11)**	**Sarnoff Tours in Roscoe West Hall (11:30 am – 2:00 pm)** **EV Car Show and EV Ride & Drive (10:00 am – 2:00 pm)** **Spring Smash, Battle of the Robots (10:00 am – 5:30 pm)** **Ham Cram Session (9:00 am – 3:00 pm)** **Amateur Radio License Exam at 3:30 pm**

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NYACC – New York Amateur Computer Club – www.nyacc.org
ACGNJ – Amateur Computer Group of New Jersey – www.acgnj.org
GSJUG – Garden State Java User Group – www.gsjug.org
Member of the New Jersey Makers Day Partnership – njmakersday.org

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Adam Cunard – TCNJ – Smash Combat Robotics

TCF Keynote Speaker

Michael Littman
Prof. of Computer Science, Brown University
Author of *Code to Joy: Why Everyone Should Learn a Little Programming*
speaking on "*Conveying Tasks to Computers: How Machine Learning Can Help*"
3:40 pm in ED 115 Track-1
(Generative AI)

*** Keynote Event: Conveying Tasks to Computers: How Machine Learning Can Help ***

Keynote Speaker:
Michael Littman, 3:40 pm ET

Prof. of Computer Science, Brown University
Author of *Code to Joy: Why Everyone Should Learn a Little Programming*

Bio: Michael L. Littman is University Professor of Computer Science at Brown University, where he studies machine learning and decision-making under uncertainty. He has earned multiple university-level awards for teaching and his research has been recognized with three best-paper awards and three influential paper awards. Littman is a Fellow of the Association for the Advancement of Artificial Intelligence and the Association for Computing Machinery. He is currently serving as Division Director for Information and Intelligent Systems at the National Science Foundation. His book "Code to Joy: Why Everyone Should Learn a Little Programming" (MIT Press) was released in 2023.

Conveying Tasks to Computers: How Machine Learning Can Help

It is immensely empowering to delegate information processing work to machines and have them carry out difficult tasks on our behalf. But programming computers is hard. The traditional approach to this problem is to try to fix people: They should work harder to learn to code. In this talk, I argue that a promising alternative is to meet people partway. Specifically, powerful new approaches to machine learning provide ways to infer intent from disparate signals and could help make it easier for everyone to get computational help with their vexing problems.

***** 10:15 am to 11:10 am **********

T-1 (ED 115): How to Build an AGI in Your Spare Time, Alianna J. Maren and Lee Goldberg (mod.)

Abstract: Over the past year-and-a-half, witnessing the emergence (and spectacular pitfalls) of LLMs (large language models), many people are now asking: how can we make a real AGI (artificial general intelligence)? Using a CORTECON (COntent-Retentive, TEmporally-CONnected network) as a fundamental component, and incorporating key neurophysiology-based insights, we can now build a fundamental AGI architecture. This new architecture will allow a range of behaviors that are more nuanced than those currently available. It incorporates three primary neurophysiology-based elements: (1) more advanced neural models, (2) more advanced free energy formulation (Kikuchi cluster variation method), and (3) feedback control loops influencing transitions between metastable states, allowing a range of behaviors to emerge.

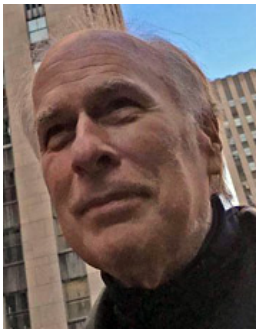
Bio: Lee began a second career as a tech journalist after spending the first 18 years of his career in electrical and aerospace engineering. Three decades later, he's still writing, currently serving as the Power Management editor at Electronic Design, where he focuses on the technologies, products and design practices that are helping build a vibrant, sustainable, low-carbon economy. His coverage includes renewable energy, energy efficiency, and electric transportation. When he's wearing his "freelance hat" Lee also writes about aviation and aerospace, 3D printers, open-source hardware, and other Maker/Hacker technologies. He also continues his coverage of sustainable technologies and various environmental and social issues within the engineering community which he began in 1996.
Lee holds a BSEE in Electrical Engineering from Thomas Edison University, and is a recipient of the Mesa Refuge Writer's fellowship. Lee's book, "Green Electronics/Green Bottom Line - A Commonsense Guide to Environmentally Responsible Engineering and Management" was published by Newnes Press.
As a leading scientist and inventor, Alianna J. Maren, Ph.D., shows scientists, technologists, and strategic leaders struggling with predictive intelligence for large data corpora to not only select and use existing methods for maximal benefit, but also to incorporate advanced new methods designed specifically for rapidly-changing situations.Dr. Maren is Founder and Principal of Themasis Associates, which focuses on advanced technology development and education for predictive intelligence methods. She is previously the Founder and Principal of Mourning Dove Press, and was Initiating Co-Founder of EagleForce Associates (later Viziant Corporation), which specialized in knowledge discovery technologies. She is the author of two previously-published books, including the Handbook of Neural Computing Applications. She is the senior author on four ground-breaking patents in the realms of computer science and artificial intelligence, including one which was awarded New York Times Patent of the Week.

T-2 (ED_113): Using generative elements in music composition and performance, Jeremy dePrisco

Abstract: The past two years have seen an explosion of generative art in many forms. How are musical artists embracing this technology? How much of what we're seeing now is truly new... or just an extension of old techniques that have been around for decades? Multimedia artist Jeremy dePrisco (aka Shivasongster) will present a survey of generative tools and techniques that are impacting the music business, particularly content creation.

Bio: Jeremy dePrisco (aka Shivasongster) is a Pennsylvania musician and sound artist. A fixture in the electro-music community for over a decade, Jeremy currently presents workshops and solo and collaborative sound explorations throughout the Tristate area. Learn more at www.jeremydeprisco.com

T-3 (ED-213): Workshop on Putting Generative AI to Work Creating Art and Literature, Louis J. Judice, The Round Mountain Group



Abstract: Great minds from Henry Kissinger to Elon Musk have debated if AI is society's salvation or downfall. Forget the deep thought and just learn how to use it and what you can create. We'll cover Adobe Firefly, ChatGPT, Dall-E and many more tools - with practical - and sometimes just insane applications.

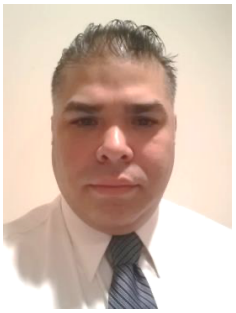
Bio: Louis Judice runs the Round Mountain Group, voted Hunterdon's best web agency many years in a row and a member of the TCF Steering Committee. He is a passionate photographer, historian and always ready to get down and dirty with the latest technology trends. And that means using it, not just thinking about it. Born in New York City he has resided in rural Hunterdon County for over 30 years, served as an elected Mayor and one of the leaders of the farmland preservation movement. His wife of 30+ years is a vice president at a major software company and his two grown sons are a software development manager and commercial real estate analyst respectively. He is a member of the IEEE, Sigma Xi and was named a Guardian of History by the famous Red Mill Museum in Clinton, NJ. RMG is a TCF Sponsor.

T-4 (ED-211): Chess and the Impact of Artificial Intelligence, Jon Edwards, World Correspondence Chess Champion

Abstract: With the rise of high-performance computing and AI tools, many chess players wonder about the future of the royal game. Chess has been at the forefront of many AI investigations, and its impact on correspondence and over-the-board chess is becoming clearer.
Machine-learning robots and AI may soon challenge all of us no matter what livelihoods we pursue. In that regard, correspondence chess is a harbinger of a future that most of us will soon face. Many interesting issues emerge, most notably: in any Human-Computer interaction, does the human contribute anything worthwhile.
In winning the ICCF 32nd World Championship, chess players worldwide are interested in knowing if chess has been solved, and what humans can still bring to the game. Edwards has real experiences that inform the discussion.
Jon will provide background on Chess and AI, as well a range of his games, from some early fun ones with spectacular sacrifices and challenging novelties in the pre-AI era to the new and more serious AI era, when top practitioners have dramatically changed their approach, including in his recent wins over Evgeny Lobanov, the them reigning Russian Correspondence Chess Champion, and Angel Acedevo-Villalba, a Spanish GM.
He will also describe in layman's terms how he has approached chess in this neural net era.

Bio: Jon Edwards has just recently finished first in the 32nd ICCF World Correspondence Chess Championship final round. He has become the 3rd US player to win the World Correspondence Chess Championship (behind Hans Berliner and Victor Palciauskas) and the 14th US player to become a Correspondence Chess Grandmaster. Jon won the 10th United States Correspondence Championship in 1997 and the 8th North American Invitational Correspondence Chess Championship in 1999. In 2016, he won the prestigious ICCF Spanish Masters including a spectacular win against Evgeny Lobanov, the reigning Russian correspondence chess champion. He has twice competed on the United States Correspondence Chess Olympiad team, both times reaching the final round. His USA team has just recently won an Olympiad Bronze medal.
Jon has an AB from Princeton University (1975) and a PhD in African Economic History from Michigan State University (1988). He worked for as AVP for Computing and Information Technology and later as Coordinator of Institutional Communication at Princeton University.
He has written more than a dozen chess books, notably including The Chess Analyst (Thinkers Press, 1999) which chronicles the success in the US championship, Teach Yourself Visually: Chess (Wiley, 2006), a photographically based chess primer, and Sacking the Citadel: The History, Theory, and Practice of the Classic Bishop Sacrifice (Russell Enterprises, 2011).
Jon provides chess instruction in the Princeton, NJ area. He has taught chess to more than 4,000 students over 30 years.
https://www.nytimes.com/2022/11/09/crosswords/correspondence-chess.html
https://www.communitynews.org/towns/hopewell-express/hopewell-resident-jon-edwards-ascends-to-rare-heights-in-chess-world/article_ddb8cdda-a1a8-11ed-ab38-07855c40871c.html
Here is a talk that I gave several weeks ago at the Marshall Chess Club:
https://marshallmedia.s3.amazonaws.com/2023/jon_edwards_complete.mp4
and this podcast:
https://www.perpetualchesspod.com/new-blog/2023/1/31/ep-315-dr-jon-edwards-the-correspondence-chess-world-champion-on-what-top-engines-think-of-different-openings-and-his-road-to-the-world-title

T-5 (ED-208): Introduction to Switch Mode Power Supplies, Manuel C. Blanco, ITW



Abstract: All electronic devices require a power supply. The electronics industry is consistently evolving to make these devices more miniaturized, efficient and customizable. The power engines that drive them are also becoming more integrated and embedded in virtually all applications. This presentation will explore and introduce the fundamentals of switch mode power supply design and its variant topologies, operation and theory, through the historical developments of the technology and evolving software A.I. tools

Bio: Manuel C. Blanco, Sr. Electrical Design Engineer at ITW where he develops and directs new strategic product designs initiatives from market design requests that directly impacts the company's portfolio. Education: B.S. in Physics-Seton Hall University, B.S. and M.S. in Electrical Engineering from New Jersey Institute of Technology.

T-6 (ED 206): Generative AI and Micros, Bill Wong, Endeavor Business Media

Abstract: Will large language models (LLM) like generative AI work on micros? A lot depends on the hardware and the scope of the models involved so that is sort of yes. This talk will take a look at where we are in terms of microcontrollers and microprocessors and running artificial intelligence applications on the edge without shipping AI chores off to the cloud.

Bio: 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 Georgica Institute of Technology and a Masters in Computer Science from Rutgers University.

T-7 (ED 204): EPIC AI Failures; Two AI Medical Case studies, MYCIN and WATSON, Joe Jesson, RFSigint Group and E/CE Department, TCNJ

Abstract: EPIC, describing AI Failures are carefully worded and selected and meant to consider the level of failure when understanding MYCIN, a significant and historical rules-based LISP expert system. MYCIN began in 1974 with a team of Stanford MD's and PhDs led by Bruce G. Buchanan and Edward H. Shortliffe, spanning 10 years of MYCIN experiments and culminating with a publication of the classic MYCIN AI study, "RULE-BASED EXPERT SYSTEMS: THE MYCIN EXPERIMENTS OF THE STANFORD HEURISTIC PROGRAMMING PROJECT" by Buchanan and Shortliffe. For my Masters work in the mid-80's, I was given the assignment to read (748 pages!), write an analysis of this work, and to write in LISP a backward-chain inference engine. The book focused on the need for MD's to rapidly identify both the specific bacteria infection agent and corresponding antibiotics. Twenty two years after MYCIN was released and no longer used by MD's, my sister, father, and mother were all victims of the lengthy time (~ 3 days) hospitals and labs required to incubate (in a petri dish) and identify both the infectious bacteria and the effective antibiotic. Three members of my family passed after 2 days and just before the answers came in from the lab. Hence my frustration. We are in the year 2024, and the same test was applied in the 80's but the number of effective antibiotics is reduced! In some cases, referenced to the number zero. IBM's WATSON was introduced in 2011 as the AI question-answering computer that beat Ken Jennings in "Jeopardy". IBM focused WATSON on answering significant medical problems and we will discuss why this system failed even after IBM spent over 60 million dollars and created Medical partnerships. To end on a positive note, we will mention embedded ML and prove smart sensors have been measurably successful. You will find this well-referenced speech fascinating!

Bio: The speaker, Joe Jesson, co-founded & was CTO of a General Electric business, Asset Intelligence, a GE business that designed and sold remote IoT sensors for the logistics and energy sectors. Machine learning and LPWAN sensor communication became an integral part of the remote monitoring and management of mobile and remote assets. An ongoing research goal is to reduce the smart energy costs where 100% of the power is generated by ambient energy harvesting. Joe is currently CEO of RF Sigint Group and has over 25+ years of engineering and management experience with Motorola APD, Oak Technology, BP, and General Electric. Master's degree from DePaul University & working on a Ph.D.defense.

T-8 (ED 109): Your Own Personal Spotify - The DIY Digital Audiophile, Tim Arnold, Educational Consultant

Abstract: Spotify is a wonderful application for streaming music anywhere via your cell phone and the Internet. What if you could do the same thing with your own digital audio collection? Last year we discussed the Daphile Audio operating system for ripping your CD's to lossless digital audio files and streaming locally to your home music system, This year we will discuss building configuring an audio server that would transcode your digital audio to a easily streamed codec and send it across the internet for you to access your music collection anywhere in the world; your own (open source) personal spotify-like server.

Bio: Timothy Arnold has been working in education and computer audio for 20+ years. He is an avid computer audio enthusiast and DIY builder.

T-9 (ED 112): TCNJ Senior Project Presentations

PIC32CX-BZ2 Dev Board & API
Team Members: Jack Marble, Peter Del Re, Ricky Mariani, Michael Oflazian
Advisor: Dr. Deese
Abstract: When it comes to designing IoT products using the PIC32CX-BZ2 microcontroller, engineers may encounter difficulties as they can be unfamiliar with how the MCU operates. This can result from the current state of development boards and APIs as they may not have the optimal interface for utilizing the MCU, thus reducing the speed and efficiency of the design process and harming the potential of the final product. To address this problem, there needs to be a development board and API made for the PIC32CX-BZ2 microcontroller that will make the design process quicker and easier for engineers who want to design IoT products. The development board and API must provide an informative but also simple design interface so that engineers can more easily understand how the MCU functions and what steps must be taken to program it correctly. The primary function would be removing the need for specialized technical knowledge of the PIC32CX-BZ2 microcontroller so that more engineers can use the MCU effectively. Secondary functions can include providing documentation of the MCU and having a step-by-step tutorial on how to operate it. These functions will culminate in a faster and more efficient design process and thus, a better final product.

HDMI Graphics Processing Unit
Team Members: Alex Di Bianco, Bev Cadet, Evan Leopold, Jaqueline Chaj-Osorio
Advisors: Dr. Pearlstein
Abstract: The project aims to design and implement a rudimentary Graphics Processing Unit (GPU) using a Nexys Video board and PSoC 5LP Development board. The GPU will be designed for users to select display and drawing modes, which will draw shapes and patterns on the output display. The main constraint of the design is the amount of available usable RAM on the Nexys board, as it specifically limits the depth of color-resolution that can be achieved for a 720p display. The FPGA on the Nexys Video board will be programmed with modules designed in Verilog and SystemVerilog. A cascade of modules has been designed to create an interface for data to be received from the PSoC Host and stored in local memory registers. This data will then be written into VRAM and processed by a display generator before being output to HDMI. Measurements of unintended RF emissions will also be measured to determine if the device is compliant with FCC regulations. Finally, an automated system to log and report design verification tests will be created. The end result of this project is for the GPU to support a 720p display at 60 frames per second, through an HDMI connection.

T-10 (ED 110): Introduction to Object-Oriented Programming and Design Principles, Michael Redlich, Garden State Java User Group (GSJUG).

Abstract: Object-Oriented Programming (OOP) is a programming paradigm that models real-world objects. The most well-known and widely-used OOP languages are C++ and Java, but some languages, such as Simula-67, were around much earlier. The advantages of OOP over structured programming include modularity and code reuse. As OOP has evolved over the years, things like design patterns and design principles have guided developers to write applications that are more adaptable to modification.
This presentation will provide an introduction to OOP, its basic attributes (encapsulation, abstraction, inheritance, and polymorphism), the class mechanism, and some design principles that have led to the development of design patterns. Example Java source code will be reviewed to demonstrate the features of OOP and design principles.

Bio: Michael Redlich has been an active member within the Java community for the past 25 years. He founded the Garden State Java User Group (formerly the ACGNJ Java Users Group) in 2001 where he serves as one of the directors. Since 2016, Mike has served as a Java community news editor for InfoQ where his contributions include the weekly Java news roundup, news items, technical articles and technical reviews from external authors. He is currently the lead Java Queue editor. Mike has joined Payara as a contract Developer Advocate and Technical Writer in the summer of 2023.
He has presented at venues such as Oracle Code One, JCON World, Emerging Technologies for the Enterprise, Trenton Computer Festival (TCF), TCF IT Professional Conference, and numerous Java User Groups. Mike serves as a committer on the Jakarta NoSQL and Jakarta Data specifications and the Eclipse JNoSQL project. He also participates on the leadership council of the Jakarta EE Ambassadors. Mike was named a Java Champion in April 2023. Mike retired from ExxonMobil Technology & Engineering in June 2023 with 33½ years of service. His experience included developing custom scientific laboratory and web applications, polymer physics, chemometrics, infrared spectroscopy and automotive testing. 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.

***********11:20 am to 12:15 pm***********

T-1 (ED 115)
: An Introduction to Generative Adversarial Networks, Larry Pearlstein, TCNJ

Abstract: This talk will provide an introduction to Generative Adversarial Neural Networks (GANs). The talk will start with a very brief overview of neural networks, and the concepts involved in convolutional networks. We will highlight some of the most popular network architectures for GANs and highlight the challenges in training GANs effectively. Finally, I will demonstrate how to use popular tools to experiment with GANs.

Bio: Larry Pearlstein is a Prof. of Electrical and Computer Engineering at The College of New Jersey. He teaches courses in embedded systems, digital signal processing, video compression and deep learning. His primary research area involves the use of deep learning for robotic vision. He also performs research in video processing, video compression and mobile embedded systems. Prior to joining TCNJ he was a Technical Director for Broadcom, where he architected chips for digital television sets. He served as Chairman of the ATSC Specialists Group on Video Coding, which helped develop the ATSC Digital Television Standard. Larry received a BSEE degree from Drexel University, and MS and PhD degrees from Princeton University. He is a Senior Member of the IEEE.

T-2 (ED_113): Electronic Music and AI, Don Slepian, Electronic Music Education and Preservation Project

Abstract: Noted local Electronic Musician and instrument designer Don Slepian will discuss and demonstrate applications of Artificial Intelligence to the field of music and music composition and performance. www.DonSlepian.com

Bio: Electronic Keyboardist Don Slepian sold many copies of his first lp record, "Computer Don't Breakdown", from the tailgate of his car at the TCF outdoor electronics marketplace in 1982. He, like many people in the arts, is exploring the uses of AI technology to enhance human creativity.

T-3 (ED-213): Workshop continued from last session

T-4 (ED-211): Zero-One Sunshine: Technology, As a Force for Good, As a Theme in Popular Music, Aaron Nathans

Abstract: Computers and technology have both improved our lives and complicated them; made us safer and more vulnerable; and brought both joy and sorrow into our world. And yet when it comes to popular music, the overwhelming majority of songs pile up on the negative side of the ledger. Popular songs about technology tell of destruction and illness. They sing: “Video killed the radio star,” “Machines dehumanize,” “Virtual insanity,” and even “I’ve got Pac-Man fever, I’m going out of my mind.” Meanwhile, almost all popular music is recorded into digital interfaces that allow for much better sound quality and sound-bending creativity, not to mention far more efficient distribution and easier consumption. In this lecture, I will discuss how I came to identify technology as a songwriting device that helps reveal who we are as human beings. I will present two original songs that explore how our lives are elevated by computers, and were made richer by people like Alan Turing, father of computer science; as well as Brian Kernighan, originator of the “Hello, World!” program.

Bio: Aaron Nathans is a Philadelphia-based alternative folk music singer, songwriter and recording artist with a distinct sound, due in large part to a combination of rhythmic acoustic guitar, wide-ranging baritone vocals and beautiful melodies that you won’t soon forget. When pairing that with talented songwriting that touches on everyday life and easily connects with audiences, you’ll see why Aaron is someone you won’t want to miss.
Aaron has a unique brand of storytelling. He writes about things no one else has written about before, including two songs about how computers have made our lives better. Aaron is a prolific presence in the Philadelphia folk music scene. He also co-host of the Philly Songwriters In-the-Round Series at the Royal (in Glenside, PA) with Avi Wisnia and Meghan Cary. The trio also run the Philly Songwriters Circle song critique group, with hundreds of members from the Philadelphia area and beyond.
Aaron also performs and records as one-half of the guitar-cello duo Aaron Nathans & Michael G. Ronstadt. His shows with Michael are high-energy events, full of musical combustion as Aaron plays off Michael's brilliant cello work. They released "Hello World," their fourth album, in 2023.

T-5 (ED-208): SiriusXM Satellite Radio: A Technological Overview, Carl Scarpa, SiriusXM Radio

Abstract: This talk is a general overview of how the SiriusXM satellite system works. The talk will cover an historical overview of the origin of satellite radio, briefly discuss the SiriusXM satellites, constellations, design features, coverage capabilities, and how the satellite system is augmented with a complementary ground repeater network. The talk will outline the frequency planning of both the Sirius and XM network, the many forms of diversity that greatly improves signal reception, and the many challenges associated with robust reception of mobile satellite data. The talk concludes with an overview of the latest Generation receiver ASIC, its design process and requirements. Time permitting, a demonstration of a live RF capture processing the SiriusXM signals will be shown.

Bio: Carl Scarpa holds a bachelor's and master's degree in electrical engineering from the Polytechnic Institute, Brooklyn New York. He has over 40 years of experience in communications technology ranging from systems analysis, algorithm development, software development, analog, digital and RF hardware design. He holds over 50 patents in the field of digital communications technology. Mr. Scarpa is currently the senior distinguished engineer at SiriusXM Radio. He was the principal waveform designer of SiriusXM's Backseat TV video service; the first nationwide mobile video service employing state of the art forward error correction and signal processing technology. He is currently the principal designer of the next generation SiriusXM waveform; a technology that will double SiriusXM's capacity without increasing system bandwidth or transmission power requirements. Mr. Scarpa has been a lead technical architect on various Sirius XM communications projects for the past 20 years.

T-6 (ED 206): Sentient to Intelligent, Eva Kaplan, Intelligent Systems, Consultant in Computer Education and STEAM

Abstract: Yes - we've been subject to "the future" through popular media. My talk will introduce reality - examples of AI in our natural environment and through today's "bots". It will also provide sources (robotics in popular media/comic books with the state of AI in our world to further delve into artificial intelligence. Attendees will receive a source guide to existent studies.

Bio: Eva has been a presenter for TCF since its inception. Hunter College inducted her into its Hall of Fame for her contributions to Computer Education. In 1964, Eva received a Master's Degree in Interrelated Arts from New York University. Also, to be noted is that in 1961, she established Computers and Kids Summer Camp - often attributed as among the first and longest running computer/technology/STEM summer programs.

T-7 (ED 204): How to Get Started in Combat Robotics, Adam Cunard, TCNJ

Abstract: You've seen them on TV, but now take a look into how to get started with Combat Robotics on a smaller scale! From hobbyists looking for a new pastime, to educators looking to breathe new life into their classroom, find out how to start rumbling with robots!

Bio: My name is Adam Cunard, I'm a 21 year old Jr. Technology and Engineering Education major at The College of New Jersey. I've been building combat robots like the ones seen on TV since 2014.

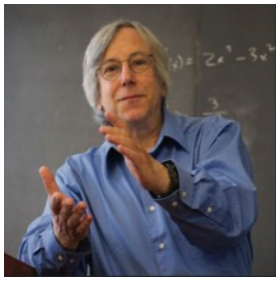
T-8 (ED 109): TCNJ Senior Project Presentations

1. Wireless Audio Relay
Team Members: Michael De George, Dennis Donnelly, Kevin Hofmann, Jack McGinley
Advisor: Dr. Deese
Abstract: The goal of this project is to integrate a low-end microphone and a commercially viable board with an innate Bluetooth radio. The purpose of this device is to captured audio and have it sent wirelessly to a smartphone, which makes use of a custom Android application, and then saved to a cloud storage server. To accomplish this we will be using an nrf5340-DK, which is a Nordic Semiconductor board that is equipped with Bluetooth 5.3 and BLE capabilities among a wide array of available pins to facilitate with device components configuration and testing. The mic to be used is the I2S Adafruit microphone, which was researched to be compatible with nrf53 series. Storage of the audio is not a concern for the board as the audio is to be streamed from the board to the phone. The Android application will feature an interface for the collected audio data and facilitate in storing the audio in the cloud. AWS will be

the cloud services used for hosting our data. In creating the project there is a focus on making a professional product that must be easy to replicate, have a low production cost, and scaled to the size of a smartwatch. The main portion of the project is programming the firmware of the board to work seamlessly between the microphone and Bluetooth radio and then ensuring the proper capture of transmitted data.

2. Smart Cloth for Tracking and Localization
Team Members: Angel Abreu, Jake Connolly, Mathew Koenig, Nathan Stephenson
Advisor: Dr. Khan
Abstract: UHF (Ultra High Frequency) RFID signals, typically recognized for diverse real-world applications but not previously employed for positioning. Our project introduces an innovative use of RFID through a wearable and flexible microstrip patch antenna (MPA). By strategically positioning passive tags within the environment, we demonstrate the possibility of tracking the wearable antenna using these tags as reference points. The initial phase involves calculating the distance between the RFID UHF reader and the flexible MPA, employing RSSI (Received Signal Strength Indicator) for accuracy. Furthermore, the paper dives into the selection of materials for wearable UHF RFID patch antennas, comparing two highly flexible conductive textiles. Each textile is used to design a MPA operating within the 860-960MHz range. This research contributes not only to the emerging field of RFID-based positioning but also addresses the material considerations crucial for wearable antenna design.

T-9 (ED 112): Krazy Keyboards, Barry Burd, Drew University



Abstract: I demonstrate several unusual devices for keyboard input including the Twiddler, the TapXR, a laser display, and piano alphabet input.

Bio: Barry Burd is a professor of Mathematics and Computer Science at Drew University in Madison, NJ. He's the author of several books, including *Java For Dummies*, *Flutter For Dummies*, and *Java Programming for Android Developers For Dummies*, all from Wiley Publishing. In 2020, he was honored to be named a Java Champion.

T-10 (ED 110): Getting Started with Java, Michael Redlich, USJUG

Abstract: Java is an object-oriented programming (OOP) language created by James Gosling at Sun Microsystems that was first introduced to developers in 1995. It is one of the most popular programming languages for client/server web applications and there are many scripting languages (Clojure, Groovy) that seamlessly interact with Java. Much of Java's language syntax was derived from the C++, but as James Gosling once stated, "Java is C++ without guns, knives, and clubs." This presentation will provide an introduction to the Java programming language, provide a brief overview, how to get started, review some Java keywords, introduce the Java class mechanism, and review a small, working Java application. The example Java application will demonstrate how the attributes of OOP are utilized within Java classes.

Bio: See 10:15 am to 11:10 am time at T-10.

***********12:25 pm to 1:20 pm***********

T-1 (ED 115): Generative AI: The Evolution of Human-Machine Relationships, Joti Balani, Freshriver.ai

Abstract: For the past 25 years, as the Web, Mobile and Cloud have evolved, humans have had time to adapt in our relationship and interactions with these machines and systems which we have had to understand (eg Keyboards, Mouse, swiping left/right on phones). With Generative AI, we have entered an unprecedented era where machines understand human language, images, voices opening the doors to millions of humans using Gen AI in ways that were only in our imaginations to date. Gen AI seems like magic and all-powerful, but as we know with great power comes great responsibility. We will explore Gen AI in all its facets, the good, the bad and the ugly so humans are armed with the knowledge of how to harness this incredible technology and solve problems to create the next version of our world for human, by humans, of humans.

Bio: Joti Balani is the Founder and Managing Director of Freshriver.ai, a Boutique Consultancy focused on Strategy and Delivery of Enterprise Business Outcomes leveraging Conversational AI, Enterprise AI-enabled Workflow Automation and Data Transformation with Foundational/large Language Models for Fortune 500 clients.
Freshriver.ai designs and delivers complex Enterprise, Human, and Systemic transformations with a proven framework that blends AI, data science, engineering, and social sciences. With over 25 years of experience in the technology and design industry, she has led several award-winning and innovative projects for Fortune 100 enterprises, creating emotional, ethical, and economic value for their brands and customers.
She is a Global Thought Leader, Strategic Advisor and Technology Expert in the fields of Conversational AI, Foundational Models, Robotics, Automation and Web3. She serves as the G100 US Country Chair for Robotics & Automation, AI Impact Lead at the ILO Institute, Intrapreneurship Governance Council Member at Unfold Consulting, and AI Advisor to Titlechain and Inpeak.xyz. She speaks at leading industry, academic and social impact events globally including CES, Fintech Connect, Volcano Summit/LATAM, Data Center Connect, G100 Summit to name a few. She is also a member of the Infrastructure Masons NYC Chapter collaborating with Industry leaders to ensure AI is sustainable and carbon-neutral as it grows exponentially.
She is a Human-first Capitalist and Activist passionate about solving critical and global problems in business and society with courage, creativity, and technology. She is also the co-founder of Women in Voice New Jersey, a chapter of the global community that empowers women and diverse people in voice technology.

T-2 (ED_113): Legal Issues with GenAI in Art and Music; Frederic Wilf, Joshua Waterston, Lewis Sorokin, and Moderator: Rebecca Mercuri.

Abstract: This moderated panel session will discuss intellectual property and other legal issues posed by generative artificial intelligence, including recent litigation and regulatory responses to AI, current efforts by the tech industry to mitigate IP risks, and best practices in an era of uncertainty. The focus at this session is on art and music, but the effects of AI are much broader.

Bio: **Wilftek LLC** in Ardmore, PA focuses on technology and intellectual property law and represents clients of all sizes, from startups and small businesses to Fortune 500 and Global 10,000 enterprises, at various stages of their business development. From the initial spark of an idea, to building relationships with business partners and customers, to planning for strategic growth, Wilftek helps clients protect their business, brand, and creative assets.
Fred Wilf is the Founder and Managing Partner of Wilftek, LLC. (http://wilftek.com) Throughout his career, Fred has presented many early continuing legal education (CLE) sessions and other seminars (including at TCF) on legal issues in telecommunications and the Internet. He edited and contributed to a 4-volume treatise entitled "Computer Software" for publisher Thomson Reuters West.
Josh Waterston is a Senior Attorney at Wilftek and a Certified Information Privacy Professional for United States privacy law (CIPP/US). Josh focuses his practice on the intersection of technology, privacy, and security, enabling clients to leverage cloud computing opportunities while mitigating their legal and financial exposure.
Lewis Sorokin is an Associate Attorney at Wilftek where he helps clients manage the legal issues arising from technology in business. Lewis has presented about legal issues in emerging technology for the Pennsylvania Bar Association's Intellectual Property Section, Drexel University, and NFT Philly. His writings have appeared in Drexel Law Review, The Legal Intelligencer, and other publications.
Rebecca Mercuri, Ph.D. (http://www.notablesoftware.com/ and https://en.wikipedia.org/wiki/Rebecca_Mercuri) is a TCF and ACM legend, who has both academic insight and practical experience in the field of electronic music, in addition to her expertise in voting systems, computer security, consumer electronics, and information technologies. As the founder of Notable Software, Inc., she provides digital forensic investigations and expert testimony for civil and criminal cases on a wide variety of subjects.

T-3 (ED-213): Stock Trading Using Neural Networks and Genetic Algorithms, Donn Fishbein (AB8OH), Nquant.com

Abstract: Algorithmic (mechanical) trading systems can outperform buy-and-hold trading strategies, and can be improved with the use of artificial neural networks and genetic algorihms. This talk will briefly review algorithmic trading and the basics of artificial neural networks and genetic algorithms, and show their application to a successful sector switching trading system that has outperformed the broad market for a period of time.

Bio: Donn Fishbein, MD, PhD, is a physician and scientist who has investigated and traded the financial markets for 25 years. His particular area of interest is mathematical systems with biological roots. For the past fifteen years, his focus has been on hybrid artificial neural network and genetic algorithm systems, both for end-of-day trading and more recently for day trading systems. He has lectured on these subjects, describing profitable systems for trading equities, exchange traded funds, and index futures. He contributes trading signals to a neural net trading website and offers consulting services and private development of trading systems based on these technologies

T-4 (ED-211): Internet Job$$$, Donald Hsu, Dominican College.

Abstract: Amazon, Apple, Facebook, Google, IBM, Microsoft, NetFlix, Tesla stocks are up. Yes, the economy is booming. Retirees are working! --- Eighty percent of people got jobs from the Internet. Accounting needs 2.1 million (Cyber Security, Forensics, QuickBooks, PeachTree, MS Dynamics); Software Developer/Engineer (Android, C++, Java, C#, Python) - thousands of jobs, but no applicants; Cloud Computing (Amazon AWS, Cisco Webex, Dropbox, IBM, Microsoft Azure, Salesforce, VMWare, Zoom); Big Data (MS Sql server, MongoDB, Oracle, SAP, Data Warehouse), starting at $85,000; Networking (Cisco, Info Security, A+, Network+, CIEE, CISSP); Systems (Unix, Linux, Window 10); Analytics (IBM RSA, IBM SPSS, SAS, R, Python, Hadoop), Social Media Manager (Facebook, Instagram, LinkedIn, Pinterest, Snapchat, Tiktok. Twitter), Artificial Intelligence, Deep Mining, Quantum Computing, Project/Product Manager, Global Finance, Sales/Marketing of Tech Product/Services --- Computer majors are down 40 to 70% in US universities. This means more jobs for you and me. --- Bring a resume and get a free critique from the speaker.

Bio: Donald Hsu, PhD., Professor Dominican College, Dissertation Chair University of Phoenix, and President Chinese American Scholars Association (CASA). He has trained/taught 70 subjects - Accounting to Unix 14,000+. Clients/students work at Amazon, Apple, AT&T, Bank 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, http://www.g-casa.com. He traveled to 90 countries in Africa, Asia, and Europe for international business. Don's profile is here, with 9,000+ partners/clients on LinkedIn, and 266 public recommendations, https://www.linkedIn.com/in/dohsu.

T-5 (ED-208): Recent Advances in Vertical Takeoff and Landing Aircraft, Gaylord Olson, Consultant

Abstract: Over the next few years there will be a general replacement of helicopters with something better. Better in this case means no fossil fuel, quieter, safer, faster, and less expensive to operate. The new aircraft designs have electrical propulsion and most are designated as eVTOL's (electrical vertical takeoff and landing aircraft). This year's talk will be an update to what was presented at TCF last year and it will include some new concepts that are currently patent pending.

Bio: Gaylord Olson is an engineering consultant and inventor currently working on various ways to replace fossil fuel with electricity. Some of this work may be found at www.sstusa.net. Another recent interest for electrification is in transportation (ground, air, and sea). Mr. Olson has a BSEE degree from South Dakota School of Mines and Technology and an MS degree in engineering from UCLA. He is a long time member of the Experimental Aircraft Association (www.eaa.org) and has several patents related to airborne transportation and high altitude wind power.

T-6 (ED 206): Electric Bikes: Past, Present, Future, Princeton Electric Bike Association, Theresa Wrobel

Abstract: Theresa Wrobel will cover the history of eBikes and their current evolution. In addition, we will focus on future developments and challenges and give a very brief discussion of eBikes and AI.

Bio: **Theresa Wrobel** is a partner in Princeton eBikes, Central Jersey's only dedicated electric bike store. In addition to serving the electric bike needs of the community, Princeton eBikes donates its profits (approximately 20% of the sales price of each bike sold) to the Boys and Girls club of Mercer County. Theresa's responsibilities at Princeton eBikes include sales, customer communication and social media management. Prior to co-founding Princeton eBikes, Theresa spent over 30 years as a marketing research consultant specializing in health care, financial service and non-profit institutions. Theresa's experience includes moderating focus groups and conducting individual depth interviews among consumers, physicians and other health care providers, business owners, CFOs, benefits managers, employees and brokers. Theresa founded the Creative Marketing Group in 1997. Previously, she spent eleven years at Research 100, a full-service marketing research firm located in Princeton, NJ. She also held marketing research positions at United Jersey Bank (now Bank of America) and Stop & Shop. She has a B.A. in Social Psychology from Cornell University and an M.B.A. in Marketing and Finance from Boston University.

T-7 (ED 204): **TCNJ Senior Project Presentations**

1. Autonomous Vehicle for Nao Robot
Team Members: Dirk Catpo Risco, Sam Potomic, Joe Woods
Advisor: Dr. Kim
Abstract: The fields of robotics and autonomous vehicles are rapidly growing and becoming parts of our everyday lives. To explore this rising technology, our senior project is to design a car and program a NAO robot to autonomously navigate Armstrong Hall while steering and controlling the car. It will combine some mechanical engineering design work, microcontroller programming in C, and NAO robot programming in Python to accomplish this goal. We will also be including some electrical engineering elements through the breadboard circuit and sensor connections. This is a project that existed many years ago at the College and we are hoping to revive it and improve the existing system's handling and lower its weight. These various elements are what has made up the core experiences of our Computer Engineering curriculum here at TCNJ so we felt it made for a compelling culminating design exercise. At this point, the results of the project involve using AprilTags to navigate between a subset of rooms within the building. We are hoping to expand the set of rooms, as well as improve the collision detection of the robot and its response to obstacles.

Bio: Joe Woods (Team Leader) is a senior computer engineering student at The College of New Jersey with interests in machine learning, mobile systems, and computer vision. Post-graduation, Joe plans on attending Drexel for his PhD in Electrical Engineering with a focus on machine learning. On the team, he is the microcontroller lead, neural network lead, and budget manager. He will be creating the firmware interface for the microcontroller, training the navigation network, and deploying to the Arduino. Additionally, he'll track the team's spending, hours worked, and progress towards milestones.

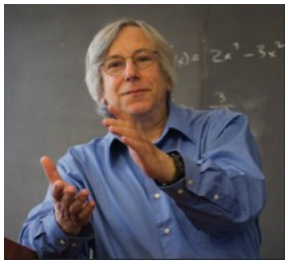
2. Autonomous Race Car
Team Members: Harshul Chanchlani, Jason Greenbaum, Luis Ruiz, Victor Heras
Advisor: Dr. Wondmagegn
Abstract: The project aims to build a race car that can be both manually controlled through an Android app using Bluetooth and autonomously navigating. This will be achieved by developing and training a convolutional neural network (CNN) with Python to process sensory input and make real-time decisions. The car's central processing unit will be a Raspberry Pi, responsible for managing the CNN, sensor data, and computations for manual and autonomous operation. Camera will be used as the main sensor for navigating the environment. This project combines the excitement of remote-controlled racing with intelligent self-driving capabilities, providing a unique and thrilling experience.

T-8 (ED 109): **Hands on Arduino Workshop for Beginners, Katalin Frolio, Lockheed Martin in Moorestown, NJ / Consultant; Workshop, ends 2:25 pm with extra time for questions.**

Abstract: The main goal of the workshop is to introduce participants to electronic devices and basic circuit theory. The Arduino is an affordable, flexible, open-source microcontroller platform using a simplified C programming language, and it is designed to make it easy for hobbyists to create homemade projects. Participants are expected to have a PC, and in order to save some time, they are also encouraged to download the Arduino software ahead of time. Step by step instructions can be found at the website: https://www.arduino.cc/en/Main/Software. **Things to have:** A laptop computer with a USB port. **Background Required:** Basic algebra for solving simple equations. **Intended Audience:** Anybody who is interested in electronics is welcomed.

Bio: Katalin Frolio has a BS from TCNJ and an MS from Villanova in Electrical Engineering with a concentration in High Frequency Systems. She currently works as an Electrical Engineer at Lockheed Martin in Moorestown, NJ, and is the chair of the IEEE Young Professionals Princeton/Central Jersey Section. She is also an adjunct professor with the Rowan ECE Department.

T-9 (ED 112): Quantum Computing for Everyone, Barry Burd, Drew University



Abstract: These days, programming a laptop is no big deal. But what about programming quantum computers? Many quantum computers are available in the cloud, and you can learn to write code for these quantum machines. In this session, you can watch while we code or bring your own laptop and code along with us. We'll connect to the IBM Quantum Lab and perform experiments with real qubits. While we work, we'll explore some basic ideas behind quantum computing.

Bio: See 11:20 am to 12:15 pm time at T-9.

T-10 (ED 110): Introduction to Python, Chuck Knight, ExxonMobil's Corporate Research Center

Abstract: Python is a very powerful programming language used in a variety of engineering and scientific settings. Its popularity has spread in recent years mainly due to its ease of use and large collection of support libraries. In this talk I'll provide a gentle introduction to the language using a hands on, demonstrative approach. By the end of this talk, attendees should know how to get started with writing simple scripts in Python, and have a general understanding of the Python ecosystem.

Bio: Chuck Knight has been working in the IT industry for 42 years; the last 24 years with ExxonMobil. He has spent his career working on various scientific and high performance computing platforms for applications including NASA's space shuttle thermal analysis, reservoir simulations and seismic imaging, as well as many other proprietary and commercialized efforts. Chuck is currently a Principal Scientific Computing Engineer for ExxonMobil's Scientific Computing team at ExxonMobil's Corporate Research Center. Chuck obtained his BS in Computer Science from Michigan State University. Chuck also has an MS in Computer Science as well as an MBA from the University of Houston.

**********1:30 pm to 2:25 pm*********

T-1 (ED 115): **Unlocking ROI on Data, Sarah Nagy, CEO, Seek AI**

Abstract: Building a natural language interface for data has long been a dream for many in the data and AI spaces. However, prior to the Transformer model (and subsequent rise of Generative AI), AI was simply not sophisticated enough to handle natural-language queries in a meaningfully valuable way. Now that AI has advanced so much, the natural language interface for data is more valuable than ever before. This talk explores three key questions. First, what would a natural language interface for data actually look like? Second, what kind of value would it add to organizations using the Modern Data Stack? Third, what will the challenges look like when it comes to working with a natural language interface for data? Sarah Nagy will share real-world learnings from Seek's customers for each of these questions.

Bio: A former quant, Sarah founded Seek AI in 2021. Sarah most recently led the consumer data team at Citadel's Ashler Capital. Prior to joining Citadel, Sarah led enterprise data product development at two startups, Edison and Predata, which both exited. Sarah started her career as a quant at ITG developing algorithmic trading strategies. Sarah has a Master in Finance degree from Princeton and dual Bachelor's degrees in Astrophysics and Business Economics from UCLA.

Press coverage in NYT:

Sarah Nagy led a data science team at Citadel, a giant investment firm, in 2020 when she first tinkered with GPT-3. It was more than two years before OpenAI released ChatGPT. But the power of the fundamental technology was apparent in 2020.

Ms. Nagy was particularly impressed by the software's ability to generate computer code from text commands. That, she figured, could help democratize data analysis inside companies, making it broadly accessible to businesspeople instead of an elite group.

In 2021, Ms. Nagy founded Seek AI to pursue that goal. The New York start-up now has about two dozen customers in the technology, retail and finance industries, mostly working on pilot projects.

Using Seek AI's software, a retail manager, for example, could type in questions about product sales, ad campaigns and online versus in-store performance to guide marketing strategy and spending. The software then transforms the words into a computer-coded query, searches the company's storehouse of data, and returns answers in text or retrieves the relevant data. Businesspeople, Ms. Nagy said, can get answers almost instantly or within a day instead of a couple of weeks, if they have to make a request for something that requires the attention of a member of a data science team.

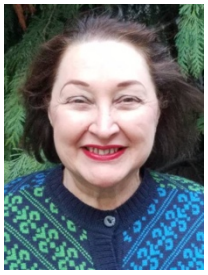
"At the end of the day, we're trying to reduce the time it takes to get an answer or useful data," Ms. Nagy said. Saving time and streamlining work inside companies are the prime early targets for generative A.I. in most businesses. New products and services will come later.

T-2 (ED_113): **Bing Image Creator: What is it, How Do You Use It, and Art Created With it, Larry Ward**

Abstract: Bing Image Creator is a free text-to-image service provided by Microsoft. It is powered by the artificial intelligences known as DALL·E 3 and ChatGPT, both of which were developed, and continue to be developed, by OpenAI, a leading American artificial intelligence lab. This talk will explain what Bing Image Creator is, explain how to use it, and show examples of the speaker's art that were created using it. A demo is included with the talk.

Bio: Larry Ward is a software engineer who grew up in Southern NJ. His undergraduate degree is in Electrical Engineering from MIT, and he also holds a Masters in EE from Georgia Tech. An avid artist, he started working with AI-generated images in 2023.

T-3 (ED-213): **AI User Notes, Josephine Giaimo**



Abstract: I will share my personal experiences with several non-generative AI implementations. 1. How I proposed a framework and metric for evaluating the performance of AI in predicting project profits. 2. How I helped AT&T improve several key metrics by using UX design and research to implement an expert system. 3. How I used my UX-related skills to support the implementation of Robotic Process Automation projects. 4. How my ethnographic research laid the groundwork for future AI data modeling. 5. How I used my background in machine learning and UX to provide user-centered documentation of an exciting, new healthcare IT product. I will distinguish between generative and non-generative AI, and encourage participants to build their own AI implementation as a personal learning experience. Takeaways: 1. You don't have to have studied calculus to successfully provide user-centered design, research, and related services as part of an AI implementation. 2. AI has been around for decades, there are many ways to implement AI. Many of them are non-generative. 3. You will learn the difference between generative and non-generative AI. 4. You can build your own no-code AI implementation, and you will learn a lot by doing so. I encourage you to do it.

Bio: Josephine Giaimo worked in the field of data science in the 1980s, where she wrote FORTRAN code for defined benefit pension plans for insurance companies and brokerage houses as an actuarial assistant. She left the field of data science to eventually become a leader in user-centered quantitative and qualitative research. Her original academic research proposed a framework for evaluating the performance of neural networks and statistical approaches in predicting project profits. She has been working in AI and UX since the 1980s. She is the Founder and Principal of User Experience Research, LLC, providing human-centered consulting to AT&T, ADP, Google, Medidata, Sarnoff Corporation, and others. She holds a Bachelor's degree in psychology from Montclair State University, and a Master's in Industrial Engineering from the New Jersey Institute of Technology. For several years, she taught psychology courses, including the dynamics of group processes, at Bloomfield College. She has taught courses in robotics and AI to K-12 students, and holds

a middle school math teaching certification. She served as Treasurer of the Princeton ACM/IEEE Joint Computer Science Society from 2011 to 2023, and currently leads its Strategic Planning Committee. She is the Membership and Operations Chair of the UXPA NJ chapter.

T-4 (ED-211): Social Media Opportunities: From Intern to VP of Strategy, Donald Hsu, Dominican College

Abstract: Social media sites are hot: Chive, Facebook, Foursquare, Google+, Instagram, LinkedIn, Pinterest, Reddit, Tik tok, Tumblr, Twitter, WhatsApp, YouTube and hundreds of new ones being created every week, if not every day! You got 400 friends on Facebook, 500 followers on Twitter, 300 on LinkedIn; can you monetize this friendship? Yes, you can. ---- Companies are hiring in social media as: Intern, Associate, Coordinator, Analyst, Consultant, Mobile Marketing, Client Manager, Community Manager, Relation Manager, SEO Specialist, Strategist, Director, Vice President, or CEO. Salary ranged $35,000 to $120,000 per year. --- Using 10001 zip code, CareerBuilder.com got 300+ openings, Monster.com gave 1000+ jobs, Simplyhired.com with 13,480 and Indeed.com with 14,732 jobs in social media. --- The speaker will give you specific details on how you can join a corporation as a social media experts.

Bio: See 12:25 pm to 1:20 pm time at T-4.

T-5 (ED-208): The Most Important Computer You Never Heard Of, Frank O'Brien, Infoage Science Museum and NASA

Abstract: Imagine a nationwide network of computers, each housed in a building nearly the size of a city block, all interconnected with high-speed data links, radars and countless other devices. They are part of the military's system of air defense, monitoring the skies for Russian bombers heading for the United States. If a bogey is spotted heading for US airspace, a quick check of all known flight plans verifies that it is an unknown. With a few clicks on the radar screen, fighters are scrambled to intercept and identify the intruder. Hopefully the target is friendly; if not, it's a bad day for everyone.
This isn't an excerpt from a dystopian graphic novel, or a cut 'n paste from a current aerospace magazine. In truth, this is all ancient history. The system was called SAGE, and was implemented in 1958. We will be talking about the computer behind SAGE, how it made IBM into a powerhouse, and became a pop culture icon.

Bio: Frank O'Brien has been at the Infoage Science Museum for 16 years, contributing to their history/education/public outreach mission. His original focus was as one of the editors of the Apollo Journals, now considered the definitive resource for those interested in mankind's greatest voyage of exploration. Over the last decade he has been a NASA Solar System Ambassador, running events and giving lectures once or twice a month on a wide range of spaceflight topics. Frank graduated from Rutgers University with a degree in Computer Science, and later returned to earn his MBA. Notably, he lives just down the road from where the Martians landed at Grovers Mill in 1938.

T-6 (ED 206): The Hydrogen House Project, Michael Strizki

Abstract: Our flagship project is the Solar-Hydrogen Home. In 2006, Mike Strizki completed the conversion of his home to run on a unique solar-hydrogen system. Located in Hopewell, NJ, it is the first inhabited solar hydrogen powered residence in North America. This advanced hydrogen production and storage system provides for all of the home's energy needs while creating zero emissions.
The system produces green hydrogen through the process of electrolysis, and is composed of a solar array, electrolyzer, battery bank, inverters, storage tanks and fuel cell. Home appliances that would normally run on natural gas have been retrofitted to run on hydrogen, including the cooking range, BBQ grill, hot water heater and clothes dryer. A geothermal system lowers heating and cooling loads, further increasing efficiency. Excess energy produced is sent back to the electrical utility grid. The system has recently been upgraded to integrate both an EV charging station and a high-pressure hydrogen vehicle refueling station- currently the only privately owned, residential HFCV refueling station on the East Coast.

Bio: The Hydrogen House Project, a 501c3 nonprofit organization was founded by inventor and engineer Mike Strizki in 2011. Since the launch of the Hydrogen Home, Strizki has designed and installed several solar- hydrogen systems throughout the Caribbean and in California. In 2015, Strizki built a solar- hydrogen system on an 11.1-acre rural property in Pennington, NJ. It is the first commercially available, affordable system of its kind. This state-of-the-art residence and working farm is a remarkable example of modern, net-zero, sustainable living. These projects have proven that we have the technology to safely power our homes, vehicles, and communities with clean, reliable energy from renewable resources.

T-7 (ED 204): Embedded Development Using C++ on Arduino, Raspberry Pi and ESP32, Evan Williams, Consultant

Abstract: Arduino is programmed in C++ but beginning programmers don't often take advantage of or fully understand this feature. However object-oriented programming can be used to build solutions more successfully. In this talk I will discuss what object-oriented programming is a give some examples of techniques used to improve a code base. Although I primarily use Arduino, these lessons apply equally to code written for Raspberry Pi and ESP32.

Bio: Evan Williams began his career in 10th Grade at Princeton University's Microprocessor Lab. This laboratory taught students how to interface 8-bit computers to real-world devices. After graduating from Thomas Edison State College, he worked for 25 years in Computer Software and developed websites. He obtained a Master's in Data Science from Thomas Edison in 2022 and taught Computer Science at Fordham University in Fall 2022. He also holds a degree from Rutgers University in Computer Science and is a ham radio operator (KC2JQC). His website is www.evanwilliamsconsulting.com.

T-8 (ED 109): Hands on Arduino Workshop for Beginners continued from last session.

T-9 (ED 112): Speculations on AI, Co-Evolution, and the Future of Our Species, Lee Goldberg

Abstract: Based on Conversations with Moore and Kilby - **"It's Almost as if Silicon Was Waiting for Us":** It's tough to say whether the rapid adoption of Chat GPT and other AI technologies are heralding an exciting new era for humankind or the beginning of a "kinder, gentler robot apocalypse". I'm still on the fence about which future we are facing but my speculations continue to be shaped by a conversation I had a quarter century ago with two people who inadvertently helped bring us to this point in human history.

Bio: See 10:15 am to 11:10 am at T-1

T-10 (ED 110): Pythonic Object-Oriented Development, Chuck Knight, ExxonMobil's Corporate Research Center

Abstract: Object-Oriented Programming is a widely used concept to write powerful applications in many languages. In this talk I'll tackle the basics of Object-Oriented Programming in Python: exploring classes, objects, instance methods, attributes and much more!
Jupyter Notebook is here https://github.com/chuck-a-knight58/Trenton-Computer-Festival

Bio: See 12:25 pm to 1:20 pm time at T-10.

***********2:35 pm to 3:30 pm***********

T-1 (ED 115): Low Energy Sensor Platform - Leveraging Machine Learning, Joe Jesson, RFSigint Group and E/CE Dept. TCNJ

Abstract: Applications of embedded AI, specifically ML (Machine Learning) and object classification has been growing exponentially as decision logic moves to the edge. Proven advantages of low energy consumption, low costs, and independent target classification drive this implementation and is transforming smart city management, agriculture, medical, health care, bridge and building structure health management (SHM), and smart logistics just to name a few game-changing applications.

Several specific ML applications will be discussed including a vision ML application applied to logistics, a remote visual cargo classification smart sensor (currently in production). Challenges of a small vs. large CNN model when improving object identification and accuracy will also be discussed and why ML at the network edge is a game-changer. Finally, we will compare and contrast the AI categories of large language models and the energy-constrained tiny ML sensor models.

Bio: See 10:15 am to 11:10 am time at T-7.

T-2 (ED 113): Constructing Music, Teresa Marrin Nakra, TCNJ

Abstract: Why does music exert such a strong pull on us? How does it work? Traditional courses in music fundamentals give students a basic understanding of the building blocks of music and how to put them together to make a result that produces an intended effect. Constructing Music: Musical Explorations in Creative Coding takes students a step further: through a series of step-by-step tutorials and lessons. I present a new method for teaching music fundamentals that foregrounds creative coding practices and builds upon the computing skills that today's students already possess. By encouraging experimentation with computer code, my book gives students tools to actively investigate, simulate, and engage with the structure of music, ultimately leading to greater understanding about the processes that underlie music's power over us. In the final chapter of this book, the questions and theories that emerge from the lessons, considering the role of music as a proto-form of AI and its impacts on emotion, wellness, and creativity are considered.

Bio: Teresa M. Nakra is Professor of Music, Design, and Creative Technology at The College of New Jersey, where she coordinates Music Technology activities. She is a recipient of the Doris Cohen Levi Prize, the David McCord Prize, the Michael C. Rockefeller Memorial Fellowship, and research fellowships from IBM, Motorola, and Interval Research Corporation. Nakra has designed interactive music systems for museums, music festivals, and concert halls across the United States, Europe, and Japan.

T-3 (ED-213): Computer Generated Lifeforms, Allen Katz – TCNJ

Abstract: Many people are not aware that my doctorate involved artificial neural networks at a time before this topic was not yet popular. Although not deeply involved with computers, I taught microcomputers for several years because there was no one else around to teach these courses. As a result, I started thinking about: *Could computers think in a way like humans? Is an electronic (computer) life form possible? Would such life forms want to communicate with us because of the huge difference in the speed of the processing elements that make up these systems.* In this talk, I will discuss these questions. I will ask other speakers and the audience to share these thoughts on this topic.

Bio: Allen Katz is a Prof. of E/CE at TCNJ. He was a co-founder of the Trenton Computer Festival along with Sol Libes in 1976 and has Chaired TCF for many years. Was President and founder of the Linearizer Communications Group, now a part of MACOM. He received his DSc and BS in EE from NJIT and his MS in EE from Rutgers Univ. He holds 17 patents and has written >150 technical papers. He received the IEEE/MTT Application Award in 2015, the Microwave Magazine Best Paper Award in 2010 and the AAS' William Randolph Lovelace II Award in 2002. He is an IEEE Fellow and a past MTT DML. Al (K2UYH) has also been a radio amateur since he was a teenager with an interest in the UHF/microwave frequencies and Moonbounce.

T-4 (ED-211): An Introduction to Mastodon and the Fediverse, Bob Murphy

Abstract: Mastodon is a fully open-source social media platform, with no advertising, monetizing, or venture capital. It is a part of the Fediverse, a social network that is truly a network, by incorporating ideas and protocols that allow users and information to freely spread throughout a wide diaspora of servers and services. Explore how you might wish to join into the rich, new world that has more of a resemblance of the internet as it was envisioned to be.
The Fediverse is a collection of communities that is a bit of a throwback to a smaller, more personal time on the internet. There are services for short messaging, audio and video sharing, and event organizing, among other things. With the centralized silos in turmoil, things change fast here, so there may be some talk of Threads and/or other new developments in the Fediverse.

Bio: I'm Bob Murphy, long time desktop Linux user, current Linux sysadmin, EFF supporter, Fediverse denizen. I am also a Montclair State University CS graduate.

T-5 (ED-208): Electronic Environmental Detectives, Jonathan Allen, RF Electronics Consulting

Abstract: The topic would be "Electronic Environmental Detectives." It would explain how electronics has contributed to meteorological and environmental measurements, including new and improved instruments and data processing. It would be an updated version of a talk I gave at Sarnoff a vew years ago, and would include ways such measurements help track and analyze climate change.

Bio: Jonathan Allen received his Ph.D. in physics from Washington U. in St. Louis with an emphasis on environmental science and a dissertation in the measurement of atmospheric aerosol particles. Since then his career has been mainly in research and development of solar photovoltaics and industrial electronics. He is now semi-retired and working as an independent consultant.

T-6 (ED 206): EVs: Past, Present and Future, Stanislav Jaracz and Ashley Lynn Qua, NJ Electric Vehicles Association.

Abstract: Join Stanislav, Acting President, and Ashley Lynn, Policy Lead, of the NJ EV Association as they walk attendees through advancements in electric vehicles and associated charging infrastructure from the near past and into the future. This presentation will navigate various aspects of EV development and adoption, dispel myths, and cover timely, relevant insights that attendees should know.

Bio: Stan Jaracz is Acting President of NJEVA, which is among the most active chapters of Electric Vehicle Association. The grass roots organization is a group of EV advocates who educate for accelerated adoption of EVs in their community through numerous vehicle and presentation shows in partnerships ranging from municipal, county and state to workplaces, non-profits and others. Our chapter received the Best Chapter Award in 2022. Stan works at EZ Ride as a Manager of EV Accelerator Program, which includes EV Adoption Leadership certification program for workplaces and development of fleet electrification plan to convert the company's fleet of 25 shuttle buses into 100% electric drive. This includes site improvements, such as charging infrastructure, solar canopies and energy storage. To learn more about NJEVA, join or contact us, please visit <jerseyEVA.org>.

Bio: Ashley Lynn Qua works at the *Smart Electric Power Alliance* (SEPA) as a Senior Manager of Transportation Electrification and acts as the Co-Chair of SEPA's Electric Vehicle Working Group. The EV Working Group is ~750 members strong and delves into the role of utilities regarding EV deployment & charger build-out, smart charging infrastructure trends, business models & strategies, and fleet vehicles & corresponding charging infrastructure. Prior to joining SEPA, Ashley Lynn was employed at the *New Jersey Board of Public Utilities* where she developed $50 M+ in landmark incentive programs, such as Charge Up New Jersey and the Clean Fleet EV Incentive Program. Ashley Lynn's EV policy & research experience also includes supporting the launch and expansion of *ChargEVC* alongside New Jersey thought leaders in 2017.

T-7 (ED 204): TBD

T-8 (ED 109): Hands on Arduino Workshop for Beginners - Extra time provided for tutorial questions and answers.

T-9 (ED 112): Generating images with AI using midjourney bot, Douglas Ferguson, DellEMC

Abstract: Midjourney bot is a tool that runs on a discord server that can generate images based on text descriptions. Some modifiers that are available are specific lens, aspect ratio, etc

Bio: Doug has spoken at nearly every TCF conference since 2001. He is an avid videographer/photographer. His other hobbies include RC aircraft and model rocketry. Doug graduated from Rutgers College of Engineering in 1988 with a degree in Mechanical Engineering and Aerospace Engineering.

T-10 (ED 110): Special Session: Ask Me Anything, Michael Redlich, Chuck Knight and Barry Burd, Garden State Java User Group (GSJUG)

Abstract: In this special session, Michael Redlich, Chuck Knight and Barry Burd will be available for attendees to ask any question related to programming languages, general programming concepts, the IT industry and anything else that may be of interest. The facilitators will have their laptops running for any real-time demonstrations.

Bio: See Mike Redlich and Chuck Knight at 12:25 pm to 1:20 pm time in T-10. See Barry Burd at 11:20 am to 12:15 pm time in T-5.

***********9:00 am to 5:00 pm***********

HAM RADIO License Exam Preparation Cram Course in ED-103 (License Testing to begin at 3:30 pm.)

Get a Ham Radio License in One Day! Alan Wolke, W2AEW – Cram Team Lead and Joe Zaroff, WA3NEQ; David Sarnoff Radio Club <https://www.n2re.org/>.

Abstract: If you wanted to get an amateur radio license but never had the time, now is your opportunity! To obtain the entry-level Technician license, all one has to do is pass a multiple-choice exam. The course will step through the information needed to pass the FCC Technician License exam. Preparation prior to participation in the course and the exam is strongly encouraged.

The *required* pre-study guide (*No-Nonsense Technician Study Guide*) can be found here: <https://drive.google.com/file/d/1vZkjiIv_6NLoNJIAuEx3B8s9ihoRMeeR/view?usp=sharing> Students are strongly urged to make use of it prior to attending the HamCram session.

The slide presentation in the class that follows the truly wonderful and free study guide can be found at <https://drive.google.com/file/d/1N1GFshG2MJziag92FQatzuiqoBMbTmtm/view?usp=sharing> (HamCram Presentation PDF).

Online practice exams are also of great benefit,
<http://qrz.com/hamtest/>.

The topic agenda for the Technician Class Ham Cram will be:
- What is Amateur Radio
- Electrical Principles
- Math for Electronics
- Basic Electronics and Components
- Schematics
- Radio Wave Properties
- Propagation
- Antennas & Feedlines
- Amateur Radio Signal/Modulation Types
- Safety Concepts
- RF Exposure
- Station Setup & Operation
- Operating Controls
- Station Equipment
- Common Troubleshooting
- Using a Multimeter or DMM
- Operating Procedures
- Public Service
- Amateur Satellites
- Fun Activities & Internet
- Rules, Regulations & Definitions

The class will begin at 9:00 am, lunch at 12:30 pm. Time permitting, we will run through a few practice exams prior to the actual testing session. At 3:30 pm the FCC examination will be given by ARRL-certified Volunteer Examiners (VEs). One does not have to attend the HAM CRAM 101 or pay for admission to TCF to attend the exam session. An exam fee ($15.00) must be paid by each examinee. **You must bring your FCC Registration Number (FRN). If you do not have a FRN, go to**

<https://www.fcc.gov/wireless/support/universal-licensing-system-uls-resources/getting-fcc-registration-number-frn>. Two forms of identification (at least one must have your photograph) will be required to take the exam. All license exams will be offered (Technician, General and Extra) at this testing session. If upgrading, have an original and a photocopy of current license. Results of your test will be provided after exam session is completed.

2024 TCF VE Team Members
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