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Batten College of Engineering & Technology, Old Dominion University

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illuminator

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The Batten College of Engineering and Technology celebrates Engineers Week

Founded in 1951 by the National Society of Professional Engineers, (NSPE), and organized nationally by *DiscoverE*, Engineers Week brings engineering to life for K-12 students, educators and parents. With a goal to ensure a diverse and well-educated future engineering workforce, the weeklong celebration aims to increase understanding of and interest in engineering and technology careers, while recognizing the contributions engineers make to society and to quality of life.

From cookies and cocoa and giant lawn games, to lab tours and a selfie contest for middle and high school girls, the Batten College of Engineering and Technology will celebrate Engineers Week with events and activities related to the national theme: Inspiring Wonder.

A full calendar with detailed information can be found at Tinyurl.com/EngWeekODU. Calendar highlights are listed below.

DATE

EVENT

Monday, February 19

10:30 a.m. - 3 p.m.

Engineering student organization showcase/cookies & cocoa with deans and department chairs

Tuesday, February 20

12 Noon - 1:30 p.m.

Engineering field day: games on the Kaufman Mall (lawn)

Wednesday, February 21

11:30 a.m. - 2:30 p.m.

Student clubs spotlight

Thursday, February 22

11 a.m. - 1 p.m.

Focus on female engineers: Society of Women Engineers (SWE) diversity panel

6 p.m. - 8 p.m.

Girls Night Out/ screening of the movie "Dream Big" at the University Theatre (#GirlEDay)

Friday, February 23

9 a.m. - 12 noon

6 p.m. - 8 p.m.

Engineering in Practice: laboratory tours
Engineering game night and site tour

Saturday, February 24

7:30 p.m. - 10 p.m.

Engineering Gala aboard the Spirit of Norfolk

For more detail and full calendar visit: Tinyurl.com/EngWeekODU



DISCOVER



GIRL DAY

FEBRUARY 22, 2018

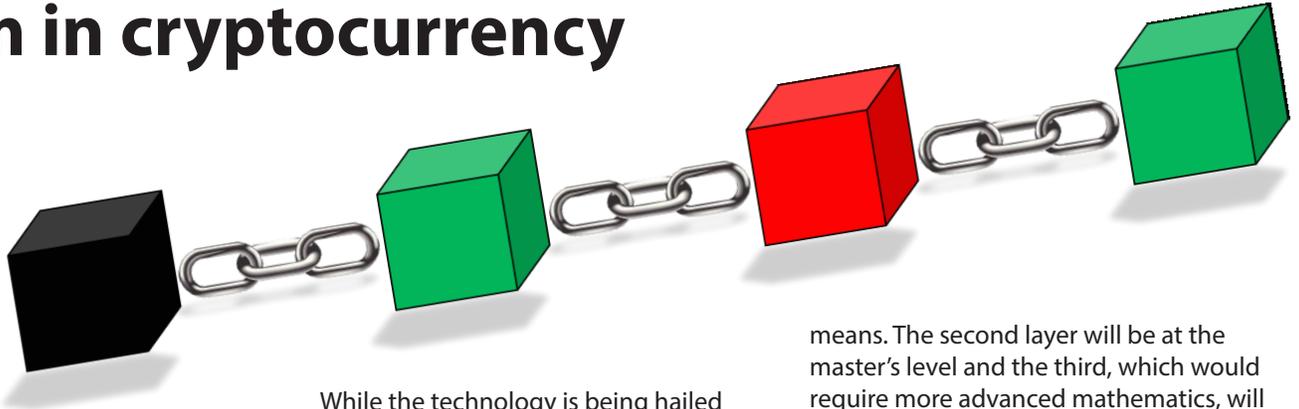


ODU

Batten College of Engineering and Technology

Blockchain technology courses to address boom in cryptocurrency

By Keith Pierce



Trading something of value in exchange for goods, services or something of equal value, has been around since the dawn of time. However, in case you haven't noticed, over the past several years the need to carry around physical money has diminished to almost nothing. Meanwhile, there is another growing phenomenon – cryptocurrencies, such as Bitcoin and Ethereum. Driven by blockchain technology, cryptocurrency, in simple terms, is digital money managed by individual owners rather than physical currency controlled by governments or managed by a bank.

From business contracts to buying and selling cars, houses and land, financial strategists report that blockchain technology is poised to change how the whole world does business.

While the technology is being hailed as the next revolution in money exchange, it also comes with new implications in the area of cybersecurity. That's where new courses within Engineering Management and Systems Engineering (EMSE) come in. Thanks to a \$178k grant from the National Security Agency (NSA), graduate and undergraduate students can soon take courses aimed at addressing everything from cryptocurrency basics and the mechanics of Bitcoin, to the application of blockchain technology in boosting cybersecurity.

"We're proposing classes in blockchain and cybersecurity at three different levels," says Adrian Gheorghe, Ph.D., professor, Engineering Management and Systems Engineering. "The first is an introductory undergraduate course that will provide an awareness of what it all

means. The second layer will be at the master's level and the third, which would require more advanced mathematics, will be at the doctorate level."

Blockchain is a distributed ledger open to anyone. Simply put, it is a continuously updated record of who holds what. Blockchain uses encryption techniques to control the creation of monetary units and to verify the transfer of funds. The technology allows individuals, as well as institutions, to shift funds instantly without the need for an intermediary. Think of your blocks in the chain as your fingerprint. They may contain money, information or assets that only you own. Your blocks are part of a network that allows you to transfer or exchange those assets with anyone in the network – such as a seller of goods and services – without a middleman. Once data has been recorded inside of a blockchain, it is virtually impossible to change because every block in the chain is affected when one block is tampered with. This means the system will reject a hacker that tries to tamper with a block or create a bad block.

"You cannot cheat a blockchain," says Gheorghe. "As soon as you allocate money it creates a block – one transaction is a block. When you put many transactions together, it becomes a blockchain, which stays irrevocable within the chain of different blocks. That's why it is considered a trusted system."

According to Gheorghe, the new courses, slated to begin in the Fall of 2018, will emphasize the impact of blockchain technology beyond cryptocurrency and help students understand the role cybersecurity plays in the evolution of blockchain technology.



Adrian Gheorghe

Kevin Muchiri receives the 2017 Shining Star award

By Keith Pierce

For Kevin Muchiri, a Ph.D. student in Engineering Management and Systems Engineering, as well as a research and teaching assistant, receiving Old Dominion University's "Shining Star" award, was not about him, but rather the very students that nominated him for the award. Only students can nominate a faculty member for the award, which is presented each semester to faculty members who demonstrate evidence of helping students succeed academically, professionally, or personally inside and outside of the classroom setting.

"The award came as sort of a surprise for me," he said. "But if we're going to talk about it or take a photo, I don't want to do it without my guys."

His "guys" are the students he advises through "The Summit," a newly formed mentoring group dedicated to supporting, advancing and inspiring Monarchs of African descent. Made up primarily of freshman engineering students, Muchiri remembers all too well, what it was like to be in their shoes.

Raised in the small border town of Busia, Kenya, Muchiri, like most international students, still remembers the exhaustive story of when he first came to ODU.

"I was standing alone in the Minneapolis-St. Paul airport," Muchiri recalls. "I had just missed my connecting flight to Norfolk and I thought I had lost my luggage, too. I had a backpack that contained, among other things, my Bible, notebook and a packet of digestive biscuits. I was still converting prices in my head, counting my shillings to dollars. I thought to myself - what am I doing? I remember reading a verse in my Bible then and thinking I was like Jeremiah - following God through the wilderness. But I knew I was making a big (and wise) investment to come to ODU. I knew I had to write this moment down and not forget it."



Muchiri sits with his mentoring group, "The Summit." Front row (left to right): Gokbet Owusu, Marcel Green, Michael Asante, Kevin Muchiri, Chris Spellman, Samuel Osunlakin. Middle Row (left to right): Darryl Owusu, Zephaniah Amonoo-Harrison, Obed Acheampong, Muizz Omotosho, Ruben Artis. Back row (left to right): Moy Joseph, Maxwell Kusi, Ben Tutu, Amadu Koroma, Adeniyi Adeniran

Perseverance and motivation paid off for Muchiri as he became the first international student to serve as the student representative to the ODU Board of Visitors, as well as a student representative to the State Council of Higher Education for Virginia (SCHEV).

In 2013, he graduated Summa Cum Laude with a Master of Engineering Management. Between his time as a BOV rep and his time serving as a senator in the ODU Student Government Association, Muchiri collaborated to improve several issues on campus, including undergraduate advising and campus safety. He attributes his motivation to his father, a small town hotel entrepreneur, who raised him to believe that, "instead of complaining about a situation, try to find solutions."

Fast forward to 2017 and Muchiri is still living by that code. Despite his demanding schedule, he finds time to help students facing what he experienced as a new engineering student in a new country.

"Monitoring the growth of the over fifty students that I've mentored, I notice that the needs of students, particularly male students of African descent, are not

restricted to academics," he said. "Many of them deal with adjustment issues, family issues, peer pressure, relationships, communication challenges, a lack of self-confidence and academic intimidation; most of which I could relate to during my time as an undergraduate student."

While volunteering with the ODU Engineering Dean's Ambassadors, it became clear to Muchiri that mentoring students in the STEM-H field, (science, technology, engineering, math and health), would be of great value to the University.

"Working with these guys has afforded me the opportunity to witness interesting trends in student engagement and it occurs to me that a group of students who are organized and empowered have the potential and the capability to change the world for the better."

The Summit program goals include encouraging responsibility, engagement and pride, as well as creating opportunities for students to engage in conversations with peers and faculty about academic success and professionalism.

Mind-controlled robots are beginning to walk the walk and talk the talk

Brain-computer-interface technology on the move in ODU's vision lab

By Keith Pierce

The idea of having robots that can walk for people who have lost limbs or talk for people who have lost the ability to speak may seem cool or futuristic to some, but to programmers, it could seem like a coding nightmare. Or is it? Normally, before a robot can do what we want, we have to program it to understand our language or to respond to specific commands. But what if the programming took nothing more than a thought, where a robot would actually say or do whatever we are thinking?

A team of electrical computer engineers from Old Dominion University's Vision Lab is working with technology that does just that.

"The way the technology works is that there is a screen in front of a patient which shows flashing lights over a series of commands," explained electrical and computer engineering Ph.D. student, Alex Glandon. "When a person wearing an EEG cap concentrates on the command visually, without moving, we pick up brain waves that are correlated to what signal they're concentrating on, and this allows someone who can't move to control a robot."

Brain-computer interface (BCI), only one of several ongoing projects in the vision lab, relies on the brain to generate certain types of signals that are interpreted by computers. Using an electroencephalogram, or EEG cap, to capture the brain's reaction to visual cues with luminous flash, the computer wirelessly transmits the brain signals to autonomous systems. The systems the team uses are not new. They are automated

systems, such as the multi-function agile remote-controlled robot (MARCbot), commonly used by the military for the inspection of suspicious objects, and NAO, a popular autonomous, programmable humanoid robot. Both have been on the market for several years. However, BCI is an emerging technology that is enabling these devices to do everything from help a person who is unable to speak call 9-1-1, enter a potential danger zone for a soldier, or help an immobile individual with day-to-day tasks, using only their thoughts.

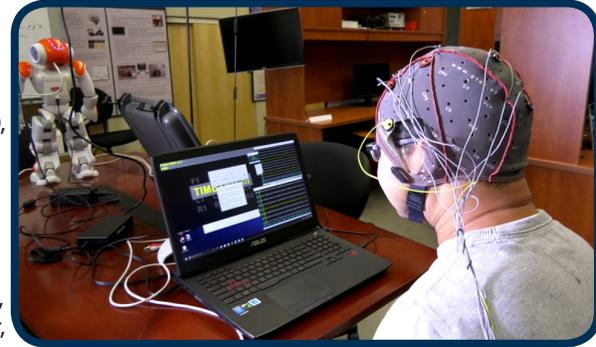
"With this technology, if someone doesn't have the ability to speak on their own, they can think and the NAO robot can actually talk for them," said Caroline Kuzio, a junior majoring in computer engineering. "It's exciting to be working on something that has so many different applications that can be helpful to so many people."

Last year, Facebook revealed that they have a team of 60 engineers working on the technology to allow anyone to use their social media platforms, regardless of physical limitations. Recently the technology attracted the attention of high-ranking military leaders, representing more than 60 countries, at a NATO conference held in downtown Norfolk.

"NATO could actually see the use of both of these robots, MARCbot and NAO, in many different applications relevant to their needs," said Khan Iftekharuddin, Ph.D., associate dean for research in the Batten College of Engineering and Technology. "NATO has been engaging with us at ODU for quite some time, with other projects and through other faculty members. It offers our students a unique advantage to work on projects with immediate, real-world applications."

In everything from facial recognition to self-driving cars, this technology, which is designed to be an "extension of us," will soon be our new norm, according to Iftekharuddin.

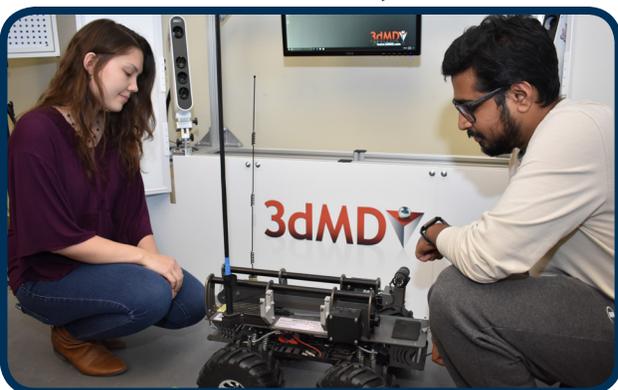
Graduate student, Megan Witherow and Ph.D. student, Mahbubul Alam, examine the MARCbot



Wearing an EEG cap, Ph.D. student, Linmin Pei, sends brain signals to NAO robot

"As a university, to stay in the game, we have to stay ahead of this technology," he said. "That's why we've been developing many different methods, algorithms and techniques to drive these robots to do different things, including facial recognition and responding to written commands."

Iftekharuddin, who routinely meets with colleagues and serves on several review panels, nationally and internationally to discuss emerging technology, speaks highly of the students in the vision lab. "I can say with a great deal of confidence that the work we do here is cutting edge and comparable, if not better in some respects, than any of the big-name engineering schools," he said. "The students in this lab are top-notch and could go anywhere they want, but they choose to be here, and for good reason."



www.ODU.edu/eng

The **illuminator** is a publication of the Batten College of Engineering & Technology

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