CTC

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National
Convergence
Technology Center
www.ConnectedTech.org
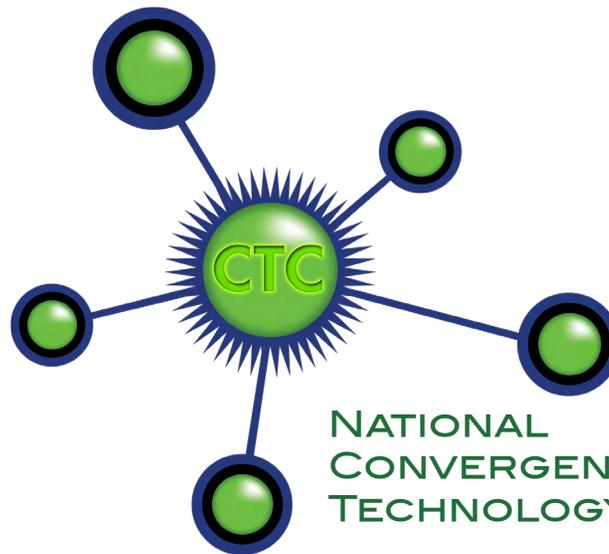
National
Convergence
Technology Center

The National Convergence Technology Center of Excellence (CTC) – funded by a grant from the National Science Foundation – focuses on business-led Information Technology (IT)/Communications/Cybersecurity curriculum, faculty professional development, recruitment and retention of under-served populations, and dissemenation of best practices and resources to high schools, colleges, and universities across the nation. Everything we do has the common goal of supporting students to become highly-sought-after IT workers.

We believe the cornerstone to any successful workforce program is a close relationship between educators and businesses. Aligning curriculum outcomes with the skills businesses demand is essential to ensuring students are readily employable upon graduation. For over 13 years, the CTC has been co-led by our Business and Industry Leadership Team (BILT) with over 40 active members from companies such as Cisco, Comerica Bank, Dell, Le-Vel, EMC, HP, Juniper, NetApp, Philips Healthcare, Texas Instruments, and VMware. The BILT co-owns and co-leads all our work.

Our strategies and successes over the years were co-developed by the BILT and our educational grant partners including current partners El Centro College, Lone Star College and The University of North Texas (TX); Florida State College Jacksonville (FL); Fox Valley Technical College (WI); Georgia Southern University (GA); Lansing Community College (MI); and Sinclair Community College (OH). We also work integrally with institutions that form our "Convergence College Network" (CCN) Community of Practice to share best practices and support each other. In this grant the CCN will grow from 60 member schools to 90 as more high schools and universities are added. We're also indebted to the ongoing generous support of our host institution, Collin College, one of the most successful and forward-thinking community colleges in the country.

It's been a dramatic journey that's seen the IT industry bubbles and busts, the decline of traditional telephony and rise of VoIP and wireless networking, and now the emerging transformational boom of cloud-based innovations and the "Internet of Things." Through it all, the CTC has remained committed to giving faculty and students the cutting-edge skills they need to get and keep a high-wage career with expansive future potential. This booklet showcases the CTC's robust resources and successful programs. We hope you'll enjoy learning more about our efforts to prepare students for the high-wage, ever-changing IT workforce and will want to join us in building the future IT workforce.

Sincerely,
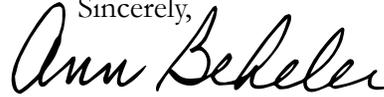
Ann Beheler, PhD
Principal Investigator

Clockwise from Top: Faculty training at Working Connections; students helping each other in an IT classroom; a standard Cisco rack from a CTC Partner college
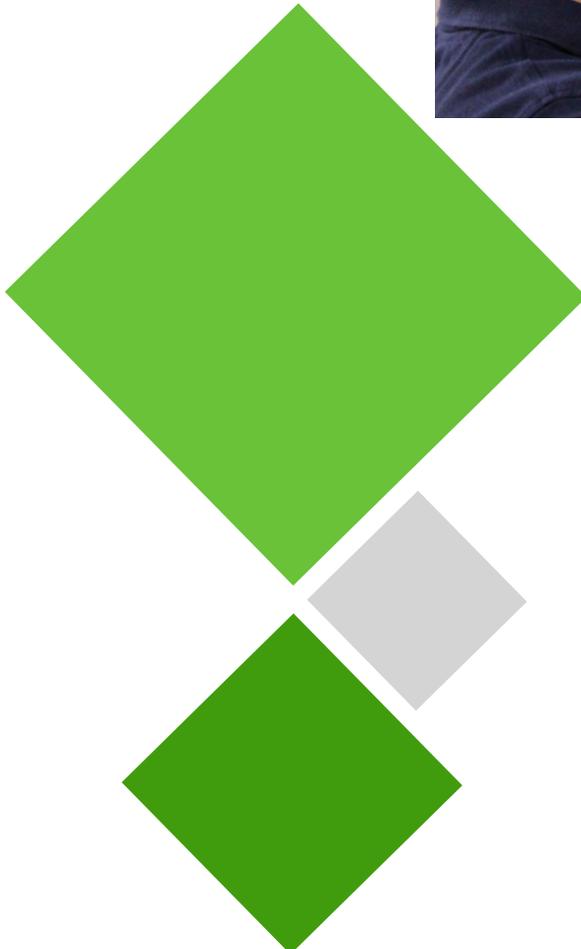
The **National Convergence Technology Center** (CTC) helps colleges meet the fast-growing demand from business and industry seeking IT specialists (mobile networks, edge computing, private/public cloud computing, "Internet of Things," mobile device integration, storage and network virtualization, video and voice integration, all over a secure network) by:

- Actively engaging a **Business and Industry Leadership Team (BILT)** to identify needed skills, which inform curriculum updates nationally;

- Invigorating faculty to teach emerging technologies through in-depth **professional development**;

- Providing **virtual lab** capability for students to reduce costs and increase availability;

- Implementing best practices for **recruiting, retaining and graduating underserved students**;

- Using **stackable certificates and articulation agreements** to increase the number of students completing certificates and degrees;

- Supporting high schools, colleges, and universities nationally through the "**Convergence College Network**" (CCN) Community of Practice (CoP) whereby 60 — soon to be 90 — members share their expertise with one another to improve their IT programs; and

- **Disseminating materials and processes** developed during the grant period via websites, conference presentations, social media and white papers.

National Convergence Technology Center at Collin College in Frisco, TX

Convergence technology as originally covered by our program includes voice, video, data and image transported over a secure network. Small, medium and large businesses hire our students for jobs that range from call center support and networking security specialists to systems administration and information security analysts.

Technology included in the convergence program has broadened as the industry has expanded. Desktop computers and hardware connected to networks – and the applications used by those devices that communicate through the network – have always been a part of convergence curriculum. But now convergence programs must also teach students how cell phones, tablets and laptops communicate wirelessly over networks and how "Bring Your Own Device" policies impact security concerns. Other industry trends have similarly affected convergence curriculum, most notably, the explosion of data that must be stored and accessed by businesses, which has led to courses that address cloud computing, cybersecurity, information storage, virtualization, programming, and the "Internet of Things."
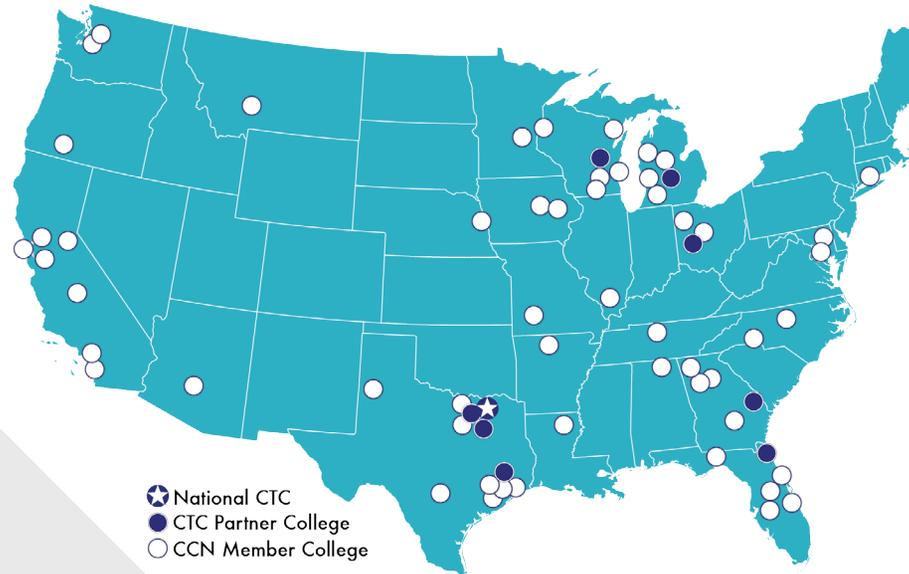
Business leaders who work with the CTC provide essential insight on the emerging technologies that new graduates should know, which allows the CTC to help schools adapt curriculum to prepare students for evolving business needs. The CTC has developed and implemented shareable models for processes such as the "Convergence College Network," Working Connections faculty professional development and Business and Industry Leadership Team engagement strategies that have been adopted by other projects and disciplines.

☆ National CTC
● CTC Partner College
○ CCN Member College

The "Convergence College Network" (CCN) is a select cohort of institutions from across the country that connects IT educators with resources to enhance their programs.

Any nonprofit, public school in the United States that offers an IT degree and certificate program – and/or is considering offering one – can join the CCN. There is no membership fee. Instead, CCN member schools receive benefits based on their unique level of engagement and participation. CCN member colleges wishing to receive the maximum benefits of Level 1 invest more time and energy in the program.

But this investment pays dividends beyond just what the CCN provides. Engaging local business leaders creates relationships that can lead to internships, equipment donations, and student mentoring.

Joining quarterly CCN conference calls builds networks with other IT faculty that strengthen programs by sharing resources and best practices. Attending professional development events helps upgrade faculty and curriculum to ensure students are better prepared for the workforce. Validating the National BILT's job skills with each local CCN school's business and industry leaders helps those institutions align curriculum with hiring needs so students are highly employable.

GROWTH and OUTREACH
of the CTC
January 2017
branches show mentor relationships

Working Connections events offer cutting-edge, cost-effective, professional development to community college IT faculty that is often only available through expensive commercial training. These events make the newest technologies and industry trends available to attendees. Working Connections also encourages the kind of networking and collaboration among educational and business leaders that can strengthen any IT educational program.

"It's really important because information technology, the turnover of knowledge, the turnover of the technology, are very rapid, and unless the faculty is kept up to date, then the students will not be able to learn the latest technologies."

Keith Libert, Polk State College

"The training program offered by Working Connections has been tremendous for us. Our faculty has been able to receive training that we may not have otherwise received." Nisheeth Agrawal, Calhoun Community College

Working Connections training workshops — typically offered for five days in June or July and three days in December — provide several concurrent tracks that cover a range of the most in-demand topics in IT, from A+ to Wireshark to VMware.

Attendees spend the entire week learning about a single topic in a hands-on, in-depth environment. The goal is to provide faculty attendees with the expertise needed to teach a new topic either as a stand-alone course or as supplemental information to an existing course.
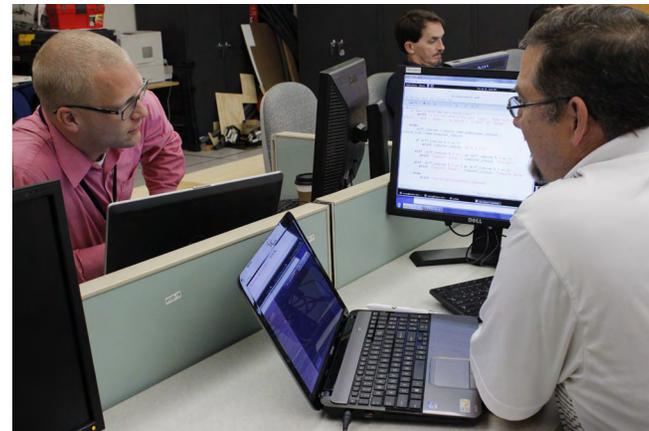
faculty at a Working Connections event

"Beyond the technical elements, these events provide great networking opportunities for our faculty to exchange ideas with faculty from across the country. This has been an extremely valuable benefit to us!"

Kim Ehlert, Waukesha County Technical College

"This week of isolation from my normal duties and typical life has allowed me to dedicate myself to learning new technologies... and grow tremendously in my field. I feel invigorated and excited about IT. Thank you for implementing such an enriching program to develop faculty knowledge to improve student learning."

Nghi Dao, Eastern Gateway Community College

★ represents colleges that have attended at least one Working Connections

Working Connections
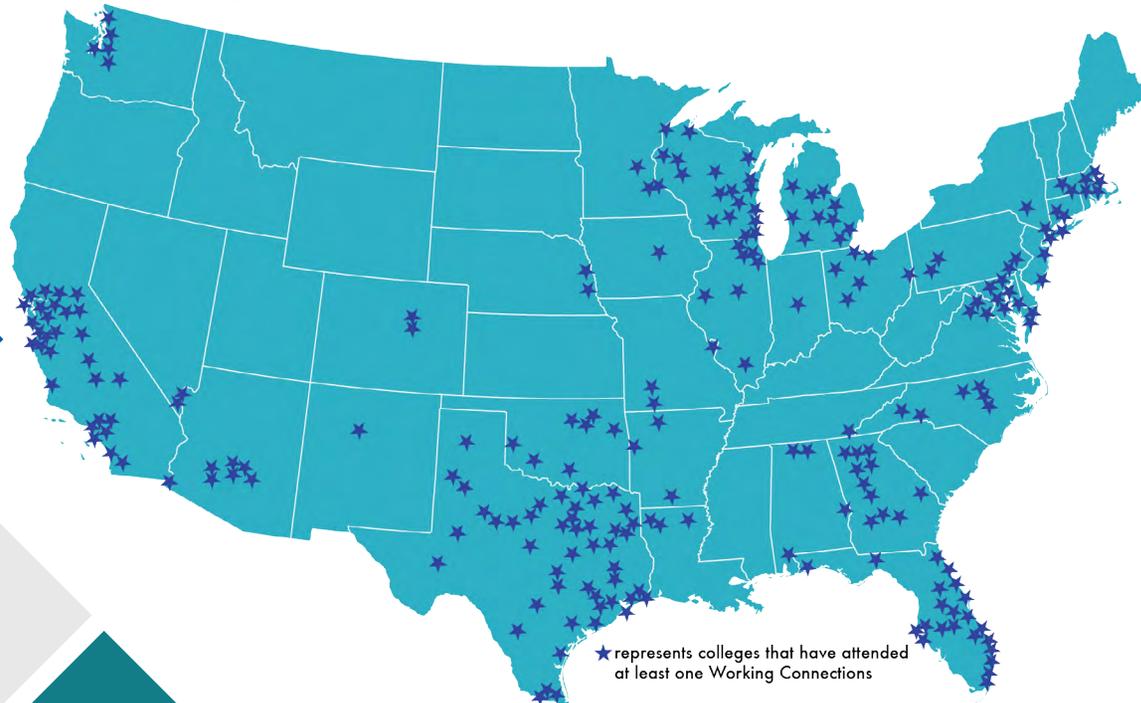
The National Convergence Technology Center's **Business & Industry Leadership Team** (BILT) meets quarterly to provide insight into employer workforce needs. The BILT consists of executives and technicians, from both large corporations and small companies, who understand the current state of the IT industry nationally and what skills will make graduates employable 12-36 months in the future. Keeping curriculum current with demands from the business world is obviously one of the best ways to get students jobs.

While many schools rely on "advisory boards" to guide curriculum development, too often those groups take a back seat to the decision-making. Not only do some traditional advisory boards meet just once a year, but some can even turn into a passive "rubber stamp" committee that simply agrees to whatever curriculum the faculty proposes. CTC-style BILTs are different in that it's the BILT steering the curriculum, not faculty. An active and engaged BILT provides value for everyone.

Matt Glover, Ann Beheler and Glenn Wintrich

For faculty, building relationships with local business leaders ensures their classroom content is current and relevant; creates opportunities for student internships; provides an avenue for guest speakers; and, most importantly, develops pathways to employment for students. Students benefit when businesses and industries know a school's program.

For the businesses, participating in the BILT and building relationships with local high schools, community colleges, and universities creates a pipeline of skilled future employees; provides access to a unique forum to share trends and ideas with other business leaders in a neutral, non-proprietary environment; and generates goodwill by demonstrating a commitment to the region's workforce needs.

The National CTC provides support to "Convergence College Network" (CCN) members looking to develop or strengthen a local BILT. This assistance ranges from delivering best practice documents, to traveling to the school, to providing on-site management of a BILT meeting.

The National CTC provides a slate of comprehensive program support tools to help two-year IT programs and prepare graduates for the workforce and to transfer into a four-year university. During this grant, several new "regional hubs" will be developed to better connect high schools, community colleges, and universities' faculty with business leaders to pursue possible 2+2+2 curriculum in support of the expanded networking expertise that will soon be demanded of entry-level IT workers.

Curriculum
The National CTC offers IT-related curriculum and classroom tools for a number of subjects, which can help faculty get content into the classroom as quickly as possible. Topics include IoT, SDN, XaaS and changes in wireless, among others.

Virtual Labs
The National CTC hosts a virtual lab environment where students can interact with real hardware through virtual machines, much as IT professionals do in the real world, 24 hours a day, seven days a week from anywhere with an internet connection. Many labs are available from major vendors like Cisco and EMC, while others provide more general content including Linux and Security+.

Virtual Lab equipment at Collin College

Virtual Internship Class
The National CTC developed a unique virtual internship capstone class that features an industry executive who mentors a group of students in a single real-world project over the course of a semester. This includes regular meetings conducted via webinar and a final workshop in which students present their IT solution to a panel of industry experts. The virtual internship experience provides not only an immersion in business culture, time management and teamwork, but also invaluable networking opportunities with industry executives.

Bachelor of Arts in Information Technology
In conjunction with the University of North Texas, the National CTC helped design a progression for technical students who complete the requirements for a CTC-led IT degree at a two-year community college, then transfer to a four-year university to complete a BA-IT degree. This degree demands fewer math and science requirements than a traditional Computer Science degree, which allows more room for the transfer of workforce-type IT courses from community colleges. The program provides considerable flexibility for students, who pursue a baccalaureate either full-time or part-time. In addition, parents often support a child's decision to enter community college if there is a clear four-year pathway opportunity like this. The program has received full accreditation by the Accreditation Board for Engineering and Technology through 2022.

Webinars
The National CTC hosts several free interactive webinars on various topics such as "recruiting and retaining underserved populations." These are open to anyone able to join remotely and typically last one hour.

Best Practices
The National CTC is also committed to sharing informational documents and videos with both the CCN and the larger educational community. This content is free and includes best practice instructions on such topics as how to form a BILT, help lead a job skills analysis, host a successful professional development event and prepare students for job interviews.

Kyle Taylor

was always the computer kid in his house. In high school, he got interested in Cisco programs and networking in a class that was discussing how viruses are transmitted over WiFi. Kyle ended up at the University of North Texas getting into engineering and IT. With a friend, he built an app for a senior design project in a capstone course that provided real-time tracking of Denton Country Transportation Authority Trains, connecting to driver phones for location updates. The app lets customers know the trains' actual positions and ETAs. Kyle and his friend took that project, submitted a white paper to a government agency, attended a conference and got their paper published. He now works as a senior web developer with future plans of starting his own company.

Olivia Hughes

did not have a background in computers before beginning at the University of North Texas as a material science major. After attending a Society of Women Engineers meeting and hearing from a woman who was a Business Systems Analyst, Olivia made the switch to IT. Later, as the president of a cybersecurity group, she grew the membership from 20 to over 70. Through the club, Olivia was recruited by a major financial company and had a job waiting for her when she graduated with her bachelor's degree.

Students enter IT programs from a variety of backgrounds: recent high school graduates, employees working in the IT field who need to freshen their skills and mid-life career changers who want to move into a robust industry and earn higher pay.

IT programs can meet all these needs with options including stackable certificates, which allow students to gain credentials while completing a degree; stand-alone certificates and associate's degrees, which can transfer into a bachelor's degree program such as the Bachelor of Arts in Information Technology degree at the University of North Texas.

Students use the marketable skills they have earned, along with a portfolio of work, to gain employment to help them pay for a four-year degree, or they can choose to complete a certificate or degree to secure a job as an end result.

Tim Savala always loved computers and technology. He earned a bachelor's degree in information systems and quickly found work repairing computer equipment. These were good jobs, but he wanted more because he didn't think he was reaching his full potential. Working at a local public school district, Tim gained experience configuring a network of hardware devices and discovered he liked it. Deciding to be an engineer to see how devices interact, Tim pursued further education in networking and enrolled at El Centro College's Cisco Certified Networking Associate/Cisco Certified Networking Professional program. Within a year, Tim had the certifications he needed to land a high-paying system engineer job for a business solutions company and is no longer repairing computers.

Chelsea Bray had long dreamed of being an art teacher, but at her father's insistence, she enrolled in a single networking class at Collin College. She walked in expecting to hate it, but instead loved it. While two of the other women in her class dropped out and her classmates complained, Chelsea thrived. As she practiced hands-on IT problem solving, she realized IT isn't about sitting at a cubicle all day. Chelsea started spending more time in the computer lab after hours to practice on the equipment. Before starting her second year in the program, Chelsea got a job at a leading control/automation systems company. She is now pursuing her bachelor's in IT and is a Senior Network Engineer at a finance company making a salary in the upper five-figures.

Jason Huebner built a career in the IT industry, working a variety of support jobs. When the company he was working for shut down, however, he realized he'd gotten as far as possible in IT without formal education and industry certification. The pull of a larger salary in IT helped him decide to go back to school. After graduating from the Network Specialist program at Waukesha County Technical College with his CCNA, Jason got a job at the college filling in for an IT administrator on leave. Now he manages the school's isolated classroom network system for the IT program.

Jorge Alvarado worked for twenty years in the telecommunications industry in Mexico. He liked to look ahead and anticipate industry trends and soon realized there were more opportunities for him in cybersecurity. Not only would that field command a greater salary, but it would also put him on the cutting-edge of a whole new industry. After augmenting his work experience with a certificate in cybersecurity from Collin College, Jorge now works as an independent consultant advising American businesses looking to enter Mexico. For Jorge, cybersecurity's biggest appeal is its international, global scope.

Connect with Us!

Connect with the National Convergence Technology Center, as well as other convergence faculty, students and business leaders on our blog and social media networks! What you'll find:

- Discussions on emerging technology trends

- Details for upcoming training workshops and conferences

- Unique case studies of innovative IT and academic programs

- Advice and guidance on program building and growth strategies

- National BILT working with regional BILT

- New educational tools and techniques such as virtual labs and stackable certificates

- Job market analysis and outlooks

- Profiles, interviews and testimonials from students, faculty and business leaders

- News and updates about our IT program across the nation

- Interesting articles and stories from tech news sources on the web

National Convergence Technology Center Staff

Ann Beheler, Principal Investigator
abeheler@collin.edu • 972.377.1649 • cell 972.897.8344

Mark Dempsey, Assistant Director
mdempsey@collin.edu • 972.377.1582

Debbie Miller, Reporting Manager
dmiller@collin.edu • 972.377.1564

Tricia Conner, Web Communications Editor
tconner@collin.edu • 469.365.1815

Amy Garrison, Administrative Assistant
amygarrison@collin.edu • 469.377.1734

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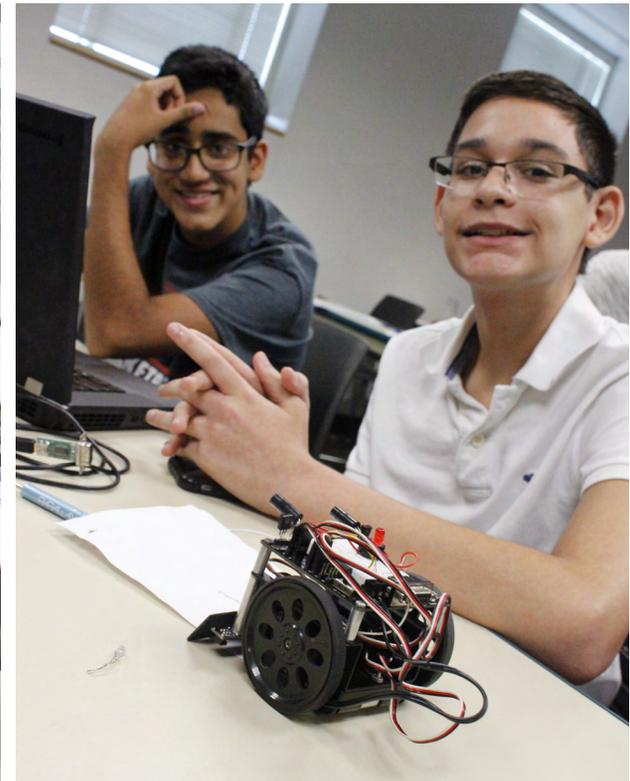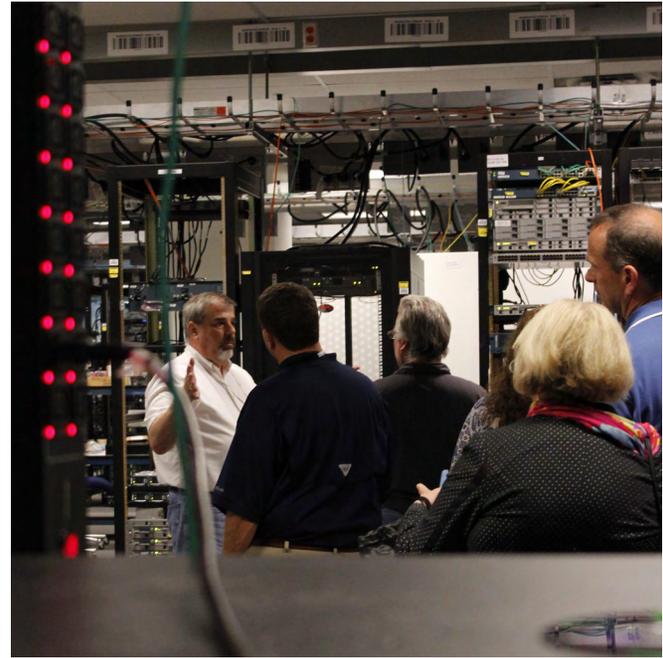
Clockwise from Top: student participant sharing experience at a National Visiting Committee meeting; touring CISCO facility; students at a summer robot/app camp ; instructor at a Working Connections faculty training track