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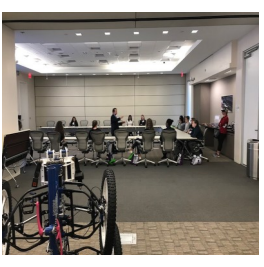
A monthly newsletter brought to you by the MTSU Department of Engineering Technology

VOL. 1, ISSUE 1 4.1.2018

EVP and DigiGirlz



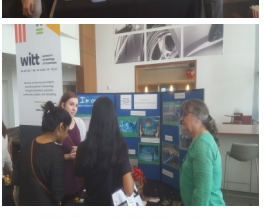
Digigirlz is an annual event to encourage and support STEM education and careers to female high schools students. The event is sponsored by Microsoft, Nissan, and MTSU. Sponsors provided workshops.

MTSU was well represented by our Engineering Technology Department and the Experimental Vehicle Program and their sponsor, Dr. Saeed Foroudastan. Two of our student team members, Kelly Maynard and Dayana Edison, along with other engineering students and professionals served on a discussion panel for the approximately 80 attendees. They shared their experiences and answered questions for the audience.

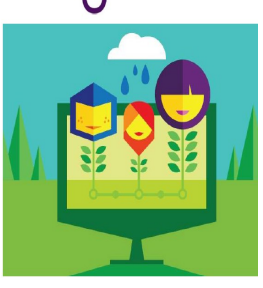
After this, we hosted four separate hands-on workshops where students had the opportunity to ride one of our previous year Rover entries (2013) and watch a YouTube assembly animation. The students then built their own small scale Rover vehicle models.

Our participation was arranged and coordinated by Melissa Flowers.

DigiGirlz Career Fair



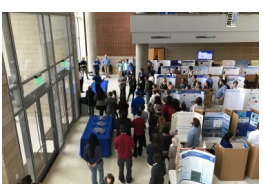
DigiGirlz



Dr. Kathy Mathis, Dr. Saleh Sbenaty, and a senior Electromechanical Engineering Technology major, Ms. Catherine Chunn, participated in the DigiGirlz Career Fair at Nissan Headquarters in Franklin, TN on Saturday March 17, 2018. They answered inquiries from high school girls about the Mechatronics Engineering, Engineering Technology, and Environmental Sustainability programs at MTSU. Ms. Chunn demonstrated her Pac-Man microcontroller interfacing project and a Boe-Bot robot that she designed and built. An SME Sumo Robot that was built by our department students was on display as well. Over 125 high school female students attended the annual event. Our participation in this, and other similar programs, is designed to increase enrollment of female students in our department.

DigiGirlz Day is designed to provide high school girls with a better understanding of what a career in technology is all about. Microsoft's DigiGirlz team in partnership with Nissan & MTSU WISTEM hosted the DigiGirlz Day, a free one-day event at the Nissan Americas Bldg. in Franklin TN. Students interacted with Microsoft, Nissan & MTSU WISTEM Center employees to learn about careers in the tech industry. Students also inquired about STEM programs from area colleges in a college fair setting.

CBAS Scholars Day



CBAS Scholars Day included a college-wide poster session located in the atrium of the Science Building on March 20. Engineering Technology Department had the second largest number of posters in this event (18 posters). Special thanks to Dr. Charles Perry, faculty participants, students, and Experimental Vehicle Program.

Helping STEM Fields Grow

As interest grows in STEM fields, students are being introduced to technical concepts at a younger age. At Rocky Fork Middle School in Smyrna, TN, there are students with an interest in STEM and a teacher to help drive them towards the knowledge they desire. Bobbie Jo Meredith, an alumni of MTSU and a member of the Department of Engineering Technology's Industry Advisory Board, dedicates her time to teaching the next generation of engineers at Rocky Fork Middle School. To help introduce new ideas and enhance the understanding of certain concepts, Dr. Saeed Foroudastan requested that Christopher Winfrey develop a presentation about solar energy and visit the class to share his knowledge and experience. Mr. Winfrey, a current graduate student majoring in Engineering Management and graduate assistant for the Experimental Vehicles Program (EVP), visited the middle school and presented information to the students regarding solar energy and how it relates to the Solar Boat. Certain students in the STEM classes at Rocky Fork place their focus on solar powered vehicles, and while their projects are not on as large of a scale as the vehicles produced by the EVP, the ideas presented by Mr. Winfrey offer knowledge that can benefit these students' projects in the future.

Human Exploration Rover Challenge:
Hands-on Design, Engineering, and Innovation

Each spring, engineering and technology students from around the world gather in Huntsville, Alabama, to participate in the Human Exploration Rover Challenge, a competition hosted by NASA's Marshall Space Flight Center. The goal is for college, university, and high school teams to design, build and race a human powered rover through an obstacle course of rocks, hills and sand to simulate an exoplanet landscape. This year's competition Technology Challenge Award will concentrate on wheel design and fabrication.

As MSFC Engineers are currently developing advanced manufacturing techniques such as 3D printing to build rocket nozzles, this year the MTSU EVP Rover Team will debut a new wheel design built utilizing 3D printing technology. The design will feature carbon fiber rim segments attached to spokes machined from ultra high molecular weight (UHMW) polyethylene. Comparing this wheel design to a previous wheel machined from aluminum, the weight is reduced from 29.5 lbs. to 9.9 lbs.

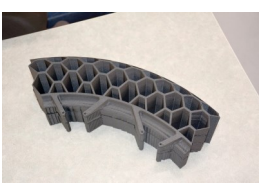
Carbon fiber offers many advantages, but unfortunately it is an expensive material and requires specialized 3D printing equipment. Engineering Technology has benefited from many industry partnerships and this project is no exception. Local business owner and MTSU alumnus Jimmy Davis and his company, The Davis Groupe, graciously provided use of the company's carbon fiber printing equipment to fabricate the rim segments.

MTSU ET student Andrew Ansley, who is both a rover team member and intern at the Davis Groupe, coordinated the printing of the wheel components. 3D printing is inherently a long process, and the original design for a wheel segment required eight days to print. However, Andrew and team leader Tony Cheatham were able to optimize the design and reduced the print time for each segment down to two days, twenty-two hours.

As weight was a critical factor on the Apollo era lunar rovers, the rover competition fosters innovation and the opportunity for engineering and technology students to develop vehicles that are light weight, since two riders must also provide the vehicle propulsion through a system of pedals, chains and sprockets. Each year the MTSU team, under the guidance of faculty advisor Dr. Saeed Foroudastan, make continual improvements to its current vehicle as well as engineering development on a new vehicle. In addition to weight reduction, major goals for this year's vehicles were also reducing the number of components and fabrication time.

The Human Exploration Rover Challenge will be held April 13-14 at the US Space and Rocket Center. 2018 marks the 15th year that MTSU's Engineering Technology Department and its Experimental Vehicles Program have competed in this competition. Further information can be found online at https://www.nasa.gov/roverchallenge/home/index.html.

EVP Rover Team leader Tony Cheatham is shown with a completed wheel assembly. The wheel features a rubber tread, carbon fiber rim, UHMW polyethylene spokes and an aluminum hub. This wheel is approximately 1/3 the weight of previous wheel designs.



Close-up of the carbon fiber rim segment. Since the wheel rim is comprised of six separate segments, damaged rim segments can be easily removed and replaced.

Rover Team members Andrew Ansley, Mathilde French, and Catherine Chunn are shown are discussing the wheel design. To foster innovation and engineering design, the rover competition only permits the hubs to contain commercially available bearings or bushings – all outer wheel components (spokes, rim, tread) must be designed and fabricated by the rover team.

MTSU Department of Engineering Technology
1301 East Main Street, Box 19, Murfreesboro, TN 37132
(615) 898-2776