CENTRAL CONNECTICUT STATE UNIVERSITY

INFOTECH

SCHOOL OF ENGINEERING & TECHNOLOGY NEWSLETTER

Civil Engineering – The First Graduating Class

May 2012 saw the first class of students graduate from CCSU's new Civil Engineering Program - All students graduating must complete a two-semester senior design project. The project must include a design team and projects that fulfill current needs are encouraged. For the Fall 2011 – Spring 2012 semesters, students and faculty, **Dr. Clifford Anderson** and **Dr. Bin (Brenda) Zhou**, selected the following four design projects.

Gildersleeve Elementary School Athletic Fields in Portland, CT

Civil Engineering students **Kevin Larose**, **David Nourse IV**, and **Geoffrey Sandberg** are designing improvements to softball and soccer fields at Gildersleeve Elementary School in Portland, CT. In order to solve a drainage problem at the back field of the school, the student team took soil samples of the field and determined the soil gradation, density, permeability and type of soil. The soil information will be combined with hydrologic data to determine why the site is not draining properly. The team used CCSU's surveying equipment to measure the field and an adjacent swampy area, and created a topographic map of the field. During their surveys, the team also took two different groups of elementary school classes outside to show them how the equipment worked. They provided a brief lesson on surveying. A final determination of drainage solutions is not yet completed, but a curtain drain is being considered. Curtain drains are essentially trenches filled with gravel covering perforated pipe which act like an underground gutter.

Redesign of Veterans Memorial Bridge in New Milford, CT

Civil Engineering students **Dominic Antonio**, **Gregory Funk**, **Megan Semenetz**, and **Sarah Soucy** formed a project team to design a replacement bridge for the Veterans Memorial Bridge in New Milford, CT. The existing 330 foot long truss bridge carries route 202 traffic over the Housatonic River. The current bridge is below the 100 year flood line, meaning that a storm having a 1% chance of occurring in any year would flood the bridge. Flood water and river debris could damage the bridge and adjacent property. A proposed replacement bridge will be wider than the existing bridge to accommodate four lanes of traffic and reduce the traffic backup that occurs on Route 202. The team designed two bridge alternatives: one a three span bridge with piers at the edge of the river, and a single span continuous truss similar to the existing bridge. The students are utilizing their skills in surveying, hydraulic analysis, structural analysis, traffic analysis and roadway alignment to bring their project to completion.

Town Hall Addition in Killingworth, CT

Civil Engineering students **Sabrina Pace** and **Xiaoxue Peng** are performing a structural design for a proposed Killingworth Town Hall addition. Currently, the building consists of a 2,000 square foot wood structure that was a farmhouse in 1847, and a 3,000 square foot modular addition. The modular portion of the building has reached the end of its useful life and is beginning to fail, according to the town building department.

Civil Engineering continued on page 5

SPRING 2012
vol. 21 no. 1

editor:
Nancy Kraczkowsky, School of Engineering & Technology, Associate Dean

design/layout:
Nana Poku, CEGT Department, Faculty

CCSU is a University of the Connecticut State University system and an AA/EO institution.

DEANS' CORNER - Bringing STEM to New Britain's young students

By **Dr. Zdzislaw B. Kremens**, Dean, CCSU School of Engineering & Technology

Left to Right:
Board President of the B&G Club Paul D'Addabbo, Todd Czuprinski and Dr. Zdzislaw B. Kremens

Only 15 % of high school graduates in the U.S. – an astoundingly low number – have the grades and coursework to apply to university engineering programs. Just as troubling is just 5% of them are pursuing undergraduate degrees in either the sciences or engineering. Those numbers explain why active recruitment and college preparation efforts have to start much earlier in our schools. We cannot wait until the junior or senior year in high school.

During the last decade, enrollment at the School of Engineering and Technology (SET) at Central Connecticut State University (CCSU) has increased over 250%. We attribute much of that substantial growth to our proactive recruitment in Connecticut's middle and high schools, in addition to our outreach programs to stimulate and encourage student interest in the sciences, technology, engineering and mathematics – the STEM areas. The most visible of our efforts are three annual statewide robotics competitions.

In 2009, we crafted a strategy to reach out to New Britain students with a newly developed summer program called "Young Engineers." This distinctive program, designed for middle school students, was funded by us and coordinated by the school district and CCSU's Institute of Technology and Business Development. Associate Professor **David Sianez** designed and taught the engaging, hands-on activities and experiments to more than 30 middle school students. By all accounts, the program was a success. Though we were facing serious financial constraints, we were compelled to fund the program again in 2010.

That year, Sianez developed motivating engineering activities which included the VEX Robotics projects. The "Young Engineers" loved these activities, and their excitement signaled a need for something more than just a summer program.

Taking our strategy to a new level, we established and sponsored a FIRST LEGO robotics team at the New Britain Boys and Girls Club during fall 2010. A group of our Technology and Engineering Education students, supervised by Professor **Patrick Foster**, worked with the 30 club members.

This past summer the "Young Engineers" program was repeated and Associate Professor **Ravindra Thamma** designed and taught the projects and activities. To further encourage the students, the Dean's Office announced this summer that we are sponsoring an annual scholarship to support an outstanding club member who applies and is accepted into one of our school's academic programs.

In addition to our continuing efforts, New Britain high school's new STEM Academy creates an excellent conduit for talented students interested in pursuing one of those disciplines, and we look forward to developing a strategic partnership with the school.

Preparing our young students for a successful college education and career in the STEM fields takes a team effort. I have mentioned a couple of our dedicated faculty who each spent uncountable hours volunteering their time and expertise. At the annual gala of the New Britain Boys and Girls Club in September, I was honored with the prestigious President's Award for introducing the club members to the world of technology. While greatly appreciative of the recognition, many of my faculty deserve acknowledgement for their passion in creating STEM educational opportunities for New Britain's young students. Together we are responding to business and industry needs for bright college graduates who are well prepared for successful STEM careers.

CCSU Student Outreach Program with Boys and Girls Club of New Britain

With the help of students from CCSU's Technology and Engineering Education department, middle-school students at the Boys' and Girls Club of New Britain have been participating in a FIRST Lego League (FLL) robotics program.

Spring 2012 is the third semester in which students in TE 299, Practicum in Technology & Engineering Education, visit the club once or twice per week. For the members of the Boys and Girls Club in grades six through eight, FLL robotics is one of many afterschool options, including basketball and other athletic activities. Thus, the students in the program must actively elect to pursue robotics. In addition, only those middle-school students who regularly attend the robotics periods and who participate in the projects are permitted to take part.

However, TE 299 students also work with other students who are interested in working with Legos, but not in the competitive or computer-programming aspects of the activity. In some cases, these middle-school students assist in building or testing the robots. Last spring, one CCSU student mentored a group of five younger Boys and Girls Club members who were interested in using Legos to design and build architectural models.

The CCSU School of Engineering and Technology is also partnering with several organizations to pursue funding for the creation of the Program for Growth and Sustainment of Underserved FLL Teams. This program is an effort to bring First Lego League opportunities to children in Stamford, Norwalk, Bridgeport, New Britain, Waterbury, New London, Hartford, New Haven, Danbury and New London by establishing and fostering the growth of 45 new teams in these cities.

New Faculty

Dr. Shuju Wu is an Associate Professor in the Department of Computer Electronics and Graphics Technology. Before joining CCSU, she was an Associate Professor of Telecommunication and Computer Networking at Southeast Missouri State University. Dr. Wu earned her Ph.D. in Information Science with concentration on Telecommunications from the University of Pittsburgh. Her current research interests include computer network architecture, Internet technologies & protocols, multicast & group communication, and distributed & P2P networking. Dr. Wu holds CCNA certification and is a member of IEEE and ASEE.

Dr. Edward (Ned) Moore joined CCSU's Department of Engineering as an Assistant Professor in August 2011. His PhD was granted by the University of Connecticut for his work in non-destructive testing. He earned his undergraduate and master's degrees from McGill University in Montreal. While an undergraduate Ned led the solar car team, and as a graduate student he worked on a robot sponsored by DARPA. Ned has industrial experience in the manufacturing and design of fuel cells. He is interested in statistical and optimization methods as applied to manufacturing.

Dr. Khaled J. Hammad received his Ph.D. degree in Mechanical Engineering from The Polytechnic Institute of New York University and did postdoctoral work with the Fluid Dynamics Group at the Pacific Northwest National Laboratory. He joined the Department of Engineering in Fall 2011. He is an active member of The American Society of Mechanical Engineers (ASME), The American Institute of Aeronautics and Astronautics (AIAA), and The American Institute of Chemical Engineers (AIChE) professional organizations. His technical expertise and research interests include Laser Diagnostics, Fluid Flow, Heat, and Mass Transfer in Single and Multiphase Systems, Non-Newtonian Fluids, and Energy Conversion Systems. Dr. Hammad is a contributing author for more than 50 journal articles and conference papers.

2011 Outstanding Alumnus - Joseph A. De Feo

Joseph A. De Feo graduated from Central Connecticut State University with a BS in Industrial Arts in 1979. He began his career as an Industrial Arts teacher at a local high school. He was Manager of Quality Programs at the Perkin Elmer Corporation prior to joining Juran in 1988. Joseph is currently the President and Executive Coach with Juran. He is recognized worldwide for his training and coaching expertise which enables organizations to achieve superior results. His varied areas of experience include: coaching executives to understand key factors in driving organization-wide transformation programs, developing and deploying breakthrough management programs like Lean and Six Sigma, and aligning an organization's Strategic Plans. He has supported executives in many industries including health care, manufacturing, consumer products, defense, financial services, government, and education.

Joseph has authored three popular professional books: *Juran's Quality Handbook, The Complete Guide to Performance Excellence, 6th Edition*, co-authored with the late Dr. Joseph M. Juran and released by McGraw-Hill in May 2010. This authoritative resource shows how to apply universal methods for delivering superior results and organizational excellence in any organization, industry, country or process. *Planning and Analysis for Enterprise Quality*, co-authored with the late Dr. Frank Gryna and Dr. Richard Chua was published in 2007 by McGraw-Hill. This university text has been used by many professors around the world. *Six Sigma Breakthrough and Beyond*, co-authored with the late Dr. William W. Barnard and published by McGraw-Hill in 2004, is a popular resource and presents a roadmap for integrating Lean and Six Sigma into the strategic and tactical framework of an organization.

As a frequent guest presenter at international conferences, Mr. De Feo is consistently rated as one of the best speakers. He has been a guest lecturer at MIT Sloan School of Management, Columbia University, Wharton School, and New York University. Joseph earned his Master of Business Administration degree from Western Connecticut State University.

Human Powered Vehicle Team

The CCSU Human Powered Vehicle Team competed in the American Society of Mechanical Engineers HPV Challenge at the Indianapolis Motor Speedway on April 29th through May 2nd 2011. The vehicle was designed and constructed from carbon fiber by seven students from multiple disciplines within the school of Engineering and Technology. This was the first side car design to compete in this annual event. The 2012 team will be racing in Grove City, Pennsylvania on April 27-29.

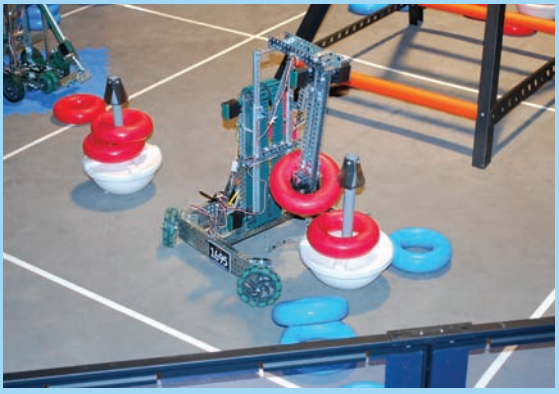
2011 BEST Robotics Competition Held at CCSU

On November 20th, 2011, 17 middle schools and high schools from the north east challenged themselves in the 6th annual national BEST (Boosting Engineering Science and Technology) robotics competition at CCSU. BEST robotics competition started in 1994, and CCSU has participated with **Dr. Ravindra Thamma** as Connecticut BEST Robotics hub director since 2006. Co-directors **Dr. Daniel Kirby** and **Dr. Haoyu Wang** are assisting him in recruiting schools, ordering materials, running kick off training and the competition. This year's theme was BUGS. The theme is based on the inadvertent discharge of genetically engineered insects from the laboratory. Teams need to use their remote controlled robots to transport at least one of each of the escaped bugs to containment centers with food to keep them alive. The bug types are flies, cockroaches and termites. Scores are based on how many insects are recovered and the containment centers they are sent to. Each team had 6 weeks to design the robot which needs to finish the job in three minutes. Teams were challenged to be innovative in robot design, operating strategy, programming and sensor applications. A kit was provided to each team free of charge. The kit of consumable and returnable materials includes everything they needed to build the robot.

About 500 students from the participating schools and their family members and supporters gathered at the competition. More and more schools from around the Northeast attend the CCSU BEST Robotics competition because it is low-cost, entertaining, and educating. We do our best to raise funds, maintain kits, and provide service to make it happen every year. All faculty, staff, and students of CCSU are invited to get involved in this outstanding volunteer opportunity, or even to attend the competition. We are looking forward to seeing you there in this year game on November 4, 2012.

VEX Robotics - CCSU Hosts State Championship

The 2012 Connecticut CTEA VEX Robotics State Championship was held on campus at CCSU on March 25th, with thirty five teams competing from New York, New Jersey, Rhode Island, Massachusetts, and Connecticut. The event was sponsored by the College of Technology – Connecticut Community Colleges, National Science Foundation, School of Engineering and Technology, and organized by the Department of Technology and Engineering Education. The VEX Robotics Competition is the largest and fastest growing middle and high school robotics program globally with more than 2,600 teams from 20 countries playing in over 200 tournaments worldwide. This was the third VEX State Championship held on the CCSU campus with dozens of volunteers committed to providing exceptional hands-on opportunities to promote Science, Technology, Engineering, and Math (STEM) activities for grades K-12 students.



Thirteenth Annual FIRST LEGO League Competition at CCSU

The students and staff of the School of Engineering and Technology at Central Connecticut State University continued their involvement in middle-school robotics activities this fall—both at the statewide level and locally in New Britain.

For the thirteenth consecutive year, the CCSU hosted over 500 Connecticut middle-school students at the Connecticut First Lego League Tournament on December 11. More than 1,000 spectators also attended. This year's theme was "Food Factor," with a focus on food safety. As always, the event was free and open to the public.

The FIRST Lego League—known as "FLL"—is a New-Hampshire-based nonprofit program which issues a Lego robotics challenge each September. In teams of ten, middle-school students have about ten weeks to address the two parts of the FLL challenge—the research project and the robot game.

For the research project, teams identify a real-life problem related to the annual challenge. Based on their research and discussions with local experts, they create a presentation outlining possible solutions to the problem. The robot game requires students to design, build, and program Lego robots to compete a series of "missions" on a 4' x 8' playing field.

The first Connecticut FLL competition was held at CCSU in 1999. Since 2005, teams have qualified for the state tournament based on their performance in local tournaments in November and early December. In 2011, more than 125 teams competed in these events, held in Berlin, Old Lyme, Shelton, Suffield, and Vernon.

Civil Engineering continued from page 1

The town office building committee has proposed a new building addition that is in a preliminary design stage conducted by the JH Architecture firm. The new building addition will have two stories and a walk out basement. Working with the architect, the team designed a steel structure; they performed structural analysis to determine the design loads, structural steel design of the major beam and column elements, and reinforced concrete structural design of foundation, retaining walls, floor slabs and footings.

Intersection Redesign in Waterbury, CT

Students **Emanuel Duarte**, **William Hall**, and **Ahmad Mattar** are designing modifications to a problem intersection in Waterbury, CT. The team is redesigning a skew T-intersection of a local road, Perkins

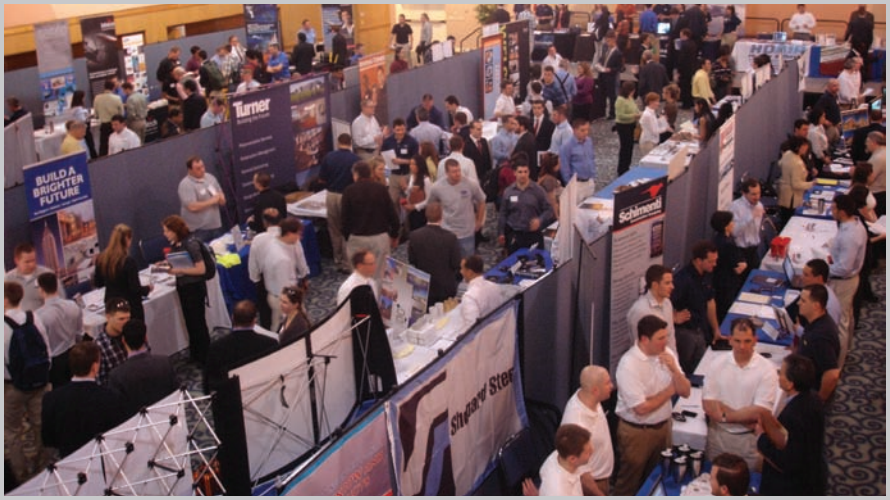
Avenue, and a collector road, Cooke Street, using the AASHTO and Conn DOT Manual. The project will decrease the probability of accidents by increasing the field of view for drivers approaching Perkins Street on Cook Street. The team is considering using a retaining wall to provide support for adjacent lands. Trees and utilities may have to be relocated from several locations. Emanuel Duarte is a Waterbury resident who drives through Perkins Street on a daily bases. After graduation he plans to continue his education and become a structural engineer. Ahmad Mattar is an East Hartford resident who found the project interesting and joined the design team. He is a transfer student from Jordan and plans to use his engineering skills to help further develop his country. William Hall is a resident of New Britain who joined the project after visiting the intersection and witnessing an accident his first time there. He plans to work on transportation engineering after graduation.

CAREER FAIRS

The Department of Engineering at CCSU hosted its first ever fall semester Engineering Career Fair on Tuesday, November 15, 2011. There were 24 employers who participated and approximately 70 engineering students in attendance. Companies in attendance included GE Aviation, Pratt & Whitney, General Dynamics, and Goodrich ISR Systems. There were also several other local mechanical, manufacturing and civil engineering firms represented. Students were able to talk with company representatives first hand to learn about job openings for internships, co-ops and permanent employment.

The event was organized by **Diane Hunter**, Career Services Coordinator for the School of Engineering and Technology and Adjunct Professor in the Department of Engineering. Participating companies were provided with display tables and copies of students' resumes. Students were provided in advance with company names and website links to prepare for the event. Students were well prepared, well dressed and made a great impression upon the company representatives.

On Tuesday, March 13, 2012 Diane Hunter also coordinated an Engineering, Manufacturing and Construction Management Career Fair. **Dr. Raymond Perreault**, Professor in the Manufacturing and Construction Management Department, also helped with the preparation of the event. The spring fair attracted 65 employers and had over 200 students in attendance. There were 26 companies in the Mechanical and Manufacturing area and 39 in the Construction Management area with about half of those also in Civil Engineering. Much positive feedback was received from employers, students and faculty.



Helicopter Flight Simulator

Students in the Engineering and Engineering Technology programs are in the process of designing and building the first fully functioning helicopter flight simulator. It is a daunting task which presents both physical and mental challenges. However, the end result will provide both students and faculty with a valuable tool for years to come. Building a helicopter flight simulator is a great opportunity for students to apply their engineering knowledge to a real world problem. To complete this project, students will have to draw upon such topics as strength of materials, machine design, flight control, and finite element analysis, all of which are core engineering classes. They will also have to learn and improve hands on skills, such as computer software, control system integration, fabrication, and welding processes.

This project is directly related to many fields in the aerospace industry. Its overall purpose is to produce a useful product. This flight simulator can be used as a tool to help train students and faculty alike on how to fly an actual helicopter. Another important design goal is for the product to be cost effective and user friendly. When CCSU hosts the NASA sponsored helicopter workshop, workshop members will be able to use this flight simulator to gain hands on experience with operating a helicopter. The NASA workshop not only benefits CCSU students, but also benefits students nationwide.

The first phase of the flight simulator project is to produce a fixed base platform design, the second phase a moving platform. Figure 1 presents an operational flight simulator with pilot control inputs mounted on a stationary platform. The first phase project was started by students and faculty in the Fall 2010 semester. Flight simulator software X-plane and Microsoft Flight Simulation were adopted and incorporated into the existing computer system to simulate helicopter flight. Figure 2 is a picture of students operating a helicopter simulator during the 2011 NASA sponsored summer helicopter training program. Computer monitor, video screen, speaker and projector are also shown in the pictures.

Time constraint is a big factor affecting the project and its schedule. Students working on the project are all full-time students; however, most live off campus and work at part time jobs. In addition, all the students have a full work load from their regular classes. Figure 3 displays Engineering & Technology students working in the Prototyping & Machining laboratory to manufacture the flight simulator controls. Assembly drawings, Figure 4, were created using both Pro Engineer and SolidWorks software.

The motion platform will be fitted with two gear reduction electric motors, and programmed to run on the popular flight simulator software XPlane. The direct interface with the drive motors will be provided by the motor controllers in the system. They will convert the logic level voltage digital speed and direction commands into the higher motor voltages and currents required to drive the motors. Three potentiometers have been incorporated inside the pilot's control sticks: one for collective and two for cyclic. 24V DC electric motors having 20 amp nominal current capacity will be used to drive the platform. It is this current capacity that will effectively set the power limit for the system. One of the important design considerations is that feedback potentiometers positive rotation match positive rotation of motors. The platform has a certain range of motion in order for the simulator to accurately mimic the feel of a real helicopter. The incorporation and calibration between the control sticks and helicopter motion will be challenging for all students.

This project gives students hands on experience that is usually not provided in the classroom. It is all about being given a problem and finding a solution. There is no doubt that students will find these skills very valuable when pursuing career opportunities in the near future - not to mention the fact that very few people can say that they have designed and manufactured a flight simulator from scratch. Many here at CCSU look forward to the completion of the flight simulator.

Figure 1: CCSU Helicopter Flight Simulator on a Stationary Platform

Figure 2: Flight Simulator in Training Usage

Figure 3: Students Machining Control Rods

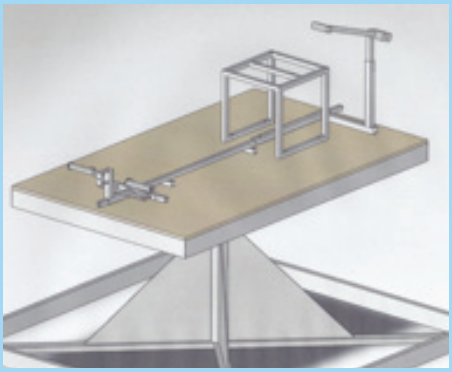
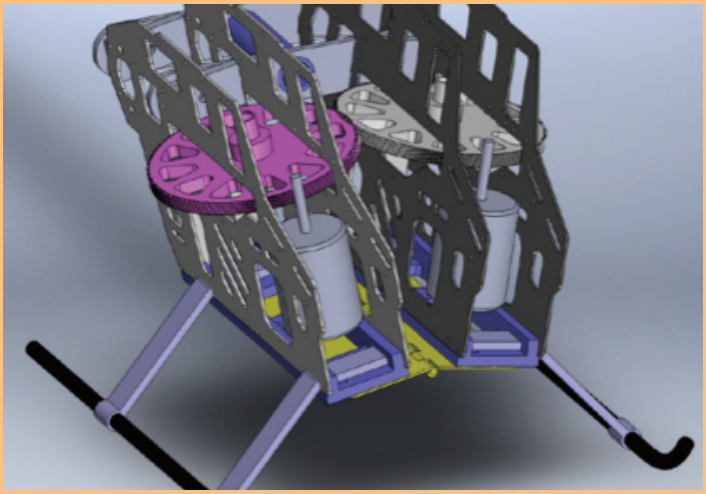
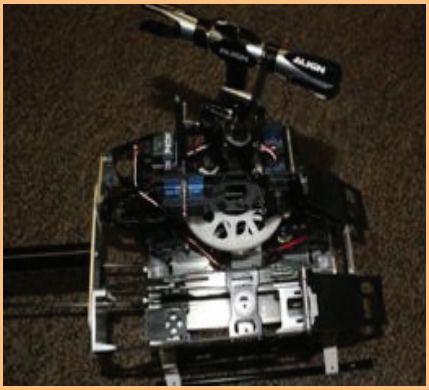


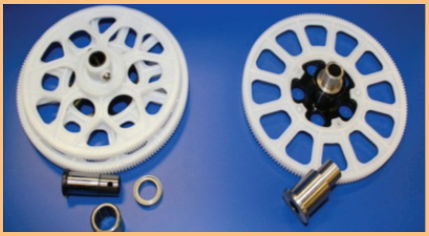
Figure 4: Motion Platform Solid Model

K-Max Scale Helicopter Testing

Kaman Aerospace manufactures helicopters that meet commercial and military heavy lift requirements. They accomplish this through helicopters equipped with dual, intermeshing main rotor blades.







A team of CCSU Engineering students; **Darrick Chekas**, **Elmazi Ermal**, **Joel Segal** and **Michael Tripp** are designing and testing a scale replica of the K-Max helicopter. The project's goal is to create a flying remote control scale version of the K-Max, and compare it against a similarly sized conventional single main rotor blade R/C helicopter. The K-Max scale helicopter will be optimized for maximum lift. This will be accomplished by changing the angle between the two rotor blade shafts. Lift and power data will be generated by using an adjustable hinge, the optimum gear angle will be determined. Once the optimum angle is determined appropriate miter gears will be machined and used for additional testing.

Further refinements of the airframe structure will be completed prior to flight testing. Testing is conducted using a previously developed test stand equipped with load cells to measure lift. It is expected that the intermeshing rotor design will produce substantially more lift than a single rotor design.

National Helicopter Program at CCSU

For a second year CCSU was the host University for a National week long Helicopter Program. The Helicopter Program was funded by the NASA Connecticut Space Grant College Consortium. Students attended from universities as far away as University of Washington, and University of Nebraska, along with many other schools that participate in their states College Consortium. The week long helicopter program was an intense program that involved classroom instruction, actual demonstration and laboratory experimentation involving, aerodynamics, helicopter principles of flight, wind tunnel testing, vertical takeoff remote control aircraft design and construction and Unmanned Aerial Vehicle (UAV) Technology coupled with visiting KAMAN Aerospace and Sikorsky Aircraft helicopter manufacturing.

Mechanical engineering and mechanical engineering technology students from the department of engineering at CCSU participated in the event and built a helicopter simulator and a UAV helicopter test stand. Both devices were used during the week long program. The helicopter flight simulator was a fixed platform and a new flight simulator is being developed that incorporates a moving platform.

Students started off the week by using the helicopter flight simulator, flying remote control helicopters and airplanes. The second two days involved class room instruction on Unmanned Aerial Vehicles followed by experimentation with the helicopter test fixture. During the mid week students received lectures and flight demonstrations on fixed wing UAV's and remote control helicopters.

Students and instructors visited KAMAN Aerospace where they viewed the K-MAX (Burro) UAV and the SH-2G Sea Sprite Helicopters. The students also talked to engineers about helicopter manufacturing.

The following day students received additional classroom instruction on fixed wing UAV technology developed at CCSU department of Engineering, followed by a plant tour of Sikorsky Aircraft.

During the week student teams built remote control airplanes. The final day of the program students participated in a remote control airplane competition. The aircraft were evaluated on vertical takeoff capabilities, slow and high speed flight and maneuverability. **Dr. Gates** and CCSU mechanical engineering graduate **Luke Ionno** successfully flew every aircraft built by 7 student teams.

Two Courses That Take You From Education to Profession

Students **Michael Laferriere** and **Andrew Munson** discuss with **Dr. Basile Panoutsopoulos** during a session of Capstone Project II, while prototyping their project "Proximity Detection".

Over the last two decades, one main characteristic of curriculum transformation is the preparation for student transition from the academic world to the professional environment. Nearly all curricula both in Engineering and Engineering Technology share this characteristic: A fourth year course, one semester or two, under the title Capstone Project, Capstone Design, Senior Project, or other similar name.

The sequence of two courses CET 497 and CET 498 have recently been updated and renamed to reflect their content and objective. This sequence of two courses has been redesigned to introduce many new topics and parallel the industrial environment; specifically the various phases of a project and contract requirements; similar to the requirements seen in the industry. The first part (CET 497-Capstone Project I) consists of problem identification, description, specification, literature search, presentation and a feasibility study proposal. The second part (CET 498-Capstone Project II) consists of prototyping, measurements, evaluation and possible commercialization of the topic proposed in the first part of the sequence. At the culmination the student will give a presentation, display a poster, demonstrate the feasibility of the project, and submit a final report.

At the completion of the sequence of these two courses, the student has been fully exposed, although in a micro scale, to the life cycle of a professional project. Students have found the experience in these two courses rewarding and have provided positive feedback after internship and employment.

Virtual Desktop Security
- New Senior Capstone Project

Desktop virtualization has gained increasing interest from large organizations including business, manufacturing companies and health care organizations, for its benefits of reduced energy, hardware, IT management and maintenance costs.

In fall 2011, the Networking Technology program in the Department of Computer Electronics and Graphics Technology offered a new senior capstone project – "Virtual Desktop Security". Under the supervision of **Dr. Shuju Wu** and with the support of the school's student-faculty research fund, senior student, **Daniel F. Fortuna**, started investigating desktop virtualization and the related security issues in the university laboratory environment. This project involves the application of multiple virtualization software, hardware and networking protocols to create a laboratory setup which hosts desktop operating systems on a centralized remote server and provides dummy client terminals the access to the entire information system. An integrated part of this project is to test the security effects of desktop virtualization on the end system as well as the server.

Instant Information Access Using Smartphones
- Graduate Student Project

Dr. Xiaobing Hou (left) is working with two MSCIT graduate students, **Huzaifa Osman** (middle) and **Yahya Alqahtani** (right), on a smartphone project for instant information access. With over 100 million users now in the U.S., smartphones are changing and improving our lives. In this project, an Android smartphone application has been developed with open source codes and freely available software packages. Users can use their smartphones to scan a Quick Response (QR) code and the information associated with the code will be retrieved from an online server and displayed on the phone screen. The system will reduce the need for hardcopy of the information and users can access it anywhere, anytime. The current target application is university health services. Students with a smartphone can access and update their health and medical information without visiting the office. The idea can also be extended to other applications as well.

The Fourth Annual Construction Management Awards Dinner

The fourth annual Construction Management Awards dinner occurred on April 12, 2012 in the Alumni Hall of the Student Center. Two awards were presented at this event. The first award, **Dr. Stuart Bennett** Alumni award, was given to **Karen Arborio** who works at Southern Connecticut State University as a coordinator in the University Construction and Facilities group.

The second award, the CCSU Construction Industry award, was given to **Bruce Bockstael** who is the Chief Architect for the State of Connecticut. Over one hundred alumni, construction management students and construction practitioners attended this function. The proceeds from this event will support various student scholarships.

Karen Arbrio (left)
Stuart Bennet (right)

Bruce Bockstael (left)
Ken Russo (right)

Construction Management Students Compete, and Learn from Real World Examples

Three teams of CCSU Construction Management students competed against students from 17 other colleges and universities in the Associated Schools of Construction Region 1 Student Competition. Over two days in Madison, New Jersey in November 2011, teams of six students competed in the Heavy Civil, Commercial Building, or Design-Build categories. A construction management company sponsored each category, providing teams with a real problem to solve and a day to solve it without access to faculty, the internet, or cell phones. On the second day, students presented their proposal to the sponsors who asked questions and scored their performances and proposals. Presentations were followed by a debrief where students learned how the sponsoring company solved the problem, and an awards banquet. The 18 CCSU students found the competition to be a great learning experience. A Career Fair was also held at the competition.

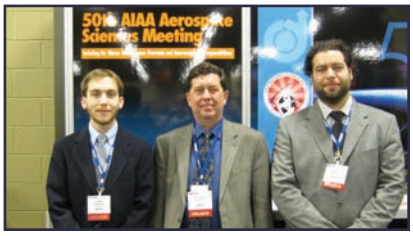
Dr. Ron Miers talks to the Heavy Civil team after they faced the competition judges.

Biomolecular Science: Emerging Medical Services Instructor (EMSI) Training Course

The spring 2012 semester marked the beginning of the Department of Biomolecular Sciences expansion into the Emergency Medical Services field. The department has offered the BMS 380: Emergency Medical Technician course for the past 7 years. The increased demand for EMT's in the state of Connecticut has coincided with a need for more instructors to teach these courses across the state. In addition, the training and curriculum changes within the field have moved EMS to the professional level. This has prompted BMS to create and offer the first credit bearing EMSI course in the state of Connecticut. The course is co-taught by **Jim Gosselin** and **Richard Judd** and meets for eight hours on six Sundays throughout the semester. The department tried the novel approach of offering the course on Sunday in an effort to meet the needs of the students interested in the course; many of which are not CCSU students, but rather professional EMT's from across the state. The course filled immediately suggesting that there is a need for such a course in Connecticut. The department intends to continue to expand its offerings in the EMS field.

Hybrid Propellant Rocket Engine Team Participates in 50th AIAA ASM

On January 9th 2012, CCSU was able to send members of the Hybrid Propellant Rocket Engine Team to present at the American Institute of Aeronautics and Astronautics (AIAA) 50th Aerospace Sciences Meeting. AIAA is the professional society for the field of aerospace engineering which counts more than 35,000 members. The AIAA Aerospace Sciences Meeting is the first major multidisciplinary event of the year for aerospace scientists and engineers from around the world. Faculty Advisor **Dr. V. Naoumov** (center), Project Manager **Alex Haralambous`** (right), and senior team member **Adam Goldreich** (left) all travelled to Nashville, TN to present CCSU SET research on the combustion of the non-conventional fuels in Hybrid Propellant Rocket Engine, and participate in the conference. This was an excellent opportunity to spread awareness of the research being conducted at CCSU, as well as to network within the aerospace community. The experience was extremely rewarding and the team plans on participating in the 51st meeting with their continued research. Research paper was also published in the proceedings of the 50th AIAA Aerospace Science Meeting.



Formula SAE Design, Fabrication and Competition

Each May, 120 of the world's fastest student-built formula cars assemble in Detroit, Michigan for a competition that demands excellence in every aspect of engineering practice, from analysis, design, manufacturing and testing to budgeting, project planning, and teamwork. CCSU's team, led by **Ryan Garvin** and **Alex Fiszel**, and advised by **Dr. Ned Moore**, has been preparing for the 2012 edition of the competition for more than 2 years.

In the beginning, the conflicting requirement of the many subsystems, such as suspension, steering, driver controls, drivetrain, and breaking had to be prioritized so that an optimal configuration could be found. This was followed by the writing of a budget proposal and a timeline with sufficient detail to convince funding agencies that the project should be given the green light. Mountains of design analysis was then completed based on both classroom and independent learning to show that the vehicle will be safe when it travels at speeds approaching 60mph. Most of the students agree now that the analysis was the easiest part. Actually manufacturing what they had designed was much more complex than they had anticipated, and where in hindsight they probably learned the most.

Of course, the competition isn't just about speed. There is also an endurance race where fuel efficiency is required. Then there are several student presentations given to experienced engineers. In one, students must describe their designs and the decisions they made. In another, they project the manufacturing cost of their car were it scaled up to 1000 units a year. The cost analysis drills down to the price of every washer, and the assembly time of every nut and bolt.

So when dawn breaks on May 9 in Detroit, ten students from CCSU will be ready to represent their school against the best in the world. They have earned the right to be there with countless hours together in the machining and prototyping laboratories. The lessons they have learned will be recognized then, but more importantly, they will serve them well for their entire careers.

The CCSU Moonbuggy Team participated in the 19th NASA Great Moonbuggy Race

As a part of the Lunar Exploration Club activities, the Moonbuggy team of CCSU engineering students participated in the 19th NASA Great Moonbuggy Race of 2012 that took place on April 13th -14th in NASA Marshall Space Center, Huntsville AL. The 2011/12 academic year was the 4th year of the CCSU participation in this NASA sponsored project. The project is a perfect match to the Mechanical Engineering curriculum: it includes design, fabrication, assembly, and performance tests of a Moonbuggy vehicle that must satisfy numerous design and operational constraints e.g., human-powered, reassemble quickly from 4'x4'x4' cube, turn in a radius of 15 feet or less.

This year 88 teams from high schools and universities participated in the competition including international participants from Canada, Italy, Russia, India, Germany, United Arab Emirates and Puerto-Rico. The CCSU Moonbuggy team competed against 44 universities, including top engineering schools such as Purdue University and University of Central Florida.

The CCSU Monbuggy vehicle was initially designed by the 2010 CCSU team and substantially improved by the 2012 team of engineering students. The improvements include transmission and differentials; seat assembly was also improved; new front brake system was designed and assembled; and Moonbuggy weight was significantly decreased. The team also performed numerous driving tests on campus that helped them show the 3rd best time in the race in Alabama. The half mile race course is a simulated lunar surface including craters, rocks, lunar soil and lava ridges and was designed by NASA engineers. Overall, the CCSU team was 7th out of 44 universities in the race and design competition. Although the CCSU team is among the top 10 teams, there is still a room for further improvements. The team is very optimistic about the next year race and invites passionate engineering students to join the project in Fall 2012.

Right to left: Students –**Joseph Scharff**, **Jessica Meinsen**, **Kyle Reutenauer**, **Travis Fifi**
Faculty adviser– **Dr. V. Naoumov**
CCSU Alumni –**Hitesh Shah**, representative of Infotech Enterprises America, Inc.

The CCSU Moonbuggy team on the race track
Drivers: Kyle Reutenauer: and Jessica Meinsen.

Society of Manufacturing Engineers

The Central Connecticut State University Chapter of the Society of Manufacturing Engineers (SME) recently held its first meeting on Friday, March 30, 2012, since the revival of the group in February. **Ken Atkins**, the recently appointed President of the club, ran the successful meeting that went over topics such as the budget in the semesters to come as well as future ideas and plans for the club.

This student run organization is led by President Ken Atkins, Vice-President **Adrian Bak**, Treasurer **Matt McPartland**, and Secretary **Ron Tremblay**. Also present at the meeting were the rest of the student members as well as faculty advisor **Dr. Steve Kirstukas** and **Dr. Peter Baumann**.

The CCSU Student SME Chapter S209 is focused on promoting the manufacturing aspects of engineering as well as organizing events and trips that will encourage students to expand their knowledge of manufacturing engineering. The club functions under the Senior SME group out of Hartford.

Sparking Student Interest in Science, Technology, Engineering and Math.

- Excerpts from Courier Article by Gerri Radacsi

Dr. Michelle Dischino is the co-principal investigator for an Advanced Technological Education project funded by the National Science Foundation. The three-year project, titled "Problem-Based Learning for Sustainable Technologies: Increasing the STEM Pipeline," began in 2009 and will continue until fall 2012.

Problem-based learning (PBL) is an instructional approach whereby students learn content by actively and collaboratively solving authentic, real-world problems.

The principles of PBL are being used to develop innovative, standards-based curricula with the aim of increasing students' interest and preparedness in pursuing STEM-related careers. Dr. Dischino as one of the project principal investigators, worked with industry collaborators who are breaking new ground in 'green' technologies to create a comprehensive series of online multimedia PBL resources focused on sustainability. Referred to as "STEM PBL Challenges," these instructional materials are designed to engage high school and college students in real-world problem solving.

Another goal of the current NSF-funded research, is to introduce pre-service teacher candidates to PBL methods and to conduct research to determine their attitudes regarding adaptation of these methods into their future classrooms.

Here CCSU plays a critical role due to the strength of its teacher education programs. In spring 2011, 15 CCSU technology education students were enrolled in a required methods course, Teaching Technology and Engineering Education, modified to include PBL.

Left to Right: **Dr. Michele Dischino** and **Dr. James DeLaura**, work with students **Elizabeth Chatis** and **Djenne Mobley**

Throughout the semester, students were presented with fundamental concepts related to PBL methodology and introduced to the STEM PBL curricular materials. They were led through the development of these materials and instructed in effective implementation, considering both student and teacher perspectives. Data from the pilot semester of the modified course, including pre- and post-surveys and focus group findings, are were analyzed and presented at a conference in March 2012.

Dr. Dischino and her associates are in the process of writing an application for another NSF grant. They plan to expand the reach of the two successful PBL projects into the field of advanced manufacturing by creating a new series of multimedia challenges, and they aim to also increase the number of STEM teachers capable of developing and delivering PBL instruction. The hope is that their efforts will continue to inspire students to pursue careers in STEM.

Introducing these problem-based learning concepts and materials into pre-service teacher education courses benefits both CCSU students and the many young individuals they will go on to teach. As one of only a handful of institutions with an undergraduate degree program in engineering education, CCSU is ideally situated to become a leader in this emerging field.

Two-Wheel Drive Bicycle Project

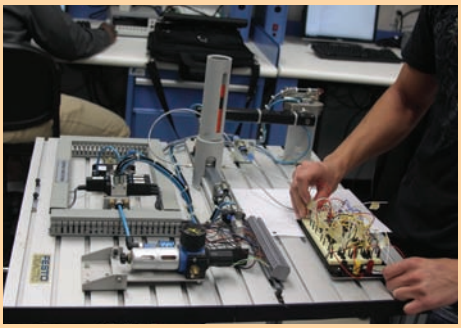
The concept of all-wheel drive in automobiles and off-road vehicles has been around for decades, although the use of this technology for mountain biking is relatively new.

In Fall 2011, **Dr. Alfred Gates** offered a two-wheel drive bicycle senior project which gives CCSU Mechanical Engineering students the opportunity to design, construct and test an efficient, lightweight, fully-functioning mechanical drive system. The new research project provides hands-on experience for students to apply the Engineering fundamentals and principals they have learned at the University. The Two-Wheel Drive Bicycle team plans to manufacture parts such as gears and framework on campus using the rapid prototyping machine, as well as test, analyze and modify components of the drive system, suspension and frame. The team will create and test a prototype drive system this first year and build a solid base of results and analysis for future students to expand upon.

Left to right: **Jeffrey LaBonte**, **Aaron Furrow**, **James Powell** and **Michael Cunningham**

Dr. Olusegun Odesina, Associate Dean presents each winner of the 2011-2012 School of Engineering & Technology Student Survey with a Kindle Fire. Pictured left to right: **Anas Rafia** (Mechanical Engineering), **Raymond Poverom** - not pictured (Mechanical Engineering), Dr. Olusegun Odesina and **Matthew Stanley** (Computer Engineering Technology).

New Robotics and Mechatronics Degree Program



The Department of Manufacturing & Construction Management (MCM) has designed the Bachelor of Science in Robotics and Mechatronics Engineering Technology (RMET) program in support of strategic goals of CCSU and the School of Engineering and Technology (SE&T). This program is directly responding to vital workforce needs in Connecticut.

The RMET program satisfies all CCSU academic requirements. In addition the program was designed to meet and exceed relevant standards of the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ETAC of ABET). The program was reviewed and approved by the MCM Department, the SE&T, the University Curriculum Committee, Faculty Senate and President. After reviewing the application on the 5th of April 2012, the newly formed Connecticut Board of Regents for Higher Education approved the Licensure and Accreditation application.

The RMET program will replace the Electro-Mechanical specialization of the B.S. in Industrial Technology program that is currently offered by the MCM Department. The Electro-Mechanical specialization would be ultimately eliminated when students in the existing program meet graduation requirements or transfer to the RMET program or any other program. The SE&T facilities have been reconstructed and equipped with state-of-the-art technology to more effectively serve the RMET program. The current knowledge base, technologies, and facilities of the SE&T are prepared to allow the RMET program to begin immediately with new courses and hands-on laboratory components.

The proposed RMET program of study will require 130 credits of undergraduate work. This includes the General Education courses that meet all relevant requirements, totaling 42 to 48 credits. RMET program Major Requirements make up 39 credits of introductory and applied robotics and mechatronics courses. Additional 42 credits of required courses in the areas of mathematics, electronics, engineering mechanics, and manufacturing provide prerequisite theory and skills for the major requirements. First students to graduate with Bachelor of Science in Robotics and Mechatronics Engineering Technology will be in 2016.

An important educational aspect of this program is its focus on development of practical/hands-on skills of the graduates through laboratory activities in all technical ROBO courses designed for this major. Two hours of laboratory activities will be offered for every two hours of lectures. A minimum 480 hour internship in relevant industries is included as a graduation requirement (ROBO 496 - 3 credits). A one-semester capstone course ROBO 497 Capstone: Senior Project integrates the diverse elements of the curriculum to develop student competence in both technical and non-technical skills to solve real-world problems. The program will develop strong analytical skills through very challenging math and sciences requirements.

The School of Engineering and Technology Student Services Center – New Facilities

With the establishment of the School of Engineering and Technology, we now provide the necessary support to our students to help in retaining them and ultimately to graduate them on-time. The university's administration has been working tirelessly to boost retention and graduation rates and has been providing resources to make sure that students get the support that they need as they navigate the academic water. We want the slogan "Start with a dream and finish with a future" to be true for our students.

The newly constructed center, located in NC 241 is staffed by one graduate intern, one graduate assistant and two student workers who have undergone training and understand all of the general education requirements, and can answer questions most frequently asked by students.

We understand that certain bottleneck courses can hold students back and prevent on-time graduation in engineering, science and technology. Therefore, the center works hard with students and faculty to identify those courses and provide additional help to students. These bottleneck courses are reinforced by certified tutors on a walk-in basis during the center's opening hours.

According to Carey (2005), "the things most people think matter to an institution's graduation rates-things like the academic preparation of its student body, the availability of financial aid, the dollars available for instruction and student advising-do in fact matter".

Christopher Drew reported that studies have found that roughly 40 percent of students planning engineering and science majors end up switching to other subjects or failing to get any degree, (New York Times, Nov. 4). The reason attributed to this attrition is what was described by David E. Goldberg, an emeritus engineering professor, as "the math-science death march." According to him, "freshmen in college wade through a blizzard of calculus, physics and chemistry in lecture halls with hundreds of other students. And then many wash out". We want to avert the wash out syndrome by providing these services.

The career's portion of the center is handled by the Career Services Coordinator who is currently hired on a part-time basis to coordinate all cooperative work, internships, and permanent work efforts for the school. This center's role has since been a major boost in terms of the companies' request for our graduates as a result of our outreach activities.

The Students Services Center serves as a support system for our students. We are happy to see more and more students embrace it.