



# NEWSLETTER

## Graduate Student Spotlight on: Manny Curillo

“Space grant scholarships don’t just change one student’s life. They can inspire and change many lives”, said Dr. Jani Macari Pallis of mechanical engineering graduate student Manuel Curillo.

Born in Ecuador, Manuel came to the United States with his family as a child, living first in New York and then settling in Connecticut. He attended Danbury High School where he was an honor student before pursuing his undergraduate degree at the University of Bridgeport in Industrial Design.

After a joint meeting between the university’s School of Design and School of Engineering, Manuel approached Dr. Pallis (a faculty member in mechanical engineering and the university’s Connecticut Space Grant Campus Director) about the possibility of a graduate degree in mechanical engineering. “It wasn’t enough for me to just design the ‘outside’ of a product, I wanted to understand how it worked ‘inside’. I wanted to understand if my designs were structurally safe,” said Manuel.

To transition between his design degree (a non-STEM major) and prepare for a graduate degree in engineering, Manuel took

advanced mathematics and calculus, physics, and an engineering mechanism design class as his electives for his industrial design degree. He even filled his summer with math classes at a community college.

“I was so impressed with Manuel’s diligence, work ethic, and desire to become an engineer that I suggested he work with me on a NASA related project,” said Dr. Pallis. Subsequently, Manuel was awarded a Connecticut Space Grant Directed Scholarship and, along with Dr. Pallis, developed an infrastructure plan that would lay the foundation for the university to engage in NASA sponsored challenges – like the CanSat and Moonbuggy competitions.



“Through Manuel’s work, participation in these NASA challenges will inspire and engage many students here”, said Dr. Pallis.

Manuel was accepted into the graduate program, began his master’s degree in Fall 2012 and now serves as Dr. Pallis’ graduate assistant.

What’s next? “I hope one day I’ll work on helicopter or car designs”, smiled Manuel Curillo. “Also, I think we should take risks in life and never give up on our dreams.” ♦

### Connecticut Space Grant College Consortium

#### VISION STATEMENT

*Make the United States the Aerospace leader of our solar system.*

#### MISSION STATEMENT

*Make Connecticut the national Leader in NASA-related education, research and workforce development.*

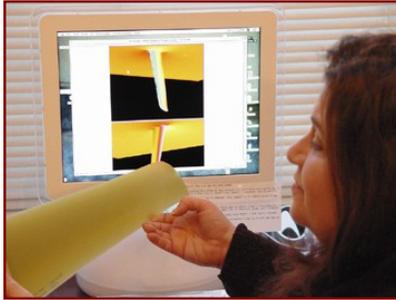


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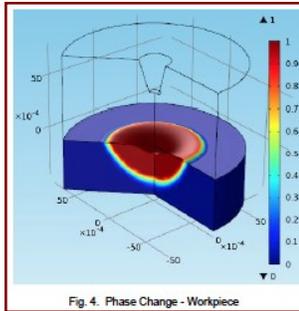
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## Faculty Spotlight on: Dr. Jani Macari Pallis

Dr. Jani Macari Pallis is an Associate Professor in the Mechanical Engineering Department at the University of Bridgeport, where she has worked since Fall 2008. Dr. Pallis is very active in the CT Space Grant Consortium—she is the Campus Director for the University of Bridgeport and has been co-principal investigator for two faculty grants.



The title of her work for her first faculty grant was “Multiphysics Modeling of Gas Tungsten Arc Welding.” Dr. Junling “Joyce” Hu was her co-PI. The purpose of this project was to model the transport phenomena (heat transfer, fluid flow, and current flow) in a gas tungsten arc welding (GTAW) process using the computational fluids software, COMSOL Multiphysics. The model development included both an arc model and a weld pool model to simulate the interaction between the arc and the weld pool. A constant-current welding power supply produces energy, which is conducted across the arc through a column of highly ionized gas and metal vapors known as a plasma. The process is widely used in aerospace and other industries to join thin metals and repair tools and dies. However, past simulations/research have not captured the detail of effects that they proposed and have often modeled the weld pool as a flat surface. Dr. Pallis and Dr. Hu’s model used a moving mesh method and simulated a depressed surface inside the work-piece as the welding (and temperature) progressed.



Dr. Pallis’ co-investigator for her second faculty grant is her colleague Dr. Hassan Bajwa. Their work is entitled “Nanoscale Antenna for Inspace Harvesting Applications.” With this grant, they will conduct research and develop a thin-film metal-oxide-metal (MOM) tunneling diode with integrated frequency independent spiral antenna. Applications of such antennas are in the field of power harvesting, sensors, medicine, and aerospace industry.

Besides her work through the grants, Dr. Pallis is involved with many other space and engineering projects. She is helping plan Space Day, scheduled for April 7, 2013, at the Discovery Museum and Planetarium. Both UB’s National Society of Black Engi-

neers (NSBE) and Society of Women Engineers (SWE) students will help young museum visitors and their families “make and take” flight and space-related hands-on activities. The CT Space Grant Consortium has provided funding to support Space Day at the museum.

Dr. Pallis is also the technical advisor to the museum’s proposed CubeSat project. A CubeSat is a miniaturized satellite for space research. Its name is derived from its volume – 1 liter or 10 cm<sup>3</sup>. The proposed mission will have both a scientific and pre-college outreach educational component. If the proposal is successful, NASA will provide launch services.

Currently, she is working with two students (one of whom was a CT Space Grant scholarship awardee in 2011-12) to construct a water channel facility for fluid flow visualization (similar to the one seen in the picture to the right) that will be used in fluid mechanics and aerodynamics classes. She and the students have laid out a plan so that they can participate in NASA university challenges starting in Fall 2013. They hope to have both a CanSat and Moonbuggy submission next year.



Dr. Pallis would also like to make known that UB was one of the two CT Space Grant Consortium members selected to submit a cooperative agreement proposal to NASA for its “Space Grant Innovative Pilot in STEM Education” solicitation. The UB proposal “Support for Engineering, Math and Science Students at the University of Bridgeport” (SEMSS@UB) would provide student scholarships, engage student participants in NASA-aligned projects, and provide faculty professional development related to best practices in first and second year undergraduate retention with an emphasis in working with underserved and underprepared populations.

As a Campus Director, Dr. Pallis works to promote the space grant program to the faculty, STEM students and various student organizations of UB, deans from other STEM schools at the university, and even high school organizations like the UB NSBE, Jr. group. Through her hard work, the University of Bridgeport has significantly increased the number of applications to the consortium, and the faculty and students have become more aware of NASA’s mission and opportunities through the Connecticut Space Grant Consortium. ♦

## Student Spotlight on: James Sean McGuinness



James Sean McGuinness is a junior in Mechanical Engineering (Aerospace) at Central Connecticut State University.

In the summer of 2012, Mr. McGuinness was granted to participate in the CT Space Grant Consortium's annual Helicopter/UAV Workshop, run by Dr. Al Gates from CCSU.

Sean says his favorite parts of the helicopter workshop were riding in and piloting a Schweizer 300C helicopter, as well as touring both Sikorsky Aircraft Corporation and Kaman Aerospace. Sean says, "It was the first time I had ever flown in a helicopter, so the fact that I got to fly it made it an amazing experience." At Kaman Aerospace, the attendees of the workshop toured the entire facility and saw how the K-MAX and the SH-2G were built. At Sikorsky, they were shown the Black Hawk final assembly and the flight simulators used in the designing of the new CH-53K helicopter. Since his experience with the Helicopter Workshop, Sean has started working for Sikorsky and gets to work on that same final assembly line for the Black Hawk helicopter every day.

Additionally, Sean was granted an Undergraduate Research Fellowship by the CT Space Grant for the work he is doing at CCSU. He and others built a scale Kaman K-MAX helicopter and are doing research on optimizing the power/lift ratio by changing the rotor shaft configurations. The Kaman K-MAX is a helicopter that has two counter-rotating, intermeshing main rotor blades. Since the two main rotor blades counter-rotate, they provide torque compensation for one another and eliminate the need for a tail rotor. The K-MAX was designed for lifting and the team is trying to alter the current angle (25 degrees) between the two main rotor shafts in order to see if they can generate more lift with less power. According to Dr. John Wei, one of Sean's mentors and former Chief Engineer at Kaman, the story behind the project is that when the K-MAX was being designed, no research was done on other shaft angles due to the extremely high cost of such a project. By doing it on a scale level, they hope to learn if there is an angle which improves the power/lift ratio.

The helicopter workshop helped Sean build great relationships with both Dr. Al Gates and Dr. John Wei. Dr. Gates and Dr. Wei are now his mentors at CCSU and the advisors on his research project. Having the opportunity to see real K-MAXs during the tour of the Kaman facilities provided him with further understanding of its operation as well as shape the future path for his planned research. He also believes that the Helicopter Workshop helped play a role in landing a job at Sikorsky.

Mr. McGuinness' love for aerospace spills into his spare time. He enjoys building and flying RC helicopter and airplanes, playing guitar, and working on anything with wheels and an engine. Sean recently bought a house with his girlfriend and spends a majority of his free time on house projects.

Sean plans to work in the aerospace industry as an engineer, with a preference of helicopters or airplanes. ♦



## Student Spotlight on: Matthew Breland

Matthew Breland is a senior majoring in Computer Engineering at the University of Bridgeport. He was awarded an Undergraduate Fellowship and an Industrial Internship grant in Fall 2011. In Fall 2012, he was awarded another Undergraduate Fellowship for his project entitled High Efficiency Broadband Solar Cell for Aerospace Applications.

Through the Fall 2012 Undergraduate Fellowship, Mr. Breland and his team are designing nano-antennae that can harvest various bands of light, from infrared (in the "dark") to the visible light spectrum. His team researched feasible and novel methods to cheaply fabricate the structures on a large scale to be used for efficient solar energy harvesting. With the grant, his team will go to the Brookhaven National Lab to run tests on antennae formed through DNA Origami techniques. This project is a great learning

experience. He is learning more about antennae, light harvesting, the spectrum of light, and DNA structures.

Mr. Breland is currently applying to both jobs and graduate schools. In his free time, he often assists in various religious activities such as fellowship events and service projects. In addition, he runs the local IEEE chapter to help bring engineers together. For fun, he enjoys playing strategic board games and sports with friends. ♦





# Connecticut Space Grant College Consortium

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## Space Grant Award Recipients (Fall 2012 - Spring 2013)

<p><b><u>Faculty Research Grants</u></b>          Dr. Bajwa (Bridgeport)          Dr. Barwick (Trinity)          Dr. Li (Bridgeport)          Dr. Vadas (UConn)</p> <p><b><u>Faculty Seed Research Grants</u></b>          Dr. Mertens (Trinity)</p> <p><b><u>Faculty Curriculum Development</u></b>          Dr. Amaya-Bower (CCSU)          Dr. Gates (CCSU)</p> <p><b><u>Graduate Fellowships</u></b>          T. D<sup>e</sup>Leon-Nwaha (UConn HC)          P. Harner (Wesleyan)          C. Warren (Yale)</p>	<p><b><u>Undergraduate Fellowships</u></b>          J. Armatis (Bridgeport)          E. Barney (Trinity)          M. Breland (Bridgeport)          B. Coleman (UConn)          E. Edelman (Wesleyan)          S. Maric (UConn)          J. McGuinness (CCSU)          S. Michels (Bridgeport)          G. Wong (Wesleyan)</p> <p><b><u>Industrial Internships</u></b>          R. Cabaniero-Buendia (UNH)          E. Gerber (Trinity)          L. Johnson (Hartford)          S. Klasner (Hartford)          C. MacDonald-Pownall (UNH)          J. McDaniel (UNH)          A. Rafia (CCSU)</p>	<p><b><u>Undergraduate Scholarships</u></b>          H. Alpert (Yale)          P. Burrows (Trinity)          L. Chen (Wesleyan)          J. Corbett (ECSU)          B. Dube (UNH)          R. Garrone (Fairfield)          J. Keltz (SCSU)          Y. Lpizra (Bridgeport)          Q. Pittman (UConn)          D. Ray (CCSU)          A. Sorensen Van Cleave (Hartford)</p> <p><b><u>Student Project Grants</u></b>          B. Coleman (UConn)          S. Hall (Yale)          E. Quitzau (Hartford)          S. Werkheiser (CCSU)</p>	<p><b><u>Senior Design Projects</u></b>          N. Arenas (Fairfield)          K. McIntosh (Fairfield)          T. Sullivan (Trinity)</p> <p><b><u>NASA Academy</u></b>          M. Aron (Hartford)</p> <p><b><u>Student Travel Grants</u></b>          T. Bachant (UConn)          B. Coleman (UConn)          L. Guadagnoli (CCSU)          J. Vallieres (UConn)</p>
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Contact Info	Academic Affiliates	Non-Academic Affiliates	Industrial Affiliates
<p>Program Director: Dr. Thomas Filburn</p> <p>Associate Director: Dr. Mary "Cater" Arico</p> <p>Program Coordinator: Mrs. Janet Spatcher</p> <p>Newsletter Authors: Rachel Parlock Amber Sorensen Van Cleave Chris Cutler</p> <p>860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org</p>	<p>Central Connecticut State University            Connecticut Community College -            Colleges of Technology            Eastern Connecticut State University            Fairfield University            Southern Connecticut State University            Trinity College            University of Bridgeport            University of Connecticut            University of Connecticut            Health Center            University of Hartford            University of New Haven            Wesleyan University            Yale University</p>	<p>State of Connecticut of            Education            Connecticut Science Center            CCAT (Connecticut Center for            Advanced Technology)            Discovery Museum            Connecticut Pre-Engineering            Program            Connecticut Invention            Convention            Connecticut Corsair            NEAM (New England Air            Museum)</p>	<p>Pratt &amp; Whitney Aircraft            UTC Aerospace Systems            UTC Research            Sikorsky Aircraft            UTC Power            Kaman Aerospace            GKN Aerospace Services            HABCO, Inc.            Otis Elevator            Carrier            Dymotek            Doncasters            Wood Group            ACMT            SPX            Tetra            Capewell Components</p>



CT Space Grant Lead Institution:



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