

ISEB Student Researchers
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

64th INTERNATIONAL ASTRONAUTICAL CONGRESS
SEPTEMBER 23–27, 2013 • BEIJING, CHINA





MARK BECNEL
University of Alabama
mark.becnel@uah.edu

POSTER PRESENTATION
Date: September 23–27, 2013
Time: TBC
Room: North Foyer, Poster Session

RESEARCH TOPIC

Development and Testing of the Inertial Electrostatic Confinement Diffusion Thruster

BIOGRAPHICAL SKETCH

Mark Becnel is a graduate student at the University of Alabama in Huntsville (UAH), Huntsville, AL. He is pursuing a master's degree in aerospace engineering with a focus on electric propulsion. He earned a bachelor's degree in physics from the University of New Orleans, New Orleans, LA. His immediate goals include completion of thesis work developing the Inertial Electrostatic Confinement Diffusion Thruster at UAH and the NASA Marshall Space Flight Center in Huntsville.

RESEARCH AND EDUCATION ACTIVITIES

- Inertial Electrostatic Confinement Diffusion Thruster: Design and build thruster, and deliver baseline thrust values. Testing includes operation of high-voltage and high-vacuum systems, experience with NASA ordering procedures, and documentation/reviews as required.
- ChargerSat 1 – Orbital Picosatellite at UAH: Satellite engineer. Part of an eight-member team focused on environmental testing, machining, and operation of cleanroom. Manifested for flight in October 2013.
- Space Hardware Club: Leader and major participant in CubeSat program, high-altitude ballooning program, high-powered rocket flight to over 100 k ft, harvesting robot and microgravity team. Student lead for the How to Build and Sustain Space Hardware Organizations Conference, along with Alabama Space Grant Consortium.
- ARISS – STEM Outreach Team Leader: Introduced eighth-graders to the ISS and amateur radio. Operated the two-month program leading up to a live talk with astronauts over amateur radio.



COREY A. M. BERGRUD
University of North Dakota
corey.bergsrud@my.und.edu

POSTER PRESENTATION
Date: September 25, 2013
Time: TBC
Room: North Foyer, Poster Session

RESEARCH TOPIC

Business Case for a Constellation of 6U Solar Powered CubeSats in LEO

TECHNICAL PRESENTATION

Date: Friday, September 27, 2013
Time: 13:30
Room: 303A

RESEARCH TOPIC

Constructing a Constellation of 6U Solar Power Cube Satellites

BIOGRAPHICAL SKETCH

Corey is a second-year doctoral candidate in electrical engineering at the University of North Dakota (UND). His research focuses on utilizing space-based solar-powered satellites for lunar applications. He has interned at NASA's Langley Research Center and at the Naval Research Laboratory. He has been an entrepreneurial intern at UND's Center of Innovation, as well as being part of a three-person team from North Dakota that received the National Science Foundation Innovation Corps award. He has acquired a bachelor's degree in mathematics and electrical engineering with a minor in physics and a master's degree in electrical engineering, all from UND.

RESEARCH AND EDUCATION ACTIVITIES

- Realizing the conceptual idea of utilizing CubeSats as a profitable business model to supply electric power for in-space activities
- Realizing the conceptual idea of utilizing solar-powered satellites as a profitable business model to supply electric power for lunar, Earth-Moon, and NEO applications
- Investigating space economics and commerce
- Micro-power harvesting product research and development
- Engineering outreach activities
- Building in-house departmental collaborations at UND through multidisciplinary team projects
- Assisting with managing student electrical team to build CubeSat at UND



MATTHEW CANNELLA
University of Colorado Boulder
Matthew.Cannella@Colorado.edu

TECHNICAL PRESENTATION

Date: September 25, 2013
Time: 11:45
Room: 208A

RESEARCH TOPIC

Development and Testing of a Pistonless Rocket-Engine-Pump Technology Demonstrator

BIOGRAPHICAL SKETCH

Matthew Cannella is a research associate in the Busemann Advanced Concepts Laboratory at the University of Colorado–Boulder. He received bachelor’s degrees in both aerospace and mechanical engineering from the State University of New York at Buffalo in 2009. His research interests are primarily focused on chemical propulsion and rocket-engine technology development. Matthew will complete two master’s degrees in the summer of 2013, in aerospace engineering sciences and engineering management. Matthew has completed numerous internships with NASA and members of the commercial space industry, and he currently serves as a NASA Student Ambassador.

RESEARCH AND EDUCATION ACTIVITIES

- Fellow, National Science Foundation Graduate Researchers Fellowship Program, 2011–2013
- Graduate with Honors, International Graduate Summer School in Aeronautics and Astronautics, Beihang University (Beijing, China, 2012)
- Fellow, NASA Graduate Student Researchers Program Fellowship (Marshall Space Flight Center), 2010–2011
- Graduate, NASA Propulsion Academy, Marshall Space Flight Center, 2009
- Intern, Shuttle APU and Hydraulics, State Space Grant Intern Program, Kennedy Space Center, 2007
- NASA Student Ambassador, 2010–present
- Chief Operating Officer, “We Want Our Future” STEM Educational Outreach Initiative, 2009–present



ROBERTO DEXTRE
University of Alabama in Huntsville
rad0012@uah.edu

POSTER PRESENTATION

Date: September 23–27, 2013
Time: 13:30
Room: C4, Poster Session

RESEARCH TOPIC

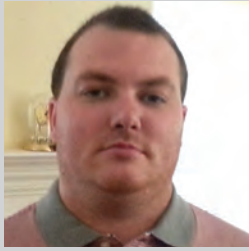
Integration Considerations in Satellite Propulsion Systems: Hall Thrusters versus Ion Engines

BIOGRAPHICAL SKETCH

Roberto is currently entering his second year as a graduate student in the aerospace engineering program at the University of Alabama in Huntsville (UAH). His research focus is on ion propulsion systems. He received his bachelor’s degree in mechanical engineering at SUNY Binghamton. Roberto has also held an internship with the NASA Marshall Space Flight Center (MSFC) and continues to develop his career through the NASA Pathways Intern Program. Funded by the Louis Stokes Alliance of Minority Participation program, Roberto intends to complete his master’s and doctoral degrees in aerospace engineering at UAH.

RESEARCH AND EDUCATION ACTIVITIES

- Ion Propulsion System Literature Review and Analysis. Worked with Dr. Kunning G. Xu to further understand the operations of ion propulsion. Developed presentations and participated in weekly meetings to evaluate progress.
- NASA Lunabotics Mining Competition Participation. Served as Team Lead of a project to develop a modular regolith excavator to harvest lunar simulant and deposit in a separate location.
- Cryogenic Propulsion Test Article Development (Summer 2011). Assisted aerospace engineer Andrew Schnell at NASA MSFC to design and build a propellant depot for basic cryogenic propulsion testing.



PATRICK GIDDENS
University of Alabama in Huntsville
pag0002@uah.edu

TECHNICAL PRESENTATION
Date: September 27, 2013
Time: 13:30
Room: C4

RESEARCH TOPIC

Fast Z-pinch Thruster for Space Tugs

BIOGRAPHICAL SKETCH

Patrick is in his last year of a master's degree program at the University of Alabama in Huntsville (UAH). He is investigating the use of linear transformer drivers as a compact pulsed power driver for generating Z-pinches for application in space propulsion. He currently works for the Propulsion Research Center at UAH. Patrick received his associate's degree in machine-tool technology from Wallace State Community College in Hanceville, Alabama, and his bachelor's degree in aerospace engineering from UAH.

RESEARCH AND EDUCATION ACTIVITIES

- Linear Transformer Drivers to power Z-Pinches for space propulsion (2011–2013)
- Charger-1 laboratory (2012–2013)
- NASA's Great Moonbuggy Race (2008-2010) (2012–2013)
- NASA's University Student Launch Initiative (2009–2010)



KATRINA LAYGO
Space Policy Institute
Washington University
klaygo@gwu.edu

TECHNICAL PRESENTATION
Date: September 24, 2013
Time: 09:45
Room: 301B

RESEARCH TOPIC

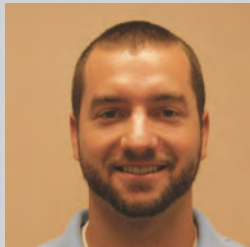
Applications of Satellite Remote Sensing and Geographic Information Systems for Support of Maritime Security in the Tri-Border Area of Southeast Asia

BIOGRAPHICAL SKETCH

Katrina Laygo is an master's degree candidate in international science and technology policy at the Space Policy Institute, George Washington University. Her research is focused on civil and commercial space applications for support of maritime security and disaster management in the United States and Southeast Asia, and on international space policy issues. She has held internships at both the Jet Propulsion Laboratory and NASA Goddard Space Flight Center. Katrina received her bachelor's degree from the University of California, Los Angeles, with a major in geography and environmental studies and a minor in geospatial information systems and technology.

RESEARCH AND EDUCATION ACTIVITIES

- George Washington University Freeman Foundation Fellow: Applications of Satellite Remote Sensing and Geographic Information Systems for Support of Maritime Security in the Tri-Border Area (TBA) of Southeast Asia (June 2013–present)
- Space Generation Advisory Council (2012–present)
- Space Security Index (2012–2013)
- NASA Applied Sciences DEVELOP Program: Applications of NASA Earth science data to enhance decision support in flood and earthquake response, air quality and water management, and ecological forecasting
- NASA Goddard Space Flight Center (2012–2013)
- Jet Propulsion Laboratory (2010–2012)
- Clinton Global Initiative University (CGI U) Commitment Mentor for Technology: The George Washington University CGI U Meeting (2012)
- University of California, Los Angeles (UCLA), Department of Geography: High-resolution Remote-Sensing Applications for Security Monitoring in Pakistan (2009–2010)

**DEREK M. NUSBAUM, MD**

Baylor College of Medicine
nusbaum@bcm.edu

TECHNICAL PRESENTATION

Date: September 24, 2013
Time: 09:45
Room: 303B

RESEARCH TOPIC

Alteration in the Lower Limit of Autoregulation with Elevations in Cephalic Venous Pressure

BIOGRAPHICAL SKETCH

Derek Nusbaum received his bachelor's degree in biological sciences with a concentration in neurobiology from Northwestern University and his medical degree from Michigan State University. He is currently in an internal medicine residency and neuroscience doctoral program at Baylor College of Medicine. His interests include neurobiology, wilderness medicine, space medicine, remote medicine, tropical/travel medicine, telemedicine, and medical-care quality improvement. He has done both clinical work and research in these areas, in the United States as well as abroad in various parts of Asia, Central America and Sub-Saharan Africa.

RESEARCH AND EDUCATION ACTIVITIES

- Currently pursuing a Ph.D. in neuroscience as part of a Career Development Award received from the Baylor College of Medicine Center for Space Medicine.
- Research interests include evaluating various risk factors for the development of elevated intracranial pressure, venous engorgement and visual changes during long duration spaceflight, evaluating structural changes to the retina with changes in intracranial pressure or venous flow, and evaluating the utility of various noninvasive modalities for estimating intracranial pressure during spaceflight.
- Works under the mentorship of R. Blaine Easley, MD, and Jonathan Clark, MD. Dr. Easley is an associate professor of pediatrics and Anesthesiology at the Texas Children's Hospital and an authority on porcine modeling of intracranial pressure changes and cerebrovascular physiology. Dr. Clark is an associate professor of neurology at the Baylor College of Medicine, former NASA flight surgeon, and current Space Medicine Advisor for the National Space Biomedical Research Institute. He has expertise in space physiology.

**TIMOTHY SZWARC**

Stanford University
timothyszwarc@gmail.com

TECHNICAL PRESENTATION

Date: September 26, 2013
Time: 14:45
Room: 306B

RESEARCH TOPIC

Thermal Mapping and Trends of Mars Analog Materials in Sample Acquisition Operations Using Experimentation and Models

BIOGRAPHICAL SKETCH

Timothy is a fifth-year doctoral candidate at Stanford University in the Department of Aeronautics and Astronautics. Timothy worked on the design and testing of the powder-acquiring drill system onboard the Mars Science Laboratory during three co-op work terms at JPL. In addition, he has worked at Honeybee Robotics in Pasadena, CA, testing and improving equipment for Mars Sample Return and novel excavation technologies for the Moon and Mars. Timothy holds a bachelor's degree in mechanical engineering from Cornell University and a master's degree in aeronautics and astronautics from Stanford. Outside of engineering, Timothy enjoys surfing, running, and hiking.

RESEARCH AND EDUCATION ACTIVITIES

- Thermal model creation for solar system sample acquisition
- Rock experimentation in Martian conditions
- Planning techniques for rover sampling operations

**INNOCENT UDOM**

University of South Florida

iudom@mail.usf.edu

POSTER PRESENTATION

Date: September 25, 2013

Room: Poster Session

Time: 13:30

Room: North Foyer, Poster Session

RESEARCH TOPIC

Photocatalytic Application of Zinc Oxide Nanowires for Green Space Exploration

BIOGRAPHICAL SKETCH

Innocent is a doctoral candidate at the University of South Florida. He received his bachelor's degree in chemical engineering from Rossijskij Himiko-Tehnologiceskij Universitet im. D.I. Mendeleeva, Moscow, Russia; and a master's degree from the University of South Florida at Tampa. His research experience includes assessment of a localized bisphosphonate therapy for Perthes disease using multifunctional gold nanoparticles and supercritical distillation of crude oil using organic additives. His current research includes sustainable algal aerospace biofuel production from wastewater nutrients and photocatalyst applications for green space exploration. He is also a mentor and tutor to several undergraduate students.

RESEARCH AND EDUCATION ACTIVITIES

- Recipient of NASA-JPFP summer internship award.
- Intern with Dr. Aloysius Hepp, a senior chemist at the Bioscience and Technology Branch, Space Processes and Experiments Division at NASA's John H. Glenn Research Center at Lewis Field.
- His interests include examining current technologies available for enhanced microalgal CO₂ fixation, specifically exploring the possibility of coupling wastewater treatment with microalgal growth for eventual production of aerospace biofuels and/or added-value products, with an emphasis on productivity.