

## **RESEARCH and OUTREACH ACTIVITIES**

**at**

### **MASSBAY COMMUNITY COLLEGE**

**Giuseppe Sena (Tony)**

Assistant Professor, Computer Science

<http://www.massbay.edu/Faculty-Profiles/Giuseppe-Sena.aspx>

[gsena@massbay.edu](mailto:gsena@massbay.edu)

### **RESEARCH ACTIVITIES:**

- Megan DeLaney (Faculty Advisor: [Giuseppe Sena](#)), ***“Finding the Optimal Route Around an Amusement Park to Maximize Fun and Minimize Time by Applying a Parallel Genetic Algorithm to the Traveling Salesman Problem”***, 20<sup>th</sup> annual conference of the Consortium for Computing Sciences in Colleges, Northeastern Region (CCSCNE), April 17 – 18, 2015 at College of the Holy Cross (Worcester, MA) **(1)**.
- Maria del Mar (Faculty Advisor: [Susanne Steiger-Escobar](#)), ***“Fun Interactive Pi-Robotic Projects for K-12”*** **(1)** (Also presented at [CUR POH](#) conference).
- Thomas Sharkey, Catherine Huang, Ian Cullinane (Faculty Advisor: [Shamsi Moussavi](#)), ***“Cybersecurity Games Can Be Interactive, Fun, Educational and Engaging”*** **(1)**.
- Justin Jiang, Patrick Ryan, Grant Fitzgerald, Richard Hayes, Julian Kuk, Chester Moses, Lindsay Schulman, ***“Using a Beowulf Cluster for the Computation of Allelic Frequencies on DNA Samples”***, 19<sup>th</sup> annual conference of the Consortium for Computing Sciences in Colleges, Northeastern Region (CCSCNE), April 25 – 26, 2014 at Providence College (Providence, RI).
- [Giuseppe Sena](#), Grant Fitzgerald, Richard Hayes, Justin Jiang, Julian Kuk, Patrick Ryan, Chester Moses, Lindsay Schulman, [Bruce Jackson](#), ***“Computation of Allelic Frequencies Using the “Cerberus” Beowulf Cluster”***, IEEE SoutheastCon 2014 conference, March 13– 16, 2014 (Lexington, KY) **(2)**.
- Brian Ryner, William Bishop, Douglas Hyland, Nicolai Drozd, Afsaneh Ghanavati, [Marina Bograd](#), [Giuseppe Sena](#), Renato Mikio Nakagomi, Zuher Miro, ***“Sudo Pi Cooler/Heater: Raspberry Pi to Design an Adaptive Temperature sensor”*** **(2)**.
- Jeff Becker, Richard Hayes, and Charles Singleton (Faculty Advisor: [Giuseppe Sena](#)), ***“Distributed Mandelbrot set & DES Brute-force Algorithm on the “Cerberus” Beowulf Cluster (Case Study)”***, 18<sup>th</sup> annual conference of the Consortium for Computing Sciences in Colleges, Northeastern Region (CCSCNE), April 12<sup>th</sup>–13<sup>th</sup>, 2013 at Siena College (Loudonville, NY).

## **OTHER ACHIEVEMENTS:**

- On April 17th 2015, the **Council on Undergraduate Research (CUR)** and **The Barry Goldwater Scholarship and Excellence in Education Foundation** presented [Dr. Bruce Jackson](#), Professor and Chair of the [Department of Biotechnology and Forensic DNA Science](#) at [MassBay](#), the **2015 CUR-Goldwater Scholars Faculty Mentor Award**.
- MassBay have produced 20 [Goldwater Scholars](#) over the past few years. Since 1996, students in Prof. Jackson's program have won more of the scholarships than all other two-year colleges in the nation combined.
- In 2012, the [Computer Science Department](#) at [MassBay](#) design and built a small [Beowulf](#) cluster named [Cerberus](#) that is used to teach parallel and distributed computing to CS students. This cluster has also been used to do multidisciplinary research in the **STEM division** (see publications above). We have used **Cerberus** to analyze real-life forensic cases, and we are planning to use it to teach computational biology.
- Students in the [Marine Biotechnology](#) and Engineering Programs at MassBay designed and built a submersible named **[RUSS \(Robotic Underwater Surveillance System\)](#)**. Using RUSS students conduct important research in places such as Montserrat (West Indies) and Puerto Rico.
- Prof. of Biotechnology [Dr. Jackson](#) was selected by PBS's *NOVA* series to be profiled for their "[Secret Life of Scientists](#)" web-series. It is only the second profile the producers of the series have produced that features a scientist from a community college.
- On April 2015 the [United States Attorney, Carmen Ortiz](#), just visited and spoke at Mass Bay regarding: "***Protecting the People: A Federal Law Enforcement Perspective on Terrorism and National Security***".

## **OUTREACH:**

- **[STEM Expo](#)**: The STEM Expo is a bi-annual event which highlights student-developed projects that demonstrate the multi-dimensional skills, problem-solving capabilities and talents cultivated in the classroom by MassBay's STEM students.
- **[Summer Bridge Program for High School Students](#)**: A 10-day program for high school students that gives them a "taste" of STEM education by enrolling in either a college level class (Engineering Design or Digital Imaging) or four 2.5 day workshops (Coding with Scratch, Artbotics, Using Python on a Raspberry PI, and Creating Mobile Apps with App Inventor). The transferable college level courses are open to rising juniors and seniors as well as current seniors; the workshops are open to all high school students.

- **Summer STEM Program for Middle School Students**: Provides middle school students an engaging and hands-on STEM experience, an exciting introduction to various STEM careers and enables them to develop new skills. Students work collaboratively to design and build a themed STEM hands-on project during the 10 day program. Students participate in class projects that will strengthen Math, Biology, Physics and Chemistry concepts, while having fun!
- **Hour of Code**: [Code.org](http://Code.org) has introduced the "Hour of Code" campaign to inspire students across the U.S. to learn to code for 1 hour. The CS Department in collaboration with the [STEAM consortium](#) of clubs joined a national effort to celebrate Computer Science Education Week at MassBay.
- **Hands-On STEM Workshop Program for high school students who aspire to be school teachers**: This is a collaboration between the **Early Childhood Education** department and [STEM Division](#) at [MassBay](#). The program brings students from several high schools to MassBay for a half-day program to learn about the importance of STEM in the education field. Students participate in various STEM workshops including ArtBotics, Surprise Science Activities, Science and Math for young children, Fun with physics and chemistry.

## **EXTERNAL COLLABORATION and GRANTS:**

- **NSF/SBIR Small Business Grant in collaboration with Artaic LLC**: In this project [MassBay](#) students and faculty worked with the team at Artaic to design solutions for two technology issues.
  - a. **Computer Science Project**: Design & implementation of Artaic's state-of-the-art new computer network.
  - b. **Engineering Project**: Design and automation of the tile feeding system.
- **NSF/ATE Grant in collaboration with Boston College (BC)**: This ATE grant has been recommended by NSF. In this project [MassBay](#) (Computer Science & Engineering Departments) will work together with [Boston College](#) on a 3-year project on the design and implementation of a project-based course to teach students computer science, engineering, and robotics concepts.
- **NSF S-STEM Grant**: [MassBay](#) was awarded an NSF grant for student scholarships. Scholarships will be awarded by [MassBay](#) to students pursuing their associate degree in STEM, who are legal US citizens or residents, and who demonstrate academic potential and financial need. [Dr. Jackson](#) is the grant's Principal Investigator, [Dr. Chitra N. Javdekar](#), Dean of STEM, and Elizabeth Enos, Director of Financial Aid are Co-Principal Investigators.

- **TRANSFORM Program Collaboration:** [MassBay](#) and [Northeastern University](#) are collaboratively creating and implementing an innovative TRANSFORM model to further develop the skill sets of non-technical college graduates. The program enables bachelor's degree graduates in non-technical fields to be trained for advanced manufacturing jobs that would otherwise go unfilled due to the shortage of qualified job seekers nationwide.
- **NSF STEP UP Grant:** **NSF STEP UP** is a STEM Talent Expansion - University Partnership (STEP UP) Project at [MassBay](#) in partnership with the [Northeastern University](#) funded by the NSF. The primary goals of the grant are to increase the graduation and transfer rates of students in the STEM fields at the community colleges.
- **STEM Starter Academy:** This is a state Department of Higher Education grant that was awarded in 2014 to all of the Community Colleges in the Commonwealth, including MassBay. The focus of the grant is to increase student awareness and access to STEM programs of study and career opportunities; enhance student readiness for and recruiting into STEM pathway programs; improve student retention based on academic success and overcoming "life barriers"; increase completion through award of certificates or degrees and pathways to STEM jobs or transfer to higher level STEM academic programs.
- **STEM Mentor Program:** This is a collaboration with industry partners, Genzyme/Sanofi, in which MassBay STEM students are paired with Genzyme/Sanofi professionals in one-on-one mentoring relationships. Mentors provide students with professional and educational guidance and receive support through the program throughout the year. In addition to individual relationships, the program provides monthly substantive, skills-based and networking programs to all STEM students. The goals of this program are to (1) complement existing curriculum that is being taught in the classroom by STEM faculty; (2) help students develop confidence, resilience, self-awareness, and social capital; and (3) help students learn how to navigate professional networks and understand workplace expectations for STEM professionals.
- **BATEC:** is a Center of Excellence for Computing and Information Technologies, sponsored by the National Science Foundation. BATEC is dedicated to increasing both the capacity and the robustness of career-focused pathways in the fields of Computer Science, Information Technology, Computer Networking and Data Analysis. MassBay is one of the academic partners.

## **STUDENT CLUBS:**

- **Computer Club:**
  - a. Encourages students to explore in-depth computing concepts and tackle modern industry issues
  - b. Connects students with resources and tools to perform their experiments and research
  - c. Builds teams for regional and national programming and computing competitions
  - d. Hosts guest speakers from among industry leaders and Massbay alumni
  
- **STEAM Consortium:** The STEAM Consortium is a collection of student clubs at [MassBay](#) that are involved in collaborative hands-on projects in the area of science, technology, math, engineering, computer science, and art. The Consortium regularly showcases its interactive exhibits in local public school and community-driven science fairs to promote interest in these fields among youth. This year we brought STEM interactive exhibits to:
  - a. Boston Public School Science fair for middle school and high school students
  - b. The Needham STEAM night for elementary school students and their parents
  - c. The Wellesley STEM fair
  - d. [BC College-Bound](#) program for high school students