

# **IEEE RAS Humanitarian Technology Day 2017**

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## **ABSTRACT**

The Humanitarian Technology Day (HTD) has discussed several humanitarian challenges and potential solutions to them using diverse engineering backgrounds for better living. This conference, organized by students for students, has brought together specialists, entrepreneurs, and non-profit organization officials from different IEEE Regions to discuss the current and emerging humanitarian issues across the globe. This event not only promoted humanitarian awareness in our local community, but it also has trained students on how to build strategies for identifying humanitarian problems, and designing and implementing solutions in their region.

## **1. DEVELOPMENT**

### **1.1. Motivation**

Multiple issues related to climatic, demographic and political trends are increasing the scale and complexity of crises worldwide. These aspects have tremendous implications for the humanitarian system, and for consolidating humanitarian capacity in particular. In order to meet current and future challenges the humanitarian system must evolve to bring in new leaders and new agendas. Students and young engineers have the power to develop novel and creative solutions for many hard engineering problems, demonstrating an important set of tools for dealing with world crisis circumstances.

### **1.2. Goals**

The objective was to plan and host a student conference about humanitarian technology at Michigan State University, including goals such as create a unique opportunity for interaction and collaboration between local students and off-campus humanitarian technology experts; increase the amount of college and pre-college students involved in humanitarian engineering projects; promote and strengthen the relationship of various non-profit organizations that share similar goals and interests; raise humanitarian awareness in the geographic area of IEEE Region 4; recruit more local student members for IEEE and IEEE Robotics and Automation Society (RAS) organizations.

### 1.3. Deliverables

The conference planning started on April, 2017, after a meeting with the RAS Chapter from the Southeast Michigan Section (SEM). The organizing committee was formed by volunteers of the IEEE Student Branch at Michigan State University (IEEE-MSU). A budget proposal was submitted to the SEM Section executive committee (ExCom) on May, 2017, and it was approved by its officers on June, 2017. The event was held on October 14, 2017, in East Lansing, Michigan, at Michigan State University. Several guest speakers who have expertise in developing or assisting with humanitarian projects, and from various engineering backgrounds and academic levels, were invited by the conference program Chair (Table 1).

In collaboration with the Ann Arbor branch of Puerto Rico Rises, a group of graduate students at MSU (originally from Puerto Rico) was collecting relief supplies on campus during October. We offered a chance for them to speak at the event about the recent humanitarian crisis, in the aftermath of Hurricane Maria, and share the results of their relief efforts. Since multiple IEEE Student Branches were attending the conference, the event agenda also included a meeting for discussing the planning of the 2018 IEEE Region 4 Student Leadership Conference, which was led by IEEE Region 4 officers and representatives.

Table I. Conference Guest Speakers

<b>Presenter Name</b>	<b>Talk Title</b>
Raj Madhavan (Chair of RAS-SIGHT)	Bringing Robotics to the People: Technology-Public Policy Considerations for Societal Good
Silvia Figueira (Associate Professor at SCU)	Humanitarian Frugal Innovation
John Barrie (Executive Director at ATC)	Mayan Power and Light
Mary Anne Walker (Director of Global Engineering at MSU)	Resources, Networks & Best Practices: Implementing Your Ideas on a Global Scale
Grace Hsia (Co-Founder & CEO at Warmilu)	Making Impact in Two Worlds: Technology Development for Resource-Scarce Settings and Technology Diversification into the Developed World
Adithya Jayakumar (Advisor of Design for 90 at OSU)	Design for 90: Engaging Students to Design for the Other 90%
Adam Lyman (Manager of the GCFSI Bean Threshing)	Rethinking Design for Social Innovation: Stories from the Field
Emily Sullivan (President of EWB at MSU)	Hard to Compete with Free
Nevrus Kaja (Chair of IEEE SAC at Region 4)	Student Officer Training: Engaging in Humanitarian Technological Activities & Projects
Christopher Lopez (Student Representative at Region 4)	IEEE Region 4 Student Leadership Conference Bid and Planning for 2018
Sylmarie Dávila-Montero, Nomar S. González-Santini, Lisaura Maldonado-Pereira, Angélica Medina-Cucurella	Rebuilding Puerto Rico - Puerto Rico Relief Efforts

(Volunteers of Puerto Rico Rises)	
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In addition to the keynote and invited talks, we organized a spin-off version of the LTU Robofest competition, which targeted K-12 robotics projects with humanitarian goals. The Robofest Humanitarian Exhibition received registrations of 4 teams in total, with only 3 teams being able to attend the conference (Table 2). The teams competed against each other and were evaluated in categories such as application of science and engineering skills, originality, practicality, and presentation quality. Each project focused on a different humanitarian problem and presented innovative solutions using robotics kits and waste/recyclable materials. The competition judging panel was composed of faculty members, industry professionals, and graduate students.

Table II. Robofest Humanitarian Exhibition Projects

Team Name	Project Name	Problem
TechSisters	HeroBots	Rescue / Healthcare
Roboteers with Altitude	Autonomous High-Altitude Balloon Network	Communication
Aquabots	Sustainable Clean Water	Water Quality

## 2. RESULTS

The conference has attracted IEEE members and non-members across Region 4 which represents the geographic area of Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, North and South Dakota, Ohio, and Wisconsin. This event promoted collaboration among participants with different degree levels such as K-12 students, college students (undergraduate and graduate), faculty members and professionals from industry. Since the conference theme was relevant to many engineering areas, we have received attendees from various fields of study, such as: Electrical Engineering, Mechanical Engineering, Computer Engineering, Chemical Engineering, Civil Engineering, Materials Science and Engineering.

The Humanitarian Technology Day 2017 had over 70 participants, including more than 30 IEEE Members (both student and professional memberships). The event had the presence of many student representatives (Figure 1) from different universities in the United States: Michigan State University, University of Michigan, Minnesota State University, Purdue University, and Stevens Technology Institute.

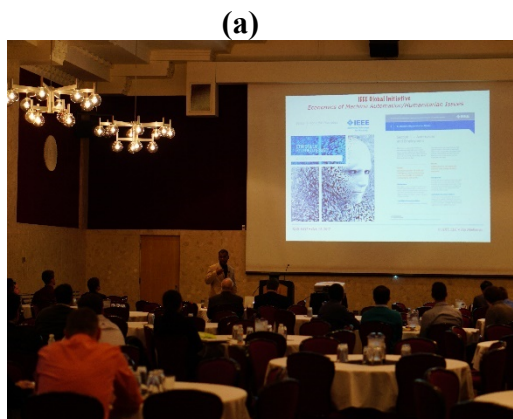


Fig. 1. Conference day with guest speakers and students. (a) A keynote presentation, and (b) the IEEE Student Branch officers from MSU (left) and MNSU (right).

After presenting their Robofest Humanitarian Exhibition projects to the judges and general public, each team was awarded a plaque for participation. The first place award was given to the HeroBots project from TechSisters team. Their project consisted of a system of robots that can rescue and help displaced people who lost their home due to natural and man-made disasters. Independent robotic systems were able to rescue victims from heavy debris, guide them to relief camps, build shelters at the relief camp, distribute food at the camp and provide entertainment with robotic puppet show (Figure 2).



Fig. 2. The LTU Robofest Humanitarian Exhibition Competition. (a) A team composed of K-12 students (TechSisters) testing their humanitarian robotics project, and (b) the same team being awarded a plaque for participation.

Through the realization of this event, many students from Michigan State University became interested in joining the IEEE organization as well as helping with the establishment of a RAS Student Chapter. The IEEE MSU Student Branch is now taking the next steps for submitting an application to form a local RAS Student Chapter which will help in developing similar initiatives, expand the number of activities through the available student programs, and create new opportunities for funding and grants request.

### 3. FINANCES

The event was sponsored by (from highest to lowest donation) the Department of Electrical and Computer Engineering at MSU, University Outreach and Engagement Office at MSU, IEEE RAS-SIGHT, IEEE Life Member Committee, IEEE-USA PACE, Continental AG, LTU Robofest, and MSU Federal Credit Union. In addition, the IEEE Student Branch at MSU has contributed with some funds from its own available balance as means of investment. On Table 3, it is included the total cost breakdown for all expenses regarding the venue, catering services, travel funds and lodging for guest speakers, and promotional materials.

Table III. Costs Explanation

Category	Description	Total Cost
Travel	Keynote Speaker: Silvia Figueira	\$692.40
	Invited Speaker: Adithya Jayakumar	\$396.40

Lodging	Rooms and Meals (Kellogg Hotel & Conference Center)	\$2,011.45
Venue	Rooms, Equipment and Catering (MSU Union)	\$5,805.00
Materials	T-Shirt and Bags (Job Shop Ink)	\$1,556.61
	Name Badge Holders (Amazon)	\$63.98
	Banners (Staples Print)	\$309.67
	Brochures (FedEx Print)	\$601.00
Awards	Plaques (Larry Cushion)	\$425.00
	Trophy (Larry Cushion)	\$50.00
<b>Overall Cost</b>		<b>\$11,911.51</b>

The funds obtained through RAS-SIGHT were directly applied towards the conference expenses, showing important contribution for the event organization and implementation.

Table IV. Utilized Funds

<b>Total RAS-SIGHT Grant</b>		<b>\$2,500.00</b>
<b>Travel Expenses</b>		
Keynote Speaker: Silvia Figueira		-\$692.40
Invited Speaker: Adithya Jayakumar		-\$396.40
<b>Material Expenses</b>		
Name Badge Holders (Amazon)		-\$63.98
Banners (Staples Print)		-\$309.67
Brochures (FedEx Print)		-\$601.00
<b>Awards Expenses</b>		
Plaques (Larry Cushion)		-\$425.00
Trophy (Larry Cushion)		-\$50.00
<b>Total Expenses</b>		<b>(-\$2,538.45)*</b>

\*The difference was covered by other funding sources.

#### 4. CONCLUSION

The Humanitarian Technology Day allowed a close connection and networking between college students and humanitarian specialists, strengthening the collaboration in many humanitarian engineering projects and initiatives. We have raised humanitarian awareness in the IEEE Region 4 community by organizing this student conference at Michigan State University where humanitarian technology experts, entrepreneurs, non-profit organization officials, and students from different academic levels were able to discuss current and emerging humanitarian problems in various under-served communities across the globe, and how to solve them by applying engineering expertise towards innovative technologies. Due to budget limitations and the number of available volunteers for the organizing committee, the conference time was kept as a single day only. In case of potential further editions, additional days can be considered, and more content can be included.

#### APPENDIX

Conference Website: <http://sites.ieee.org/sb-msu-htc/>

Conference Electronic Brochure:

[http://sites.ieee.org/sb-msu-htc/files/2017/10/ieee\\_ras\\_htd\\_brochure\\_2017.pdf](http://sites.ieee.org/sb-msu-htc/files/2017/10/ieee_ras_htd_brochure_2017.pdf)