Global Reach, Local Impact: IEEE and Technology, Aiding Humanity

J. Roberto B. de Marca
IEEE President and CEO

IEEE GHTC 2014
San Jose, USA
IEEE at a Glance

Our Global Reach

431,000+ Members

45 Technical Societies and Councils

160+ Countries

Our Technical Breadth

1,400+ Annual Conferences

3,700,000+ Technical Documents

160+ Top-cited Periodicals
Global Community, Global Impact

TOTAL MEMBERSHIP* – 431,191

*membership data as of EOY 2013
Demographics is changing

Region 7: Canada
Region 8: Europe, Africa, Middle East
Region 9: Latin America
Region 10: Asia & Pacific
(from GP AdHoc 2012)

All members

Student Members

Half our student members are in Asia & Pacific or Latin America
How We Impact

IEEE drives the technologies that improve the quality of life.
2013 JCR® study reveals IEEE journals continue to maintain rankings at the top of their fields.

19 of the top 20 journals in electrical engineering are published by IEEE.

Source: 2013 Thomson Reuters Journal Citation Reports® (JCR)
IEEE leads as the most-cited publisher in new patents from the top patenting organizations.

IEEE is cited over 3x more often than any other publisher.

Patents filed between 1997 and 2012 by 40 top-patenting organizations
Source: 1790 Analytics LLC. Copyright 2013.
IEEE Xplore® Digital Library

IEEE intellectual property, all searchable in one place.

- Powerful search tools
- Over 3.7 million full-text articles and papers
- Users download more than 8 million documents per month
<table>
<thead>
<tr>
<th>Nation</th>
<th>Number of Conferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>1929</td>
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<tr>
<td>China</td>
<td>1050</td>
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<tr>
<td>India</td>
<td>360</td>
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<tr>
<td>Japan</td>
<td>271</td>
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<td>Italy</td>
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<td>United Kingdom</td>
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<td>Korea (South)</td>
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<td>Spain</td>
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<td>Taiwan</td>
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<td>Singapore</td>
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<td>Turkey</td>
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<td>Greece</td>
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<td>Poland</td>
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<td>Russia</td>
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<td>Egypt</td>
<td>62</td>
</tr>
<tr>
<td>Netherlands</td>
<td>61</td>
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Leading Nations in Total Conferences 2008-2013
Consumers around the world enjoy the benefits of IEEE’s standards. Here are a few you may recognize...

IEEE 802.11
IEEE 802.15
IEEE 1394
IEEE 1680
Improving Personal Health

- Insulin Pump IEEE 11073-10419™
- Glucose Meter IEEE 11073-10417™
- Weigh Scale IEEE 11073-10415™
- Blood Pressure Monitor IEEE 11073-10407™
- Electrocardiograph (ECG) IEEE 11073-10406™
- Cardiovascular Fitness & Activity Monitor IEEE 11073-10441™
- Body Composition Analyzer IEEE 11073-10420™
- Sleep Monitor IEEE 11073-10423™
- Sleep Apnea Breathing Therapy Equipment IEEE 11073-10424™

Connectivity Transports
- IEEE 802.3™ (Often referred to as Ethernet)
- IEEE 802.11™ (Often referred to as WiFi®)
- IEEE 802.15.1™ (Often referred to as Bluetooth®)
- IEEE 802.15.4™ (Often referred to as Zigbee®)
- IEEE 11073-30300™ (Often referred to as Infrared Communications)
- IEEE 11073-30400™

World Wide Web

Health Care Manager

Physician
IEEE Xtreme Competition

IEEE Xtreme is a global challenge in which teams of IEEE Student members compete in a 24-hour time span against each other to solve a set of programming problems.

Grand Prize:

All expense-paid trip to an IEEE conference of choice, anywhere around the world!

IEEE Xtreme 8.0: 18 October 2014

www.ieee.org/xtreme
Humanitarian Technology and social innovation in IEEE
Humanitarian Technology Challenge (2008 – 2011)

Description

- Focused collaboration with NGOs, and all IEEE OUs
- Drive technology-based solutions
- Using a systems-engineering approach
- Jointly sponsored by IEEE and UN Foundation

Outcomes

- Identify three challenges with implementable and sustainable solutions
- Bring systematic approach, with repeatable methodology
- Raise awareness within IEEE
Humanitarian Technology Challenge

- Worked with 15 NGOs and Foundations in four focus groups to research needs
  - 37 needs identified and three selected using five developed criteria
  - 22 Societies represented on Society Partnership Group
  - All 10 Regions represented on Regional Partnership Group
  - 35 external strategic partners for field tests
  - By end of year, solution tests underway in 10 countries
  - Over 1000 volunteers involved
  - Over $3M in funding over four years, including NIC/Board, UN Foundation, IEEE Foundation, NPSS, PES

12/03/13
Solutions Overview

- **Individual Patient ID**
  - Consistent availability of patient medical records.
  - *Important for ongoing treatment of patients, especially migrants and those with long-term diseases*

- **Data Connectivity**
  - Capability of exchanging data among remote field offices and central health facilities.
  - *Important for accessing treatment protocols, creating and monitoring health trends, and sharing results of treatments*

- **Reliable Electricity**
  - Availability of electric power for lighting and other electronic devices in resource-constrained environments.
  - *Important for education, communications, and economic development (two solutions)*
Field test of a Patient Identification system was done using Radio Frequency Identification cards, bracelets, rings or amulets, so that patients’ medical records can be accessed quickly and reliably. The system was also tested in Dubai.
IEEE and its local partner, GTR Pontificia Universidad Catolica del Peru, has erected and equipped four data communications towers in the Amazon jungles that interconnect nine locations for exchange of medical data.

Over 900 villagers had fast access to medical practitioners electronically, instead of taking days to reach them physically.
Reliable Electricity in Nicaragua

In Nicaragua, IEEE has placed two smaller scale electricity systems capable of powering a small community center or health clinic.
IEEE and its local partner, Sirona Cares, have placed in Haiti six Sunblazer trailers that recharge portable battery kits rented to residents and small businesses.

Over 1000 people had nighttime lighting for reading, socialization and medical care.

http://www.youtube.com/watch?v=AhlZGKqQrRE
IEEE Presidents’
Change the World Competition

- Recognizes and rewards students who identify a real-world problem and apply engineering, science, computing, and leadership skills to solve it

- Grand Prize winner for 2012 was Stephen Honan for his project: “Clean Water: Transforming a Natural Disaster into a Natural Resource”
  - Developed a low cost filtration system that uses ferns to rapidly purify arsenic-laden drinking water
  - Also developed an environmentally friendly way to recycle waste products from the filters and harvest the arsenic for use in the production of solar panels and semiconductors
From 2011 to 2014: Increase engineering capacity in underserved and developing areas of the world

**Community engagement**
- Sharing of knowledge, skills, & experience
- Organising interested IEEE volunteers

**Workforce development**
- Strengthening educational infrastructure
- Bringing young people to engineering

**Thought leadership & advocacy**
- Convening prominent thinkers
- Unique content
- Advocate for role of engineering in the sector

**Develop knowledge base to guide decisions**
- Approach, Tools, Practices, Framework, Sustainability strategy

In projects across the IEEE and with strategic external partners
Workforce Development
Thought Leadership & Advocacy

UN Foundation Practitioners Network, Patna, India
SIGHT: Special Interest Group in Humanitarian Technology

- 52 active SIGHTs
- Projects and Activities (18 reports)
- Community Engagement Workshops (5)
- Conference Participation Support (12)
SIGHTs are Growing!

Currently: 52 active SIGHT groups from all over the world

<table>
<thead>
<tr>
<th>Country</th>
<th>SIGHTs</th>
</tr>
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<tbody>
<tr>
<td>Argentina</td>
<td>1</td>
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<tr>
<td>Bangladesh</td>
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<tr>
<td>Bolivia</td>
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<tr>
<td>Brazil</td>
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</tr>
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<td>Canada</td>
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<tr>
<td>Chile</td>
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<td>Guatemala</td>
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<td>India</td>
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<tr>
<td>Indonesia</td>
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<td>Malaysia</td>
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<tr>
<td>Mexico</td>
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<tr>
<td>New Zealand</td>
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<tr>
<td>Nicaragua</td>
<td>1</td>
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<td>Pakistan</td>
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<tr>
<td>Singapore</td>
<td>1</td>
</tr>
<tr>
<td>USA</td>
<td>5</td>
</tr>
</tbody>
</table>
Categorization

- **Part A** - Minor Projects:
  - Usually one time, non recurring
  - Education, Networking and Preparatory
  - Inspiration, Encouragement, Orientation

- **Part B** - Major projects
  - Sustained, multi year efforts
  - Significant external collaboration
Part A projects and activities

Green Energy Showcase – Karachi SIGHT
PUC-MINAS SIGHT Meeting in Luiziânia, Brazil
2014 – Major Projects

- Solar Rickshaw – Bangladesh SIGHT
Community Engagement Workshops

Montreal CEW – Canada SIGHT, June 2014
EPICS in IEEE Around the World

Involving over 214 volunteers with 432 University Students and 816 pre-university students thousands in communities around the world

<table>
<thead>
<tr>
<th># of Projects</th>
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<tbody>
<tr>
<td>Argentina</td>
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<tr>
<td>Belgium</td>
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<tr>
<td>China</td>
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<tr>
<td>India</td>
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<tr>
<td>Kenya</td>
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<td>Malaysia</td>
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<td>Mexico</td>
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<td>Namibia</td>
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<td>Nigeria</td>
<td>1</td>
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<td>Portugal</td>
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<td>South Africa</td>
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<td>Tunisia</td>
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<td>Uganda</td>
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<td>United States</td>
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<td>Uruguay</td>
<td>2</td>
</tr>
<tr>
<td>Zambia</td>
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<tr>
<td>Zimbabwe</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>51</td>
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Since 2009 51 out of 89 proposals have been funded

30 projects are considered completed.

Volunteer Training Workshops (first in 2010 in South Africa)

200+ volunteers, 432 University Students and 816 pre-university students have been involved to date
<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Category</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>2011</td>
<td>Argentina</td>
<td>Environment</td>
<td>Waste Electrical and Electronic Equipment (WEEE) Recycling Program</td>
</tr>
<tr>
<td>2011</td>
<td>Argentina</td>
<td>Access &amp; Abilities</td>
<td>IP telephony system implementation</td>
</tr>
<tr>
<td>2011</td>
<td>Argentina</td>
<td>Education &amp; Outreach</td>
<td>Design, development and construction of modular educational kits for teaching electronics in high school level for public schools in the Province of Cordoba</td>
</tr>
<tr>
<td>2010</td>
<td>Belgium</td>
<td>Human Services</td>
<td>Construction of solar cells to meet basic needs of Bagaya, Senegal</td>
</tr>
<tr>
<td>2013</td>
<td>China</td>
<td>Human Services</td>
<td>Intelligent Bookshelf Designed For Children And The Disabled</td>
</tr>
<tr>
<td>2014</td>
<td>China</td>
<td>Human Services</td>
<td>Education and Outreach of Electrical Engineering and Renewable Energy</td>
</tr>
<tr>
<td>2011</td>
<td>India</td>
<td>Education &amp; Outreach</td>
<td>Video learning for rural schools</td>
</tr>
<tr>
<td>2011</td>
<td>India</td>
<td>Education &amp; Outreach</td>
<td>Humanitarian computing local solutions for the visually impaired</td>
</tr>
<tr>
<td>2012</td>
<td>India</td>
<td>Access &amp; Abilities</td>
<td>Communicative Hand Glove For Deaf And Mute</td>
</tr>
</tbody>
</table>
“The CSI was founded on the premise that affordable electricity needs to be scalable to reach millions to have any significant impact to reach the energy-impoverished 1.4 billion. Other underlying premises are that to be scalable, businesses need to be sized to attract private investment and that the products need to be more desirable to customers than alternatives now in use, for example candles and kerosene for lighting.”

From [http://communitysolutionsinitiative.org/](http://communitysolutionsinitiative.org/)
The Sirona Haiti Rural Electricity Project

The operation is sustainable and scalable.

From http://communitysolutionsinitiative.org/
Objective: Develop small-scale generation options which can be owned and operated by a local entrepreneur in the developing community. Creating both a source of electricity for communities as well as jobs for the members of the communities.
Growth of Conferences focusing in Humanitarian Technology

- GHTC Conference Series
- International HTC, first issue held in Canada earlier this year
- Region 10, first issue held in Sendai, Japan in 2013. Second issue held in Chennai, India, 2014.
Going Forward
Humanitarian Technology in IEEE includes:

- Technologies to improve the quality of life of:
  - underserved populations.
  - persons with physical or mental disabilities.
  - the elderly.

- Technologies to prevent and mitigate the effects of natural disasters.
Overview of Options

Option #1
• Focus on changing the culture of the profession

Option #2
• Focus on boots-on-the-ground work

Option #3
• Focus on humanitarian technology development
Option #1

Overview
- Focus on changing the culture of the profession

Vision
- IEEE will lead the charge to establish a sense of social responsibility as a core professional expectation.

Scope
- Advocacy for pro bono work with industry
- Advocacy within Universities
  - Curriculum modification/development
- Developing programs for contributing to society
  - From universities through the profession
Overview
• Focus on boots-on-the-ground work

Vision
• IEEE will possess a large network of volunteers around the world carrying out and/or supporting impactful humanitarian activities on the local level

Scope
• Member activities such as SIGHT, EPICS, CSI
• Outgrowths of these activities, such as partnerships with local NGOs, educational activities, etc.
Option #2 SWOT

- **Strengths:** Many passionate IEEE volunteers
- **Weaknesses:** No overarching direction for the activities
- **Opportunities:** IEEE possesses the membership reach to have widespread global impact
- **Threats:** Without overarching direction, difficulty to scale or have lasting impact
Overview

• Focus on humanitarian technology development
  - Also called appropriate technology

Vision

• IEEE will be recognized as one of the global leaders in supporting the development of appropriate technology

Scope

• Be the recognized leader in publications and conferences for appropriate technology
• Focus on the technology itself, rather than the act of helping
Other Important Steps

- Develop a collaboration model with other organizations active in this space.
- Develop a funding model(s) for the activities, leveraging the IEEE brand.
- Integrate with other IEEE activities (e.g. in Societies), including efforts in emerging technologies (Smart Cities, Internet of Things, Life Sciences, etc.)
Most important play in 2014 FIFA World Cup
Thank you.

Grazie.

Diolch yn fawr.

Cảm ơn bạn.

Kiitos.

Děkuju.

Asante.

Go raibh maith agat.

Σας ευχαριστώ.

Salamat sa inyo.

감사합니다.

谢谢

Merci.

 obrigado.

Obrigado.

Gracias.

Danke.

Asante.

Thank you.

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