

Surgical Robotics

Industry Connections Activity Initiation Document (ICAID)

Version: 1.0, June 06, 2014

Instructions

- Instructions on how to fill out this form are shown in red. It is recommended to leave the instructions in the final document and simply add the requested information where indicated.
- **Shaded Text** indicates a placeholder that should be replaced with information specific to this ICAID, and the shading removed.
- Completed forms, in Word format, or any questions should be sent to the IEEE Standards Association (IEEE-SA) Industry Connections Committee (ICCom) Administrator at the following address: industryconnections@ieee.org.
- The version number above, along with the date, may be used by the submitter to distinguish successive updates of this document. A separate, unique Industry Connections (IC) Activity Number will be assigned when the document is submitted to the ICCom Administrator.

1. Contact

Provide the name and contact information of the primary contact person for this IC activity. Affiliation is any entity that provides the person financial or other substantive support, for which the person may feel an obligation. If necessary, a second/alternate contact person's information may also be provided.

Name: Raj Madhavan

Email Address: raj.madhavan@ieee.org

Phone: +1-240-404-8795

Employer: University of Maryland, College Park

Affiliation: Institute for Systems Research

2. Type of Activity

Specify whether this activity will be entity-based (participants are entities, which may have multiple representatives, one-entity-one-vote), or individual-based (participants represent themselves, one-person-one-vote).

Individual-Based

3. Purpose

3.1. Motivation and Goal

Briefly explain the context and motivation for starting this IC activity, and the overall purpose or goal to be accomplished.

The past decade has witnessed accelerated growth of medical robotics and computer-assisted medical technologies due to the significant practical utility, economic value, and diversity of applications benefiting patients, providers and healthcare systems. However, several challenges arise from the complexities engendered within the human body and the diverse sets of multi-disciplinary knowledge that need to be merged to create these system-level solutions and to successfully bring them to the market.

We believe that there is a need for the robotics and medical device community to initiate a discussion on several issues that could benefit academia and industry in their shared pursuit of improved patient care. We therefore propose to initiate the Industry Connections Activity and hold our first meeting at the 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) to be held in Chicago in mid-September.

We seek to focus the discussion around topics of "System Interoperability", "Consensus Benchmarks", "Quantitative Assessment" and "Translational Research" in the broader medical robotics arena. This discussion is a critical first step to allowing multiple stakeholders (academia and industry) to identify suitable candidates for pursuit of standardization, build consensus and translate path-breaking/fast-evolving research advances into grounded sets of best-practices/benchmarks and to assist the community in translating robotics research into clinical use.

3.2. Related Work

Provide a brief comparison of this activity to existing, related efforts or standards of which you are aware (industry associations, consortia, standardization activities, etc.).

There is some work ongoing within the International Electro-technical Commission (IEC) and the International Standards Organization (ISO) in this broad area. A joint exploratory project was formed in May 2011 between IEC Subcommittee 62A, Common aspects of electrical equipment used in medical practice, and ISO Technical Committee 184/Subcommittee 2, Robots and robotic devices. This joint working group was established with the remit to "Develop general requirements and guidance related to the safety of medical electrical equipment and systems that utilize robotic technology. (i.e. medical robots). The work would encompass medical applications (including aids for the disabled) covering invasive and non-invasive procedures such as surgery, rehabilitation therapy, imaging and other robots for medical diagnosis and treatment."

Since being approved by the National Committee Members of IEC Subcommittee 62A and the National Member Bodies of ISO Technical Committee 184/Subcommittee 2, this joint working group has held six working meetings and has co-sponsored three workshops in New Zealand, Italy and most recently at Stanford University in California. To date, the focus of their work has been on the basic and functional safety aspects of medical electrical equipment and systems employing robotic technology. It is intended to fit within the IEC 60601 family of safety standards, which are safety standards for electrical equipment and systems used in medical practice. Within this broader framework ISO Technical Committee 184/Subcommittee 2 is also developing a safety standard for non-medical personal care robots. This document, ISO 13482, Robots and robotic devices -- Safety requirements for personal care robots, will shortly be circulated as a Final Draft International Standard (FDIS).

However much of the technical standards being proposed are relatively basic and fail to adequately capture the complexity and challenges engendered in developing benchmarks & standards for medical robots (as exemplars of intelligent mechatronic systems). Further none of these other activities have truly engaged academic- or industry-experts (in particular from the active-membership of the Robotics and Automation and the Engineering in Medicine and Biology Societies). These experts may have a wealth of directly pertinent experience to bear on the development of these standards.

3.3. Previously Published Material

Provide a list of any known previously published material intended for inclusion in the proposed deliverables of this activity.

An Information Session for the Formation of an IEEE RAS Standards Study Group on Surgical Robotics was conducted on Tuesday, May 7th 8:00 am - 12 noon IEEE International Conference on Robotics and Automation 2013 in Karlsruhe, Germany. Further details including presentations are available at:
<https://sites.google.com/site/ieeerassurgrobstandards/>

3.4. Potential Markets Served

Indicate the main beneficiaries of this work, and what the potential impact might be.

Much of the technical standards being proposed for medical-robots (as exemplars of intelligent mechatronic systems) are relatively primitive and inadequate from both performance-evaluation as well as safety perspectives. They fail to adequately capture the complexity and challenges engendered in developing benchmarks & standards for medical robots. The immense medical mechatronic systems market from pacemakers to infusion-pumps to surgical robots would benefit from development of objective, robust, reliable, repeatable and quantitative metrics of performance and therefrom leading to objective standards.

4. Estimated Timeframe

Indicate approximately how long you expect this activity to operate to achieve its proposed results (e.g., time to completion of all deliverables).

Expected Completion Date: 06/2015

We anticipate possibly completing this IC activity by the end of 2014.

IC activities are chartered for two years at a time. Activities are eligible for extension upon request and review by ICCom and the IEEE-SA Standards Board. Should an extension be required, please notify the ICCom Administrator prior to the two-year mark.

5. Proposed Deliverables

Outline the anticipated deliverables and output from this IC activity, such as documents, proposals for standards, conferences and workshops, databases, computer code, etc., and indicate the expected timeframe for each.

- Formation of a Study Group on Surgical Robotics
- A report summarizing the work carried out within this IC activity

6. Funding Requirements

Outline any contracted services or other expenses that are currently anticipated, beyond the basic support services provided to all IC activities. Indicate how those funds are expected to be obtained (e.g., through participant fees, sponsorships, government or other grants, etc.). Activities needing substantial funding may require additional reviews and approvals beyond ICCom.

Meeting space and some travel support will be provided by the IEEE RAS Standing Committee for Standards Activities (RAS-SCSA).

7. Management and Procedures

7.1. IEEE Sponsoring Committee

Indicate whether an IEEE sponsoring committee of some form (e.g., an IEEE Standards Sponsor) has agreed to oversee this activity and its procedures.

We will use the ICCom baseline *Industry Connections Activity Policies and Procedures (Individual-Based)*.

Has an IEEE sponsoring committee agreed to oversee this activity?: Yes

If yes, indicate the sponsoring committee's name and its chair's contact information, and skip the remaining parts of this section (skip 7.2 and 7.3, below).

Sponsoring Committee Name: IEEE RAS Standing Committee for Standards Activities (RAS-SCSA)

Chair's Name: Raj Madhavan

Chair's Email Address: raj.madhavan@ieee.org

Chair's Phone: +1-240-404-8795

7.2. Activity Management

If no IEEE sponsoring committee has been identified in 7.1 above, indicate how this activity will manage itself on a day-to-day basis (e.g., executive committee, officers, etc).

Briefly outline activity management structure.

7.3. Procedures

If no IEEE sponsoring committee has been identified in 7.1 above, indicate what documented procedures will be used to guide the initial operations of this activity (e.g., the baseline *Industry Connections Activity Policies and Procedures*).

Specify policies and procedures document to be used.

8. Participants

8.1. Stakeholder Communities

Indicate the stakeholder communities (the types of companies or other entities, or the different groups of individuals) that are expected to be interested in this IC activity, and will be invited to participate.

Universities doing Medical/Surgical Robotics Research, Medical Robotics/Surgical Robotics companies such as Intuitive Surgical, Medtronic, etc.

8.2. Expected Number of Participants

Indicate the approximate number of entities (if entity-based) or individuals (if individual-based) expected to be actively involved in this activity.

20

8.3. Initial Participants

Provide a list of the entities or individuals that will be participating from the outset. It is recommended there be at least three initial participants for an entity-based activity, or five initial participants (each with a different affiliation) for an individual-based activity.

Use the following table for an entity-based activity:

Entity	Primary Contact	Additional Representatives
Entity Name	Contact Name Email Address Phone Number	Name, Email Address Name, Email Address

Use the following table for an individual-based activity:

Individual	Contact Information	Employer	Affiliation
Venkat Krovi	vkrovi@buffalo.edu 716-645-1430	State University of New York at Buffalo	Mechanical and Aerospace Engineering

Nabil Simaan	nabil.simaan@vanderbilt.edu 615-343-0470	Vanderbilt University	Mechanical Engineering
Raj Madhavan	raj.madhavan@ieee.org 240-404-8795	University of Maryland	Institute for Systems Research

We anticipate about 15-20 people (across industry/academia) after the IROS Conference meeting to be held in Chicago in September 2014.