1. WHAT IS THE SCOPE?

Example 1:

Medical sensors are gaining significance in clinical medicine for *in vivo* applications. Chronically implanted sensors for disease states such as cancer, diabetes, and heart disease are being tested in patients. Such devices augment the well-established portfolio of electronic products in areas such as cardiac pacing and drug delivery. Products involving acute use in patients, such as percutaneous or fully implantable glucose sensors, camera endoscopy capsules, and gastric pH monitoring devices, are emerging to augment this growing field. Finally, sensors that interface with neuronal tissue promise an exciting new field for inquiry in applications such as artificial retinas and, more generally, in understanding and modulating brain functions.

Products destined for use with patients present additional design and regulatory issues. Biocompatability, manufacturing quality controls, calibration standards, and device history records are some of the issues that gain enhanced attention and scrutiny under federal regulations. Understanding and complying with federal standards creates both new burdens and new opportunities for engineers within and for those seeking to enter the medical device field.

Medical sensors draw on detection methods that probe optical, galvanometric, ionizing radiation, RF, and ultrasonic source signals. Groups addressing this type of device are often characterized by a multidisciplinary team approach that includes electrical, biomedical, and chemical engineers as well as physicists and biologists. Though we are specifically excluding medical imaging in this special section, it is often the case that imagers do provide input in many sensor applications.

Example 2:

There is an urgent need to design, develop, fabricate of different types of sensors and sensing technology based on non-invasive techniques to determine the integrity of a material, component or structure or quantitatively measure characteristics to prevent catastrophic failures in systems used by the general public. In short, the implemented sensor systems should be able to inspect or measure without doing any harm or degrade the performance of the system. With the increasing reported accidents, especially the mechanical failure of bridges in USA and many other countries, the need for highly reliable and high performance inspection techniques is increasing. The monitoring of structural health of the targeted systems is necessary at almost any stage in the production or the life cycle of its components. Some of the most important areas are:

1. Civil engineering - inspection of concrete structures, bridges, infrastructure due to aging problem.

2. Metal industry – steel producers, steam and pressure vessel construction for the inspection of cracks, defects, and any other flaws and their characterization, fatigue estimation, quality assurance, wall thickness and coating thickness testing, determination of hardness etc.
3. Transportation – railways.
4. Power stations – nuclear and conventional power plants.
5. Pipe lines – Inspection of pipes and piping systems in industrial plants. The pipes are used for carrying oils, gases, and liquids such as water, milk, etc.
6. Petro-chemicals – isolation of reactive compounds.
7. Aircrafts – fatigue estimation in aircraft surface and other parts.

Many different sensing techniques with different characteristics are available for these application areas. The following are examples that are commonly used: Magnetic, Ultrasonic, Acoustic, Radiography, Eddy current and X- ray. The sensors to be used depend entirely on the specific application.

Example 3:

The scope of this Special section will be examination of the promise and challenge presented by nanometer- scale structures that have been demonstrated as sensors. Sensor stimulus may be the presence of a chemical or biological agent, radiation, light, pressure, motion, or other physical phenomena. Of particular interest in this examination of Nanosensor Technology are nanosensor design, modelling, method of fabrication, and performance characteristics. Also of interest is the integration of multiple individual nanosensors into operational sensing systems, along with system design and performance.

Sensor technologies and nanotechnology have come together, in recent years, to provide new opportunities for sensing using nanometer-scale structures. Nanostructures such as carbon nanotubes, nanowires, nanobelts and quantum dots have been demonstrated to behave as sensors for various physical phenomena. There is considerable promise in the use of such ultra-small devices for sensing. For example, it is possible that some physical phenomena hitherto below achievable detection thresholds might now be sensed by nanostructures.

Chemical or biological nanosensors that are themselves on the molecular scale may be able to provide sensitivity down to the single molecule level. Individual nanosensor response time might improve as the signal traversal distance shrinks still further. Integrated systems of nanosensors may have multiple potential advantages over more conventional sensor systems. On the other hand, additional difficulties may well present themselves. These include the fundamental challenge of the integration of physical structures and devices on the nanometer scale, as well as integration and incorporation of nanodevices into the micro-scale world.

This Special Isection on Nanosensor Technology will be devoted to the technologies of research and development of nanosensors. Within this context and as supplemental observations, suggested applications for nanosensor devices and systems would be of great interest. Nanosensor applications, however, are not the focus of this Special Section.

Example 4:

Process Tomography, within the more general area of process imaging, can provide essential information about industrial processes by visualising the changes occurring inside an object . While other imaging techniques require direct access, sensing systems based on the tomography principles provide valuable data that could not otherwise be measured non-destructively or without intrusion. This data relates directly to a certain physical process (modality) that in many cases has a commercial importance. In the example case of chemical industry, which is one of the most developed applications, tomographic images of inaccessible cross-sections provide feedback for improved operation of mills, filters, reactors, etc. Often, the tomographic sensor can be easily integrated with the existing process and adapted for other similar processes and circumstances.

Sensors for Industrial Process Tomography employ electromagnetic modalities that span the spectrum from DC voltage measurements to detection of Gamma-rays. Acoustic and other modalities have also been proposed. This multitude of sensors can be encompassed from the point of view of their industrial application, i.e. their ability to

- supply high-quality data suitable for imaging by subsequent inversion.
- satisfy all space and time constraints imposed by the particular process.
- operate in typically hostile and/or remote environments.

Thus, there is the scope to reveal particular strategies for measurements and data processing, synergy between hardware and software, balance between process costing and sensing equipment price, etc. It is worth emphasising that this is distinct from adjacent fields, e.g. tomography systems for medical applications, where notably different requirements, goals and priorities have to be met.

2. WHY THE IEEE JOURNAL OF SELECTED AREA IN SENSORS?

Example 1:

The proposed Special Section will focus on the technologies of nanosensors, including nanosensor design, modelling, and performance. Nanosensors for almost all physical phenomena will be considered, including electrical, chemical, biological, mechanical, magnetic, radiation, and thermal. An upcoming Special Section on Nanosensors for Defense and Security will focus on nanoelectronic sensors and their application to defense and security. While there is overlap in the two topics, the area of nanosensor technology is broader, and encompasses much R&D that ultimately may impact, in addition to defense and security, other pressing societal needs such as medicine and energy.

This topic has not been featured on its own in any of the IEEE publications yet, to the best of our knowledge. Furthermore, it would not be possible to represent all aspects of nanotechnology applications to sensors in a single peer-reviewed journal. The particular scope of the suggested Special Section falls well within the remit of the IEEE Journal of Selected Areas in Sensors and would benefit its reader audience. The reputation and popularity of the IEEE publications will definitely contribute to the synergy between this and adjacent or complementary fields.

Example 2:

The proposed Special Section will focus on particular aspects of Industrial Process Tomography, i.e. sensor modelling, sensor design and performance. While future interest in this field is ensured by the constant supply of emerging modalities, techniques and engineering solutions, many of the basic concepts and strategies have already matured and now offer opportunities, which other areas of engineering can build upon.

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Example 3:

The proposed Special Section will focus on particular aspects of sensors for medicine and thus provides an opportunity for input from biomedically oriented researchers and those from industry. As an application area for sensors research, medicine is one of the most active and successful fields of use. Highlighting this dynamic field will provide insight to students choosing an area of specialty and encourage existing experts to reach out to colleagues concerned with patient care issues.

The opportunity for this Special Section is to create an archived resource for sensor specialists that will focus on their particular interests and backgrounds. Articles will be sought that emphasize sensor design and function and do not report exclusively on clinical problems or studies.

Example 4:

The proposed Special Section will focus on the different aspects of sensing technology, i.e. high reliability, adaptability, recalibration, information processing, data fusion, validation and integration of novel and high performance sensors specifically aims to use to inspect mechanical health of structures and similar applications. While future interest in this field is ensured by the constant supply of emerging sensing modalities, techniques and engineering solutions, many of the basic concepts and strategies have already matured and now offer opportunities, which other areas of engineering can build upon.

To the best of our knowledge, this topic has not yet been the central focus of any of the IEEE publications. The particular scope of the suggested Special Section falls well within the scope of the IEEE Journal of Selected Areas in Sensors and would benefit its reader audience. The reputation and popularity of the IEEE publications will definitely contribute to the synergy between this and adjacent or complementary fields.

3. WHY THESE GUEST EDITORS?

Most important in this section is to highlight previous publication and editorial work of the proposed Guest Editors (overall, in IEEE journals and in the IEEE Journal of Selected Areas in Sensors). Please consider the advantages of geographic diversity among the members of the Guest Editorial panel, e.g. among 3 Guest Editors this can be achieved by including a representative from each: Americas, Europe & Africa and the Far East.

Example 1:

Each of the proposed guest editors has a specific background and expertise that, together, form a complementary whole for assessing the range of papers to be considered in this special Section.

Name 1, titles 1 (Occupation 1)

XXXX's career has spanned industry and academia, most recently focusing on implantable, telemetric sensing devices for use in cancer therapy. XXX is a condensed matter physicist with extensive experience in medical physics and devices. He has published XXX papers (of which X1 in IEEE Sensors J) and YY books, has edited Z Special Sections in IEEE journals.

Name 2, titles 2 (Occupation 2)

YYY and colleagues have performed seminal clinical work with artificial retinas. He is an ophthalmologist at the yyy School of Medicine and Assoc. Dir. of Research at the yyy. He has acted as Associate Editor in XXX and YYY Journals Name 3, titles 3 (Occupation 3)

ZZZ is an expert in materials/tissue biocompatibility and his research interests include biosensors, protein mediated cell adhesion, and wound healing. He is the director of the zzz.

Example 2:

For over 15 years, the XXX Group has been performing research on fundamental molecular science as well as on applications of nanotechnology to computing, sensing, power sources, and other areas. The Group's work in nanoelectronics, nanosensors, nano-enabled power sources, and advanced electromagnetic materials has been performed in collaboration with other leading researchers in these areas. XXX leads the Group's Nanosensing task, and has written a MITRE Report on nanometer-scale sensing systems that has significantly raised awareness and interest in this topic within the Defense and Intelligence Communities. YYY work has led to collaborations with several of the other guest editors, who are all world-class

scientists and engineers. ZZZ of Harvard, one of the world's leading nanotechnologists, has performed ground-breaking work in demonstrating nanowire sensors in solution. VVV of Georgia Tech first discovered "nanobelts" and then demonstrated their sensing capabilities. WWW leads the Nano-Biophysics group at WWW where he and his team are fabricating nanoscale electronic devices for biosensing. Between themselves, the Guest Editors have XXX published papers (of which X1 in IEEE Sensors J) and YY books, Z Special Issues/Sections edited in IEEE journals and hold or have held Associate Editor positions in the following journals (Z1, Z2, Z3…)

Example 3:

Via the Virtual Centre for Industrial Process Tomography (VCIPT), which is a consortium lead by the University of xxx and the University of yyy, both guest editors are connected with European academic and industrial partners, as well as with researchers in the USA, Japan, Australia, etc. The guest editors' institution, xxx, has a long track record in the field of Industrial Process Tomography, which was initiated here in the late 1980's and has attracted several millions worth of funding from UK and European sources.

The guest editors are members of groups that have a world-leading status and cover a wide base of expertise; while XXX own research field is capacitance tomography, the research interests of YYY are in optical tomographic modalities. Thus, the complementary expertise and contacts will allow the guest editors to attract a range of contributions in addition to those presented at the YYY. XXX was a co-chair of this Congress and has been one of the founders of the track of WCIPT conferences. YYY was a member of the organising committee, responsible for setting up the "Hardware" stream of sessions and keynote speaker at this Congress.

4. WHY NOW?

Example 1:

Almost a dozen people recently lost their lives when the eight-lane I-35 bridge collapsed in Minnesota into the Mississippi river at rush hour during August 2007. After that, several other incidents of bridge collapse took place in China, India and Pakistan. These accidents underline the paramount importance of early detection of events. We must develop sensor systems with intelligent features to detect and provide early warning of these problems. It is expected that the special section will provide many new ideas of detection and inspection of the health of structures which are very important for human safety and society well being. The sooner we publish this section, the better for the construction industry, local communities, and society in general.

Example 2:

While the history of sensors and sensor technologies extends back over the past few centuries, nanotechnology is still young. Serious exploration and research on engineering at the molecular scale started less than two decades ago. Experimentation in using nanostructures for sensing began in earnest only after the turn of the 21st century. In the space of those few years, however, the convergence of sensors and nanotechnology has uncovered vast new possibilities for the enhancement of sensing technologies through the use of nanostructures and the application of
molecular engineering. This Special Section will provide a forum for the research community to share recent advances in sensing technologies made possible using nanotechnology. It will serve as an exchange of current knowledge and a stimulus for further advances in Nanosensor Technology.

Example 3:

As outlined above, the topic of sensors for Industrial Process Tomography is currently a well-defined area offering an appropriate blend between refinement of recent solutions and newly emerging challenges.

Industrial Process Tomography has been the subject of XXX World Congress of Industrial Process Tomography (WCIPT), held in Europe in 1999 and 2001. These conferences attracted high-quality contributions, published in special Proceedings volumes, and full papers grouped by subjects have appeared in various peer-reviewed journals published by IoP(UK), Elsevier, etc.. The third conference from the WCIPT track took place in XXX, 2-5 September 2003 (http://www.vicpt.org.uk/congress), with a substantially enhanced participation from North American authors. The success of the previous WCIPT conferences and the quality of the presentations in the current one, as well as the current state-of-the-art, uphold the suggestion that this will be an appropriate moment for the dissemination of ideas and achievements in the field.

Example 4:

The commercial emergence of new medical sensing devices is growing. Further, we are on a threshold of the appearance of a new class of implantable, telemetric sensor for disease diagnosis and therapy. Telemetric patient monitoring is growing rapidly in an attempt to provide patient comfort and adequate surveillance. As this industry grows, it is important that readers are able to react to increased opportunities for research, funding, and employment opportunities.

5. WHO WILL SUBMIT?

Example 1:

Ideally, the Call for Papers (CFP) will appear in the IEEE Journal of Selected Areas in Sensors and in Trans. on Biomedical Engineering and Eng. in Medicine and Biology. Additionally, we

propose to send the CFP to the Sensor Council's e-mail distribution list (over 14,000) and also request that the EMBS society send it to their members. A review paper(s) addressing primary sensing mechanisms for *in vivo* devices will be solicited. Also, a review paper on exciting new future trends would be targeted.

Example 2:

The list of authors will be finalized after receiving responses. The broad extent of the Call for Papers (CFP) Announcement should provide room for a wide range of submissions in this very exciting new field. The prominence and the wide field of personal contacts of the guest editors should stimulate the submission of good quality papers from other excellent researchers. It also may be possible to bring the CFP to the attention of attendees at the 2007 XX IEEE International Conference on NXXX, January 2007), and at the XXX Conference, July 2007). Both Conferences are being organized by YYY of the Centre for YYY at the University of YYY. The ZZZ IEEE Sensors Applications Symposium (ZZZ) may provide another opportunity for distribution of the CFP. Finally, the special section will be announced to the 15,000 sensor practitioners on the IEEE Sensor Council's e-mail distribution list.

Example 3:

The list of authors will be finalised after receiving responses. To date, the organisers of the XXX Congress have already attracted around 150 submissions, a large proportion of which fall directly within the suggested scope of the Special Section. The broad extent of the suggested Call for Papers announcement and the range of topics that fall under the remit of the section, as well as the personal contacts during the XXX in Banff, will ensure the submission of a healthy number of good quality papers for the Special Section of the IEEE Journal of Selected Areas in Sensors.

It is envisaged that the Special Section may contain tutorial, invited and review papers, as a small portion of the total volume.

Example 4:

The call for papers will be widely distributed using the IEEE Sensors Council's e-mail distribution list. A special effort will be made to reach researchers working in the area of sensors for Non-Destructive Testing (NDT) in an effort to persuade them to submit papers for this special Section.

6. WHAT IS THE TARGET NUMBER OF ACCEPTED PAPERS?

Each section of JSAS will include between 8-10 papers. However, the general guideline is to assist the JSAS Editorial Board to assess and advise on the timing and the planning of the expected publication date.