

IW-NMWR-2010: Networked Mobile Wireless Robotics



Inaugural Session: (L to R: Er. R.C. Vyas, Dr. Martin Howarth, Dr. RC Purohit, Dr. S.R. Maloo, Dr. PN Goswami, Dr. S.S. Rathore, Dr. Y.C. Bhatt, Dr. Dharm Singh delivering keynote address)

A three days In-country workshop on “Networked Mobile Wireless Robotics (IW-NMWR-2010)” was organized by Special Interest Groups-Wireless Networks (SIG-WNs) of Computer Society of India and Udaipur Chapter, Techno India NJR (TINJR) Institute of Engineering, Udaipur, Institution of Engineers, India, Udaipur Local Centre and Department of Computer Science and Engineering, College of Technology and Engineering, Udaipur during 26-28 October, 2010 at Techno NJR Campus Udaipur.

Inaugural Session

Inaugurating the workshop, Prof. R.C. Purohit, Dean College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology (MPUAT), Udaipur and Chief Guest, appreciated the initiative taken by the SIG-WNs CSI and TINJR.

Guest of Honour Dr. S.R. Maloo, Director Research, and MPUAT expressed his views about the importance of this workshop and emphasised on the practical utility of Mobile Robotics. He spoke about the advances in wireless sensor technologies, and communication devices like cell phones continue to change the ways of agriculture. Like sensor technologies, the advent of intelligent robots in agriculture has the potential to raise the quality of fresh produce, lower production costs and reduce the drudgery of manual labour. Dr. Martin Howarth, Sheffield Hallam University, U.K. delivered the keynote address.

Prof. R.S. Vyas, Chairman, OC and MD TINJR welcomed the guests, participants and students to the workshop. Organising Secretary Dr. Dharm Singh spelt out in brief the objectives of the workshop and the effectiveness of hands-on-exercises. He gave the brief introduction about the CSI, and SIG-WNs of CSI. . Dr. Y.C. Bhatt, Honorary Secretary gave a vote of thanks to delegates, guest and participants

Robotics and automation

Dr Martin Howarth, Head of Department Engineering and Mathematics, Sheffield Hallam University, U.K. gave the key not speech on technologies and various projects on Robotics

and automation like Distributed Human-Robot System for Chemical Incident Management. He said a large nanotechnology research programme on Nanorobotics - technologies for simultaneous multidimensional imaging and manipulation of nano-objects are going on in Howarth, Sheffield Hallam University.

The integration of different technologies to act as simultaneous real-time nanoscale "eyes" and "hands", including the advanced nanorobotics, high-resolution ion/electron microscopy, image processing/vision control and sophisticated sensors, will lead to the ability to manipulate matter at the scale of atoms or molecules.

The Nanorobotics programme will thus allow unique experiments to be carried out on the manipulation and observation of the smallest quantities of materials, including research into nanoscale electronic, magnetic and electromechanical devices, manipulation of fullerenes and nanoparticles, nanoscale friction and wear, biomaterials, and systems for carrying out quantum information processing.



Keynote address: Dr. Martin Howarth delivering the keynote address

Robotic System Safeguards Employees' Health

Dr. Martin Hawarth, Sheffield Hallam University, U.K. spoke the automation and robotic system enable human-beings to execute works in very dangerous places and they also preserve their health. According to him, there are extreme temperature sites in which man cannot work but a robot can do so. The creation of these technologies not only secures the quality of services and finished products, but also ensures the quality of workers' living standards. Dr. Hawarth says the aim is to develop automated systems to a level where operator stress is reduced at the same time as productivity is lifted.

Robot Miners of the Future

Advanced robotics is making many mining jobs more efficient and less dangerous said Dr. S.S. Rathore, Chairman, IEI, ULC. Mining robotics is tipped to have wide application, in

particular the automation of potentially dangerous work such as rock-breaking, rock-bolting in unstable geology and hole-drilling and charging. Automation, mining companies are hoping their machines will run more efficiently and with less downtime.

Valedictory Session

The valedictory function began with the welcome address by Dr. P.N. Goswami, Director TINJR and expressed his satisfaction over the excellent conduct and successful closure of the workshop.



Valedictory Session (L to R: Er. R.S. Vyas, Dr. Dharm Singh, Dr. PN Goswami, Dr. M.L. Kalra, Mr. M.L. Talesra, S.S. Rathore, Dr. Y.C. Bhatt,)

Prof. M.L. Kalra, former Hon'ble Vice-Chancellor, Kota University addressed the house about the importance of automation, control and robots in the development of the country. He said Mobile robots have the capability to move around in their environment and are not fixed to one physical location. An example of a mobile robot that is in common use today is the automated guided vehicle. Mobile robots are also found in industry, military and security environments. They also appear as consumer products, for entertainment or to perform certain tasks like vacuum cleaning. Mobile robots are the focus of a great deal of current research and almost every major university has one or more labs that focus on mobile robot research.

Modern robots are usually used in tightly controlled environments spoke *Mr. M.L. Talesra*, Guest of honor. Domestic robots for cleaning and maintenance are increasingly common in and around homes in developed countries. Robots can also be found in military applications.

Dr. Dharm Singh, Organising Secretary presented the three day's workshop report and recommendations and detailing out the resource persons who made their presentations on the assigned topics and the number of participants who enriched their knowledge on Networked Mobile Wireless Robotics. It is a pleasure to inform the house about active participation and registration of almost 310 participants, delegates and resource persons.

Among the participants were senior members of CSI Mr. Azimuddin Khan, Vice-Chairman, CSI, Udaipur, Dr. Ashok Jetawat Former chairman, CSI Udaipur Chapter, Ms. Jayshree Jain and Mr. Bharat Deora, to mention a few. The function ended with Dr. Y.C. Bhatt presenting the Vote of Thanks.

Recommendations

1. Wireless communication technologies that totally fit the specific needs of robot systems should be standardized.
2. Sensor based technologies should standardized adopted for agriculture and mining use.

Media Coverage



'नेटवर्क मोबाइल वायरलेस रोबोटिक्स' पर कार्यशाला

उदयपुर, 28 अक्टूबर (वि) : एस.आई.जी.-इन्स्टीट्यूट ऑफ इंडिया, उदयपुर चैप्टर, टेक्नो इंडिया एन.जे.आर., इन्स्टीट्यूट ऑफ टेक्नोलॉजी, उदयपुर वि इंस्टीट्यूशन ऑफ इंजीनियर्स (इंडिया), के उदयपुर सेंटर, सी.टी.ए.ई. उदयपुर के सहयोग से 'नेटवर्कड मोबाइल वायरलेस रोबोटिक्स' विषय पर तीन दिवसीय अन्तर्राष्ट्रीय कार्यशाला टेक्नोकम्पस में शुरू हुई। इस अवसर पर मुख्य अतिथि प्रो. आर.सी. पुरोहित अधिष्ठाता, सी.टी.ए.ई. ने कहा कि रोबोटिक्स वायरलेस सेंसर प्रौद्योगिकी प्रणाली की उपयोगिता पर

प्रकाश डाला। जैन ने बताया कि यह प्रौद्योगिकी कृषि विकास में एक ग्रामीण किसान को इलेक्ट्रॉनिक रूप से आज की गुणवत्ता, कम उत्पादन लागत के लिए आवश्यक सिद्ध होगी। प्रारंभ में टी.आई.एन.जे.आर. के अध्यक्ष आर.एस. व्यास ने अतिथियों एवं प्रतिभागियों का स्वागत किया एवं सेफेल्ड से एम.ओ.यू. की जानकारी दी। सचिव डॉ. धर्मेसिंह ने कार्यशाला का महत्ता, उद्देश्य एवं उपयोगिता पर प्रकाश डाला एवं सी.एस.आई. की गतिविधियों के बारे में जानकारी दी। डॉ.एस.एस. राठी ने इंस्टीट्यूशन की गतिविधियों एवं विशिष्ट अतिथि प्रो.

एस.आर. मातू डायरेक्टर (रिसर्च), एम.पी.यू.टी. ने रोबोटिक्स का किसान स्वचालित मशीन में उपयोगिता पर प्रकाश डाला।

सम्मोह के मुख्य वक्ता डॉ. मार्टिन हावर्थ, सेफेल्ड हेल्थम विज्ञानिकालय, यू.के. ने रोबोट प्रौद्योगिकी पर विभिन्न परिदृश्यों के बारे में जानकारी दी। उन्होंने बताया कि रासायनिक परिदृश्यों में मानव रोबोट प्रणाली का विकास में बहुत योगदान है। जैन रोबोटिक्स पर सेफेल्ड यूनिवर्सिटी में होने वाले रिसर्च पर प्रकाश डाला। अन्त में डॉ.आई.सी. भट्ट ने धन्यवाद ज्ञापित किया।

<p>UDAIFUR Dr Martin Howarth, Head of Department Engineering and Mathematics, Sheffield Hallam University, U.K.</p>	<p>26th – 28th Oct. 2010 - Workshop on Networked Mobile Wireless Robotics</p> <p>"Robotics and Automation" The speaker gave the keynote speech on technologies and various projects on Robotics and automation like Distributed Human-Robot System for Chemical Incident Management. He said a large nanotechnology research programme on Nanorobotics – technologies for simultaneous multidimensional imaging and manipulation of nano-objects is going on in Howarth, Sheffield Hallam University.</p> <p>The integration of different technologies to act as simultaneous real-time nanoscale "eyes" and "hands", including the advanced nanorobotics, high-resolution ion/electron microscopy, image processing/vision control and sophisticated sensors, will lead to the ability to manipulate matter at the scale of atoms or molecules.</p> <p>The Nanorobotics programme will thus allow unique experiments to be carried out on the manipulation and observation of the smallest quantities of materials, including research into nanoscale electronic, magnetic and electromechanical devices, manipulation of fullerenes and nanoparticles, nanoscale friction and wear, biomaterials, and systems for carrying out quantum information processing.</p> <p>"Robotic System Safeguards Employees' Health" The speaker informed that the automation and robotic system enable human-beings to execute work in very dangerous places and they also preserve their health. According to him there are extreme temperature sites in which man cannot work but a robot can do so. The creation of these technologies not only ensures the quality of services and finished products, but also ensures the quality of workers' living standards. Dr. Howarth says the aim is to develop automated systems to a level where operator stress is reduced at the same time as productivity is lifted.</p>
<p>Dr. S S Rathore, Chairman IEL ULC</p>	<p>"Robot Mines of the Future" Advanced robotics is making many mining jobs more efficient and less dangerous, said the speaker. Mining robotics is tipped to have wide application, particularly in the automation of potentially dangerous work such as rock-breaking, rock-bolting in unstable geology and hole-drilling and charging. Automation, mining companies are hoping their machines will run more efficiently and with less downtime.</p>
<p>Dr. Martin Howarth, Sheffield Hallam University, U.K.</p>	<p>"Robotic System Safeguards Employees' Health" The speaker informed that the automation and robotic system enable human-beings to execute work in very dangerous places and they also preserve their health. According to him there are extreme temperature sites in which man cannot work but a robot can do so. The creation of these technologies not only ensures the quality of services and finished products, but also ensures the quality of workers' living standards. Dr. Howarth says the aim is to develop automated systems to a level where operator stress is reduced at the same time as productivity is lifted.</p>
<p>Dr. S S Rathore, Chairman IEL ULC</p>	<p>"Robot Mines of the Future" Advanced robotics is making many mining jobs more efficient and less dangerous, said the speaker. Mining robotics is tipped to have wide application, particularly in the automation of potentially dangerous work such as rock-breaking, rock-bolting in unstable geology and hole-drilling and charging. Automation, mining companies are hoping their machines will run more efficiently and with less downtime.</p>

These new continents can emerge from the ocean in the time it takes for a Web page to show up on your screen. Contrary to what you may have heard, the Internet does not operate at the speed of light; it operates at the speed of the Department of Motor Vehicles.

--Dave Barry, Dave Barry in Cyberspace

The 'Net is a waste of time, and that's exactly what's right about it.

--William Gibson

Advisors

Prof. P. Thirumathy, President, CSI
Mr. M.B. Agrawal, Vice President, CSI
Prof. B.R. Vaidyanathan, Honorary Secretary, CSI
Mr. B.R. Mohan, Divisional Chairman, CSI
Dr. M. Chandrasekar, Director, IIT, DAV, Indore
Mrs. Shree Ramani, Chairperson, NIB Foundation
Dr. Naveen Purohit, IIT Aligarh
Dr. Rajeev S. Shukla, Secy, Suman Memon Ltd.
Dr. Shalindra Mishra, REC, Bargarh, Utkalanchal
Dr. Harish Kumar, IIT, Punjab University, Chandigarh
Dr. Chh. Hengli, NKT, Taiwan
Dr. R.P. Sandhu, CTAE, Udaipur
Dr. V.S. Shukla, Institute of Management Studies, Noida
Mr. Anil Singh, Engineering College, Bilaspur
Mr. Rakesh Purohit, Engineering College, Bilaspur

Convener

Dr. R.C. Purohit, Dean, CTAE, Udaipur
Dr. P.N. Goswami, Director, TIRUB, Udaipur, +91-930297700
Dr. S.S. Rathore, IIT, Chokkiam, The IIT, Udaipur Local Centre

Organizing Committee

Chairman

Mr. R.S. Vyas, Director, TIRUB, Udaipur

Organizing Secretary

Dr. Dharm Singh, IIT, Coorner, SIG-WN
Email: dharm@sigwn.ac.in, singhdharm@iitrra@gmail.com
+91942736473, +91-294-2478385(t)

Co-ordinators

Dr. V.C. Bhatt, Assoc. Secretary, The IIT, U.K., +91-941416644
Mr. Anandh Babu, IITM Ltd, Udaipur/Indh, +91-941417767
Mr. S. M. Palanivelu Pappa, Assistant Manager, CSI
Mr. Bharat Jain, TIRUB, Udaipur, Indh, +91-941428385

Members :

Mr. Naveen Choudhary, CSE, CTAE, Udaipur
Mr. Kalyan Jain, CTAE, Udaipur
Mr. Pradyip Sharma, GM, Bhubaneswar, India
Mr. Sachin Sati, TIRUB, Udaipur
Mr. Pratik Parwal, TIRUB, Udaipur
Mr. Pawan Kothari, TIRUB, Udaipur
Mr. Rakesh Tiwari, TIRUB, Udaipur
Mr. Naveen Kumar Jain, SGVT, Jaipur
Mr. Bhaskar Goyal, SGVT, Jaipur
Mr. Rishika Khosla, IITB, Udaipur

Technical Programme Committee

Chair:

Dr. Martin Busswell, Sheffield Hallam University, U.K.
Co-Chairs:
Mr. Pradyip Choudhary, IITB, Udaipur
Prof. Dharmendra Sathya, Sheffield Hallam University, U.K.

Publication Committee

Dr. Rajendra Prasad, TIRUB, Udaipur
Mr. Anand Babu, TIRUB, Udaipur
(History co-ordinator)
Mr. Ganesh Kumar (C. H. S.),
TIRUB, Udaipur, Indh, 984372029
Email: G.Kumar@iitrra@gmail.com

Reception Committee

Mr. Rajendra Singh, TIRUB, Udaipur
Mr. Uday Prasad, TIRUB, Udaipur
Mr. Anand Babu, TIRUB, Udaipur
Mr. Sanjay Shrivastava, TIRUB, Udaipur

Transport Committee

Mr. Sandeep Singh, TIRUB, Udaipur
Mr. Naveen Jain, TIRUB, Udaipur
Mr. Sandeep Choudhary, TIRUB, Udaipur
Mr. Sandeep Choudhary, TIRUB, Udaipur

Accommodation

Mr. Vivek Jais, TIRUB, Udaipur
Mr. Rajendra Singh, TIRUB, Udaipur
Mr. Uday Prasad, TIRUB, Udaipur
Mr. Pradyip Sharma, TIRUB, Udaipur
Mr. Anand Babu, TIRUB, Udaipur

Venue Committee

Mr. Gaurav Anand, TIRUB, Udaipur
Mr. Rajendra Singh, TIRUB, Udaipur
Mr. Pawan Choudhary, TIRUB, Udaipur
Mr. Gaurav Anand, TIRUB, Udaipur

Press & Media

Mr. Gaurav Anand, TIRUB, Udaipur
Mr. Gaurav Anand, TIRUB, Udaipur

Techno INDIAN Institute of Technology

Techno India NIT Institute of Technology (TINIR) was established in 2008 after due approval from AICTE and affiliation with Rajasthan Technical University. The Institute has a sanctioned intake of 240 students in Electronics & Communication Engg., Electrical & Electronics Engg., Computer Science & Engg (CSE) and Information Technology. 15% seats are filled through Management Quota which are strictly based on merit. The balance 85% seats are filled through RPCT counselling.

Techno NIT provides a unique opportunity to its students to get B.Eng. degree from NIT, at an affordable cost through credit transfer agreement. Under this scheme the Techno NIT students who are consistent in their academics with at least 85% marks in aggregate in the first three years, become eligible for a seat in the final year of equivalent engineering degree program at Sheffield. A degree from Sheffield Hallam offers an opportunity to students to apply for a 2-year work period in the UK after graduation.

Special Interest Group- Wireless Network (SIG-WN)

SIG-WN, Computer Society of India (CSI) member

It's the case and present the use of wireless communication in a broad range of sectors including multimedia applications, rural development, education, consumer electronics, enterprises, healthcare, industry and security.

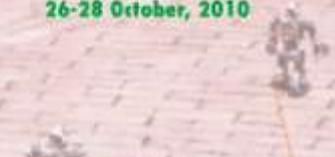
Explores new business and research opportunities for members in their technologies and their applications and share together on development issues of wireless network standards.

Improvement in data delivery mechanism, handoff procedures, efficient formation of heterogeneous wireless networks etc.

In-Country Workshop on Networked Mobile Wireless Robotics (IW-NMWR-2010)



26-28 October, 2010



Organized by

SIG-WN, Computer Society of India & IIT Udaipur
Techno India NIT Institute of Technology, Udaipur
Department of CSE, CTAE, Udaipur
The Institute of Engineers (India), Udaipur Centre

Venue

Techno India NIT Institute of Technology (TIRUB), Udaipur
PLOT -BPS-I, MIDC IND AREA, KALADWARI, UDAPUR (RAJ.)
Dr. P. N. Goswami, progoswami@gmail.com, +91-93029-57300
www.technojr.org www.iteindia.org

Organizing Secretary

Dr. Dharm Singh, Chairman SIG-WN, CSI
Department of Computer Science and Engineering
College of Technology and Engineering
Mishra Pratap University of Apt & Technology, Udaipur
Email: dharm@sigwn.ac.in, singhdharm@iitrra@gmail.com
+91942736473, +91-294-2478385(t)
www.iteindia.org

Provable

A networked robot is a robotic device connected to a communication network such as the Internet, Ethernet, Internet or LAN. The network could be wired or wireless, and based on one of a variety of protocols such as TCP, UDP, or MQTT. Many new applications are now being developed ranging from automation to exploration. The subfields of Networked Robots:

• *Tele-operated*, where human supervisors send commands and receive feedback via the network. Such systems support research, education, and public awareness by making valuable resources accessible to broad audiences.

• *Autonomous*, where robots and sensors exchange data via the network. In such systems, the sensor network extends the effective sensing range of the robots, allowing them to communicate with each other over long distances to coordinate their activity. The robots in turn can deploy, repair, and maintain the sensor network to increase its longevity and utility. A broad challenge is to develop a sensor base that enables communication to control to enable such new capabilities.

Networked mobile wireless robots are smart artifacts which sense and communicate over radio, plan and communicate over radio and act and communicate over radio. They communicate with humans (e.g. with a tele-operator), with each other, with machines, and with the smart environment, allowing for a wide range of applications. These robots combine a large degree of autonomy with complex collaborative behavior to accomplish common tasks.

Networked robots pose a number of technical challenges related to network noise, reliability, congestion, fixed and variable time delay, stability, payload, range and power limitations, deployment, coverage, safety, localization, sensor and actuation fusion, and user interface design. New capabilities arise frequently with the introduction of new hardware, software, and protocol standards. From an engineer's point-of-view one of the key technical challenges is to use digital (radio) communication links and packet networks of discrete in time nature for networked control of analog phenomena, e.g. continuous movement.

Objectives

The workshop will bring together two communities, communication experts and control professionals from academia as well as industry, in order to address challenges resulting from networked closed-loop control applications (including radio links) and situation aware cooperative autonomous systems. Mobile robotics is an area of active research with significant, untapped potential for the home or household use, for applications in industry and production, for elderly care, in hospitals as well as in a host of other fields. One of the biggest hurdles is the fact that currently there are no wireless communication technologies available that totally fit the specific needs of robot systems.

Wireless Robotics Communication

These days, it is necessary to standardize three basic types of communication in the field of robotics: Communication between the individual components of the robot itself, Communication between robots, without a base station and Communication between a (mobile) robot and a fixed wireless base station.

Communication between the individual components of the robot itself:

The internal wiring of robots can become very cluttered, even messy and unmanageable. Body-area network solutions could become a breakthrough for standardization providing the communication parameters engineers need for this application.



Communication between robots, without a base station!
Robots should be able to communicate directly with one or a number of peers, when they get into each other's immediate reach. This is mandatory whenever tasks are to be performed jointly.

Communication between a (mobile) robot and a fixed wireless base station:

Wireless links based on currently available technology, i.e. IEEE 802.11, ZigBee, etc., are in routine use for simple tasks. However, the criteria in terms of transmission quality, latency and in particular, robustness are not completely satisfactory.



Robotic Sensor Network (RSN)

A sensor network is a network of devices equipped with sensing, communication and computation capabilities. A Robotic Sensor Network (RSN) is a sensor network with the added capability of actuation (e.g. mobility). Examples of robotic sensor networks include teams of mobile robots, underwater systems, Unmanned Aerial Vehicles (UAVs), or networks of passively or actively observing phenomena.

Robotic sensor network technology has the potential for a tremendous positive impact on our society, in emergency response, RSNs can be employed in search-and-rescue operations for situational awareness during a disaster. In environmental monitoring, they can be used to detect forest fires or monitor crop quality. In health care, they can monitor patients or the elderly over extended periods of time without confining them to a small area. They are numerous automation tasks, such as surveillance, monitoring energy consumption and quality inspection that can benefit from the RSN technology.

This three days workshop will cover various practical activities along with the theoretical concepts covered throughout the workshop.

Day 1

- Introductory Session
- Key note addresses
- Invited talks

Day 2 and Day 3

- Wireless communication concepts
- Introduction to robot
- Interface of humans
- Robotic sensor networks
- Live training project (will be conducted in group of 4-5 per registered participant)

ACCOMMODATION

Paid accommodation can be arranged by organizers in guest houses and hotels in the range of Rs. 200/- to Rs. 1,000/- if prior intimation and advance is received.

In-Country Workshop

ON

Networked Mobile Wireless Robotics (NMWRs- 2010)

26-28 October, 2010

Registration Form

Name _____

Designation _____

Qualification _____

Mailing Address _____

Phone _____ Mobile _____

e-mail _____

Institution/Organization _____

Category

- Members of IET, CSI Other CSI Member
 Non-members

ID/Cheque No. _____ Date _____

Bank Name _____

Date _____ Signature _____

Note:

- A) D.D. Or of pay cheques should be drawn in favour of "Indian Institute of Technology"
Udugur payable in Udupur.
B) Completed form with required endorsement should be sent to:
City office: Indian Institute of Technology Centre
4th Floor, Mahatma Chatterjee, Opposite G. P.O.,
Udugur-511001
E-mail: nmwr@iitkgp.ac.in, Ph: 0294-410992
<http://www.iitkgp.org/>
C) Photocopy of the registration form is acceptable.

REGISTRATION

The organizers deliberate that still to accept a 75% and as per venue that available. All participants are requested to register before 23rd October, 2010.

Registration Fee's	For (Rs.)
CSI IET Life Member	Free
CSI Student Member	Rs. 1500
Non-member	Rs. 1500