Workshop on Formal Methods for Safe and Secure Medical Devices

10th -11th January 2020

Organized by

Indian Institute of Technology Bhubaneswar

Sponsored by

Scheme for Promotion of Academic and Research Collaboration (SPARC), MHRD, Govt. of India

Speakers

Prof. Partha Roop
The University of Auckland
New Zealand

Dr. Mark Trew
The University of Auckland
New Zealand

Prof. Manoj S Gaur
IIT Jammu
India

Dr. M. Sabarimalai Manikandan
IIT Bhubaneswar
India

Dr. Srinivas Pinisetty
IIT Bhubaneswar
India

Organized by:

School of Electrical Sciences
Indian Institute of Technology Bhubaneswar
Jatni, Khordha, Odisha-752050, India
https://www.iitbbs.ac.in/

About the Workshop

Securing cyber-physical systems such as implantable medical devices (IMD) requires good understanding on both the physical component (the human organ) and the controller (IMD). In this workshop, we will cover about formal methods based approaches used in the domain of medical devices. We will discuss about approaches used for modelling behaviour of organs used for static verification and testing of IMDs. We will also discuss some static verification approaches proposed such as model checking, used for verifying IMD software, and discuss their advantages and limitations. Some major limitations are scalability and mainly the approaches are not suitable to detect (and prevent) security vulnerabilities. We will later discuss about light-weight formal approaches (runtime verification and runtime enforcement). We will discuss about safety/security issues in IMDs and runtime monitoring based approaches as solutions with description of case-studies and their implementations.

Workshop Topics

- **IMD security and associated challenges: Security challenges and overview of existing methods, need for formal methods. Need for considering biophyisical signals and signal processing.**
- **Introduction to formal methods for medical devices: Pacemaker safety, modelling and verification of pacemakers using formal techniques, introductions to temporal logics and model checking.**
- **Cardiac electrophysiology, disease and pacing: Background and associated mathematically detailed models, cell communication and pacemaker response, abstracted models using hybrid and timed automata, heart on a chip design for pacemaker testing.**
- **Formal Methods for securing IMDs: Static and run-time-based methods for security.**
- **Security issues in smart devises: Authentication, information flow, and leakage.**
- **Concluding panel discussions on future directions**

Contact

Email: ap53@iitbbs.ac.in; spinisetty@iitbbs.ac.in;
Mobile: +91-8249184836; +91-8985679665

Who can attend?

- **B.Tech students having interest in this field**
- **M.Tech, Ph.D & Research scholars**
- **Academicians, doctors, researchers and engineers from Industries and R&D organizations.**

Venue

School of Electrical Sciences, Indian Institute of Technology Bhubaneswar, Jatni, Khordha, Odisha752050

Workshop Coordinators

Dr. Srinivas Pinisetty, SES, IIT Bhubaneswar
Dr. M. Sabarimalai Manikandan, SES, IIT Bhubaneswar

Student Coordinators

Mr. Abhinandan Panda, Research Scholar, SES
Mr. Siddhasagar Pani, M.Tech 2nd year
Mr. V. R. Ujwal, M.Tech 2nd year
Mr. Aishik Bhattacharyya, M.Tech 2nd year

Travel & Lodging Arrangements

Travel and lodging expenses have to be borne by the participants or their sponsoring organizations. However, a limited number of accommodations on payment basis can be made available at IIT Bhubaneswar Campus and in close by hotels upon request. Working lunch, tea and snacks will be provided during the workshop.

Registration Details

Registration Fees:

- **IIT BBS students and research scholars – NIL**
- **Students (including research scholars) - INR 600**
- **Professionals - INR 1500**

Registration Deadline: January 05, 2020

Registration Link:

https://forms.gle/fVsE1oUf5r16YVgu8

Fee payment instructions: Payment of registration fees should be made through bank transfer to **CEP, IIT Bhubaneswar, Syndicate Bank, IIT Bhubaneswar**, **A/C- 24282010001960**. Please make the fee payment first and enter the transaction details of payment while filling the registration form.

About IIT Bhubaneswar

IIT Bhubaneswar is one of the eight new Indian Institutes of Technology established by the Ministry of Human Resource Development, Government of India under The Institutes of Technology (Amendment) Act, 2011. Indian Institute of Technology Bhubaneswar (IIT BBS) was established on 22nd July, 2008. The Institute strives to offer the best engineering education with unmatched novelties in curriculum. Within a short span of incipience, IIT BBS has made rapid strides towards becoming one of the elite technology institute of India spurred by sustained creation of knowledge and innovation, through high quality R&D activities and commitment to holistic education. The Institute aims to develop and pursue dynamic and flexible curricula designed to facilitate creativity and cognitive thinking among students through productive partnership with industries. Students get exposed to a wide variety of activities through societies and clubs, involving liberal arts, design, dramatics, robotics, music, dance and sports, instilling them with social awareness, a spirit of innovation, entrepreneurship and a thirst of discovery. All academic activities of the Institute are being carried out from the picturesque permanent campus at Argul, spreading over 936 acres of land with unique serene and pollution-free academic environment, in the state of Odisha, India. It is located on the foothills of the magnificent Barunei, having link with Indian freedom movements. At present, the Institute has seven schools and within a short period of time, IIT BBS has been able to build up world class infrastructure for carrying out advanced research and is equipped with state-of-the-art scientific and engineering laboratories. The Institute has a pleasant and friendly environment which facilitates a multidimensional growth of the individual in the campus.

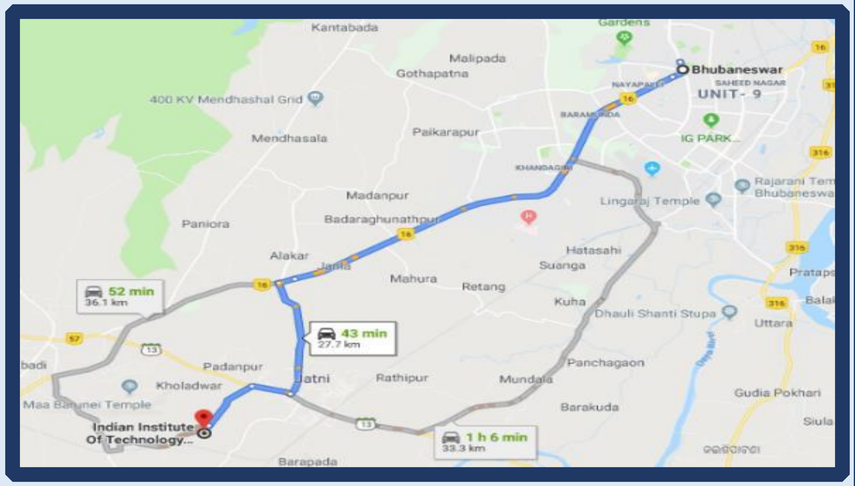
About Bhubaneswar

Bhubaneswar, the capital of Odisha, is also popularly known as the "Temple City of India", named after Tribhuvaneswar, “Lord of Three Worlds” or 'Lord Lingaraj'. It is an important Hindu pilgrimage centre. The History of the city stretches back over 2000 years. The area first appears as ancient capital of Kalinga. The smart city Bhubaneswar with its modern buildings and extensive infrastructure perfectly complements its historic surroundings. With facilities to cater to every type of visitor, Bhubaneswar makes an ideal tourist destination. It is the largest city in Odisha and is a centre of economic and religious importance in Eastern India. The city is also known for its rich and varied heritage arts, crafts and dance.

Khandagiri-Udayagiri caves, Nandankanan Zoological park, Odisha state Museum, Dhauli Shanti Stupa, Regional Museum of Natural History, Sun Temple- Konark and Jagannath Temple-Puri along with the Chandaka Wildlife Sanctuary are major attractions in and around Bhubaneswar. Chilka lake, an important habitat and breeding ground for both resident and migratory and aquatic birds, most notably flamingos, is 100kms away from Bhubaneswar.

How to reach IIT Bhubaneswar

The city Bhubaneswar is well connected by rail, air and road to the rest of the country. IIT Bhubaneswar is about 8 km from Khordha Road Junction railway station, 30 km from the Bhubaneswar railway station, and 35 km from Biju Patnaik International Airport, Bhubaneswar.



CONTACT

Dr. Srinivas Pinisetty, Assistant Professor
Phone:+91-674-7135762 (O), +91-8985679665 (M)
Email: spinisetty@iitbbs.ac.in

Mr. Abhinandan Panda, Research Scholar
Phone: +91-8249184836 (M)
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