HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE

CENTRE FOR
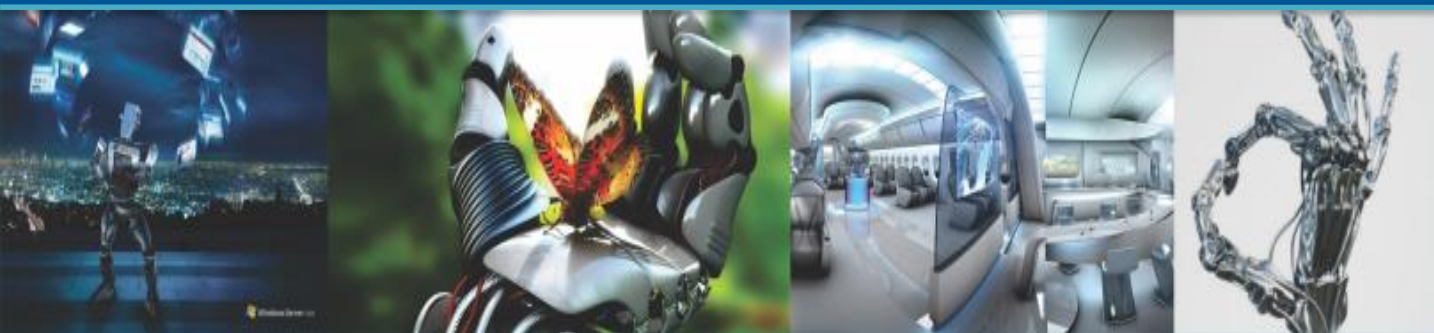AUTOMATION &
ROBOTICS
ANRO

Centre for
Automation and Robotics

**A platform for
research and innovation**

**A consultant for
Industrial applications**

**A learning centre for
training on robotics and
automation systems**

FOCUS

Centre for Automation and Robotics (ANRO) at Hindustan Institute of Technology and Science (HITS) was established on 20th October 2014 to promote educational and research activities in the field of robotics, automation and computer vision. This centre bridges the gap between industries and University with a distinctive capability to harness the intellectual energy of academia to impact Indian industries.

Objectives

- To carry out advanced interdisciplinary research in the broad areas of automation and robotics

- To generate trained manpower through degree programmes of Ph.D., & M.Tech. (Robotics) and training

- To take up industrial projects with specific deliverables in the areas of automation and robotics

- To conduct outreach programmes through workshops and training programmes to disseminate knowledge in interdisciplinary areas

Highlights

ANRO has leading Industry partners

 World's largest Robot manufacturer

 World leader in Pneumatics

Funded Research Projects - 3	Industry Establishment Projects - 2
Consultancy Projects - 3	Academic Research Projects - 18

Publications - 38	Citations: Scopus – 123
Product Development - 5	Patent Filed - 2

Major Facilities

The Centre has established two state of the art laboratories in collaboration with Yaskawa and SMC Pneumatics to serve the teaching and research needs of the students and faculty of the University.
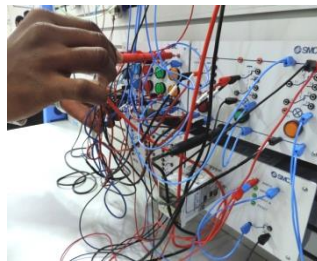
Robotics Lab ⚡ YASKAWA

Two Yaskawa industrial robots
Industrial Vision System
Deburring Application System
Robot work cell simulation
LabVIEW, MATLAB, ADAMS

〰SMC. Advanced Pneumatics Automation Lab

Flexible Manufacturing System (FMS)
Electro - pneumatic trainers
Pneumatic Trainers
PLC automation workbench, Autosim

CNC and Condition Monitoring Lab

CNC Vertical Machining Centre
Sensors, NI data acquisition systems
wireless data acquisition
Two laser cutting machines
3D scanner, 3D printer

It is also planned to establish motion control lab and augment the above facilities with CNC and advanced condition monitoring systems.

Faculty

Dr. D. Dinakaran, Prof., Group Lead
Specialization:
Condition Monitoring and Manufacturing Automation

Dr. M. M. Ramya, Professor
Specialization:
Machine Vision and Artificial Intelligence

Mr. U P Vignesh, Assistant Professor,
Specialization:
Sensors & Control

Mr. Shyam R. Nair, Assistant Professor,
Specialization:
Industrial Robots and Instrumentation

Ms. Manju Mohan, Assistant Professor,
Specialization:
VLSI design and Electronics

Research

Automation

Machine Vision

Condition Monitoring

Robotics

Scholars and research areas

Pie chart values: 5, 5, 2, 1, 6

- ■ Condition Monitoring
- ■ Robotics
- ■ Manufacturing
- ■ Image Processing
- ■ Machine Vision

Ph.D. awarded – 3

Research Scholars:

Full Time – 2

Part Time - 16

Funded Research Projects

Ultra response Gas Purging System
– Dr D Dinakaran, P Rameshkumar, A Vinothkumar

Funding Agency : MTRDC (DRDO)

An ultra-response gas purging system for repetitive Marx generator is to be developed for continuously supplying N2 gas to the switch chamber with the gas pulse cycle time of 10 ms at 1000Hz .

Application of NDT for Foundry Products and Improving Skill of Indian Foundry Men
–Dr D Dinakaran, Dr D G Harris Samuel & Dr M M Ramya

Funding Agency :Royal Academy of Engineering (UK)

To develop a computerised NDT for casting components to improve the quality of casting, reconstruct the casting component image using NDT to link it with quality control through IoT and to validate and transfer the technology to Indian and UK Industries

Trainer for Tactical Warfare
– Dr M M Ramya

Funding Agency : CVRDE (DRDO)

This project is being initiated to work out the configuration for tactical warfare and demonstrate the PC based model with simulated situations, moves, defensive and offensive operations, command and control operations.

Developing Technologies to Manufacture Specific Grades of Austempered Ductile Iron (ADI) for Automotive Components
– Dr D G Harris Samuel & Dr D Dinakaran

Funding Agency :Royal Academy of Engineering (UK)

ADI with high specific strength and about 10% reduced weight competes as a cost effective material substitute for forged steels in several core service sectors of engineering components. This project aims at developing detailed process know how for manufacture of advanced grades of ADI
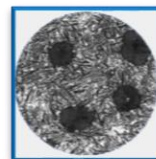
Computerized thickness gauging of inverted housing casting using ultrasonics
– Dr D Dinakaran & Dr D G Harris Samuel

Funding Agency :- Nelcast Ltd

Computerized thickness testing of the casting component will enable the 100% testing of components and enhance the quality control. A GUI will be developed to automatically plot the thickness values during the measurement. The proposed system will replace the existing destructive method with a reliable low cost solution.
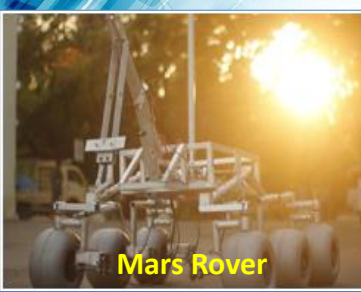
Intelligent System for Adaptive Enhancement of Underwater Images for Accurate Object Recognition (Completed)
– Dr M M Ramya

Funding Agency :- Naval Research Board (DRDO)

This project envisages developing an intelligent system for adaptive enhancement and object recognition in underwater images using soft computing techniques.

Mars Rover

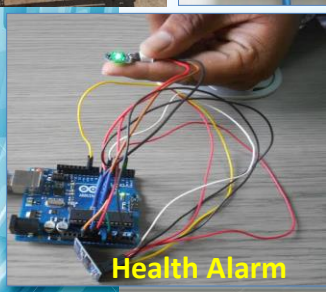Scooping Machine

Low Cost Current Sensor

SAMDROID

Road Cleaning Robot

Most Popular Project in NASA Tech Brief- 2013

Health Alarm

Our students and faculty at Mars Desert Research Station (MDRS), Utah, USA. Secured 2nd Position in India and 18th Globally.

Academic Programmes

❑ **M.Tech - Robotics**

❑ **Advanced certificate course in Industrial Robots**

The **M. Tech (Robotics)** programme is designed for students who have a B.Tech./B.E degree or possess an equivalent background. Advanced certificate course is offered in collaboration with industry, to cater the needs of students from any stream with an interest in the field of robotics. The Centre also supports. **B.Tech Mechatronics Engineering** under school of mechanical sciences in terms of lab facilities, teaching, curriculum design & development and other academic activities.

Advanced certificate course in Industrial Robots is offered in collaboration with Yaskawa India. Resource persons are from Yaskawa India, Arobot, Axis Automation and Atalon

Advisory Board

Mr.Akinori Urakawa
President and CEO,
Yaskawa India

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School of Computing
Plymouth University, UK

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Anna University

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Chettinad University

Mr. Yasunori Matsumoto
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India

Dr. Venugopal
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IGCAR, Kalpakkam

Dr. T Ashokan
Professor
IIT MADRAS
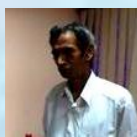
Mr. V. S.Vaidhyaraman
Vice President
Rambal Limited

Dr.P.A.Monoharan, Chair,
IEEE Robotics and Automation
Madras Section

Machine Vision

Indian Robot Premier League

Robotic Vision

Condition Monitoring

Life Saving Capsule Robots

Game Development

First Lego League

World Robot Olympiad

Indian Robot Premier League

Virtual Reality

Intelligent Robotic Arm

Programmes 2014-2017

- Debate on Humanoid for Humanity

- ❑ FDP on Pneumatics , Neural Network & Fuzzy Logic
- ❑ Training on Ultrasonic Inspection for Nelcast Ltd
- ❑ Debate on Humanoid for Humanity
- ❑ Workshop on Game Development
- ❑ IET Sponsored Workshop on Robotic vision
- ❑ Workshop on Condition Monitoring
- ❑ Guest Lecture on Machine Vision & Augmented Reality

- ❑ Seminar on Life Saving Capsule Robots
- ❑ Seminar on Underwater Robot
- ❑ Workshop on Robotic Simulator
- ❑ Guest Lecture on Advanced Pneumatics
- ❑ Training on Motion Control by Yaskawa
- ❑ Robot Design Competitions
  - ❖ World Robot Olympiad
  - ❖ Indian Robot Premier League
  - ❖ First Lego League
  - ❖ Nasa's University Rover Challenge

Awards and Recognitions

Dr M M Ramya at IMF, NIAS, IISc

Dr M M Ramya receiving Award

- • **Dr D Dinakaran** was elected as Executive Member of Condition Monitoring Society of India (CMSI)
- • **Dr. M. M. Ramya** was invited for a talk in Inclusive Manufacturing Forum 2017 at NIAS, IISc, Bengaluru.
- • **Dr. D. Dinakaran** Received 'Best Young Technology Faculty Award' – 2014 by EET-Research Wing, India
- • **Mr. Shyam R Nair** Received "BES Alumni Award" from the Honorable Home Minister of Kerala for achievements in various fields, Jan. 2015
- • **Dr D Dinakaran** delivered an invited talk in CII conference - June 2015
- • **Dr D Dinakaran** delivered an invited talk in Condition Monitoring Conference organized by CVRDE and CMSI – Dec. 2015

Mr Shyam R Nair receiving Award

Dr D Dinakaran at CII Conference

MoU Signing between **HITS** and **Yaskawa India** (World's largest manufacturers of industrial robots) on 20th October 2014.

Release of ANRO Brochure by Mr. Akinori Urakawa, President & CEO, Yaskawa India and received by Dr. Mrs. Elizabeth Verghese, Chancellor, HITS.

MoU Signing between **HITS** and **SMC Pneumatics India** (World leader in pneumatics) on 3rd October 2015.

International Visits

With Prof Picton & Prof Adams, University of Northampton

Dr D Dinakaran participating in Visitng Professors Conference, Aston University, Birmingham, UK

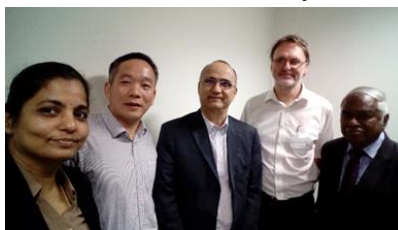With Mr Nick Turner, Institute for Advanced Manufacturing Engineering, Covnetry University

With Prof Claire Davis and Dr Zushu Li **Warwick University.**

With Prof. Jim Pervez & Prof. Mohammad Tokhi , London South Bank **University.**

With Mr David Gilbert, BiNDT

With Profs. Shane Xie, Harvey M Thompson & Abbas Dehghani-Sanij, **Leeds University**

With Mr Shaarad Sharma, **Royal Academy of Engineering, London**

Industry/Academic Partners

Students design life saving health alarm

ASHMITA GUPTA | DC
CHENNAI SEPT.20

If you are suffering from a heart attack or there is a sudden drop or increase in pulse rate, a watch like device will help you deal with the emergency by alerting your doctor or caretaker in real time.

To ensure timely treatment fro people facing a medical emergency, five mechanical engineering students from Hindustan University have developed a watch that alerts physicians. Dr.D.Dinakaran, Professor, Centre for Automation and Robotics, who mentored the students, said, "The students have been working on this project for the past six months and within three to four months we are planning to market our product. We have made a prototype. This device will soon be patented."

It is a wristwatch like device which has to be worn by the patient. It will transmit any abnormal changes in pulse rate acquired from the sensors

● Professor Dinakaran said that other products related to pulse rating will cost around ₹1 lakh in the market. But this device costs around ₹1,000-1,500.

to the wireless alarm which can be fixed anywhere inside the house or in the hospital. The unit that will be displayed will thereby enable the caretaker of the patient to reach him faster.

Explaining the functioning of the device, team leader Kiran Thomas Verghese said that the heartbeat is recorded using a Pulse Oximetry Sensor. The sensor will output the heart beat in the form of an analog signal, which will be converted into digital form.

"This is done by taking the average highest crest and lower trough of analog waves for 200 readings, we get the accurate reading," he said.

He added that if the heart rate of the person is too low or too high the processor transmits the fact to the receiving unit by means of an RF transmitter. The receiving unit is a processor to a RF receiver or a buzzer. During the event of heart attack or any other problem the transmitting unit signals the receiving unit to generate an alarm. Santhosh Kumar E., also part of the team, said the main advantage of this device is that since different people have different body conditions, it can be customised according to the pulse rate. "A certificate of the pulse rate has to be given by the doctor," he said.

Professor Dinakaran further said that other products related to pulse rating will cost around Rs. 1 lakh in the market. But this device costs around Rs. 1,000 – 1,500. "When it comes to mass production, the cost will be less than Rs. 1,000. We discussed with Chettinad University and other experts. They feel this device will be very useful," he said.

Students at ANRO start their study with hopes of someday creating groundbreaking projects. But many of these students aren't waiting for graduation; they're immediately using the knowledge they acquire to help change the world.

Its exciting to see students enter the centre with the skeleton of an idea and emerge with mastery to flesh out that dream into a working reality. Below, we've highlighted few!

The Finger-first Alarm

This wearable band could save the aged, finds *Rajeshwari Swaminathan*

> Its my dream to make robots to reach common people for meeting their need!
> - **Karthik Kumar S.**, M.Tech (Robotics)

Innovation

Home assistive robot-Athena

Mr. S Karthik kumar, final year M. Tech student, is interested in improving social, cognitive and affective functioning of elderly people. His research focuses on the development and use of low cost robot to provide person-centered cognitive interventions to improve the quality of life of elderly people.

The objective of this work is to develop intelligent assistive robot to engage individuals in social human-robot interactions (HRI). Specifically, this work involves the design and development of the sensory systems and HRI control architectures for the robot to facilitate natural and realistic social interactions during activities of daily living and cognitive exercises for elderly people.

Finger Alarm

Won 1st Prize in Hindustan Innovation Challenge
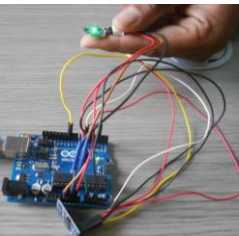
The Finger Alarm is helpful to patients as well as the elderly people enabling their caretakers. It transmits the abnormal changes in pulse rate acquired from the sensors to the wireless alarm and display unit thereby enabling the caretaker to reach the patient faster. This is achieved by detecting the heart rate and the temperature of the patient. This device ensures the safety of patients.

Contact Us

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