



Road Map of Robotics @ IIIT Hyderabad

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Robotics

- Important to
 - Strategic sector (Defence, Space)
 - Industry (Manufacturing, production)
 - Society (For people with special needs)
- However
 - Few education/research programs
 - Few opportunities for hands on training

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Application Areas

- **Autonomous Vehicles:** Land/sea/air.
- **Hazardous Environments:** Insecure, radioactive, space, furnaces.
- **Surgical/Medical:** Robot-assisted surgery, other procedures.
- **Assistive Robots:** For special needs.
- **Industrial, Instructional:** Machine operation, Sports training.

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IIIT Robotics Lab: Objectives

- Boost robotics research in India
 - Build robots
 - Target special needs
- Produce trained manpower
- Spread the thrill of robotics through
 - UG courses
 - Outreach to high-school, +2, students

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Roadmap: Phase I

- Capability Development
 - Embedded Systems
 - Sensors
 - Algorithms
 - Mechatronics
 - Build manpower
 - UG/MS/Ph.D. students
 - Faculty
- Duration: 0-3 years

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Roadmap: Phase II

- Technology Development
 - Robots for the real world
 - Tuned algorithms
 - Application Development
 - Industrial/Strategic sectors
 - Medical/Surgical
 - Societal
- Duration: 1-5 years

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Manpower Development

- **Students:**
 - Hands-on courses for UG/PG
 - Research at MS/Ph.D. levels
 - Research Exchange with CMU, MIT
 - Generate interest among +2 students
- **Faculty:**
 - Attract promising individuals to IIIT
 - Develop own through res exchange

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Research Areas

- **Robot Design:** Embedded Systems, Mechatronics
- **Sensor Integration**
- **Algorithms:** Navigation, Sensing
- **Component Areas:** Computer Vision, Speech & Language Processing, Multi-Agent Systems, Wireless communications, etc.

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Current Activities

- Robot Design course: already on
- Robot Programming course: planned
- Computer Vision, Embedded Systems, Dialog, Communications, Agents: active research areas
- Research Exchange: already on

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Next Mobile Robot Platform

- Goal: A low-cost, versatile, mobile robot for education & research.
- CMU and IIIT collaborating on it.
- Embedded software, stereo vision, range finder, teleoperation interface to be built at IIIT this semester.
- Will appear at NASA's RoboCamp.

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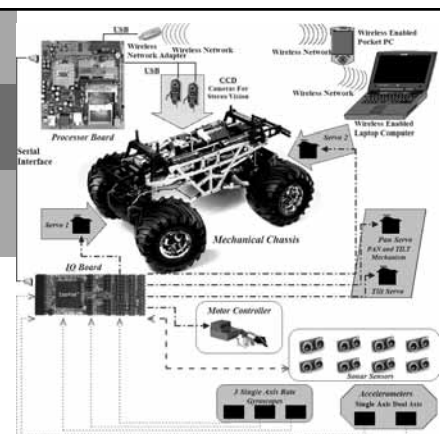
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Robotics Course

- Two researchers from CMU and 26 students of IIIT are building it!
- Stereo cameras, laser/sonar ranging, wireless link, easy programming API
- New platform, new motherboard, new cameras, renewed expectations
- Components for 2 robots are here. 8 more on the way.

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Course Projects

- Interfacing ISOPOD with VIA board and sensors
- API for stereo vision
- Firmware on the VIA board
- Host communication, API for robot, remote control GUI
- Control using PID and encoders
- Implementation of inertial navigation system
- Laser range-finder with diode, camera
- Sound-card and speech API

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Plans

- Enhance research in
 - Embedded Systems
 - Computer Vision
 - Speech and Dialog
 - Multi-Agent Systems, etc.
- Enhance education
 - Robot design course
 - Robot programming course
 - Learning by doing
 - Robot competitions

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Plans ... continued

- Work with users
 - DRDO and defence
 - Other strategic sectors
 - Industry
- Use our special relation with CMU
 - Courses
 - Share research experience
 - Exchange researchers

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Thank you!



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