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2015 - 2019	<b>BTech.</b> in Mechatronics Engineering, Manipal Institute of Technology, KA	<b>8.83</b> <sup>/10</sup>
2012 - 2014	<b>AISSCE</b> from Vasant Valley School, Delhi	<b>95.00</b> %

## ACHIEVEMENTS

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- Top 5% in a batch of 81 students.
- Best Rover team in Asia; 8th out of 82 teams at University Rover Challenge (URC), Utah, 2017. ([link](#))
- Best paper presentation at the iACT-2017 conference, ISA Bangalore.

## RESEARCH EXPERIENCE

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### BioRobotics Group, Manipal ([link](#))

Manipal Institute of Technology, KA

*Co-Founder*

*August 2018 - Present*

#### Neuromechanical and neuromuscular controllers for a Humanoid:

Developing controllers for COMAN\* using Central Pattern Generators (CPG) and virtual muscles.

#### ROS Package for the Pleurobot:

Developing a ROS Package for the Pluerobot (BioRob, EPFL) with CPGs.

#### Tutorials for ROS and Robotics:

Created tutorials to teach ROS, and Gazebo using a linear inverted pendulum model.

### BIOROB ([link](#))

Prof. Auke Jan Ijspeert, Dr.Hamed Razavi

*École polytechnique fédérale de Lausanne*

*May 2018 - July 2018*

#### Simulation Platform for the COMAN Robot †:

Simulate systemic integrations of complex interactions with compliant robots.

- \* Developed simulators with OROCOS-RTT and ROS. ([Simulation Packages](#))
- \* Tested continuum of gaits ([Video](#)) and simulated the robot carrying a stretcher.

#### Neuromechanical framework to study animal locomotion ‡:

Simulator to conduct gait analysis of modular tetrapoda models with analysis tools.

- \* Developed a simulator for lesion studies on tetrapods and designed a CPG based controller.

**Outcome:** Worked with various robotics frameworks, performed gait analysis, designed a single controller for modular tetrapods. Implemented real time analysis tools and graphs: PyQt, NetworkX, matplotlib with custom GUI.

### Autonomous Robotics Lab ([link](#))

Dr.Sudipto Mukherjee

*Indian Institute of Technology, Delhi*

*May 2017 - Jan 2018*

#### Underactuated Flexible Manipulator using Differential Flatness:

Design a flexible manipulator on MATLAB with just 2 non-colinear forces acting as input.

- \* Implemented a flat controller for a planar manipulator with trajectory tracking. ([video](#))

**Outcome:** Conducted extensive research on differentially flat orthotic and prosthetic devices.

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\*COMpliant HuMANoid robot

†This work is supported by the Horizon 2020 Work Programme. (<https://cogimon.eu/>)

‡This work is supported by the Human Frontier Science Program (HFSP). ([Gain access to this repo](#))

# Mars Rover Manipal ([link](#))

Manipal Institute of Technology, KA

Robotic Arm Lead, Research Lead, Mechanical Member

2015 - 2017

## Development of a Mars Rover Prototype:

Developed a Mars Rover for the URC, UT - 2017 and stood 8th. ([URC-2017](#)).

- \* Designed the suspension, robotic arm, autonomous system & control architecture.
- \* Presented the Rover at various conferences. ([Critical Design Review](#)) [[1](#)]

## Robotic Arm Lead:

Supervised a team of 6 researchers to develop a compliant 6DOF Manipulator for the Rover.

- \* The arm has a 6kg payload and a 1.5m reach.
- \* Self adapting gripper to perform screwing, grasping, retrieving, etc tasks. [[2-4](#)]

## TEACHING EXPERIENCE

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### Teaching Assistant

Manipal Institute of Technology, KA

MTE-3003, MTE-2211

Jan 2017 - Nov 2018

#### Robot Dynamics and Control (MTE-3003):

Taught senior undergraduates (class of 35 students) ROS and evaluated final research project.

- \* Modified the course plan to teach robot dynamics through simulations. ([Lab repo](#))

#### CAD & Kinematics Lab (MTE-2211):

Taught and evaluated 3D kinematic models of 81 students.

## PROJECTS

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- Obstacle detection and path planning using computer vision and fuzzy logic.
- Traffic Detection using a Kalman Filter.
- LQR based control of a 3-link Linear Inverted Pendulum on a cart (LIP).

## TECHNICAL SKILLS AND COURSES

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<b>Programming</b>	C/C++, Python, C#, MATLAB, Simulink, Embedded C, Arduino, AVR, HTML, CSS, JS, $\text{\LaTeX}$
<b>Robotics Software</b>	ROS, OROCOS, GazeboSim, MOVEit
<b>CAD &amp; CAM</b>	ANSYS Mechanical Workbench, ADAMS, Solidworks, CATIA V6, AutoCAD, Blender
Please refer to my course curriculum for reference. ( <a href="#">Mechatronics Course Plan</a> )	

## PUBLICATIONS AND PRESENTATIONS

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- [1] **Rajamani, D. K.**, Pitchika E. D., Dhankar K. S., Shorewala S., Bansal D., & Upadhyaya Y. S.(n.d.). *Design Overview of a Planetary Exploration Rover for Unstructured Terrain*. 3rd International and 18th National Conference on Machines & Mechanisms.
- [2] **Rajamani, D. K.** , Pitchika E. D., Dhankar K. S., & Upadhyaya Y. S. *Design and development of a linear jawed gripper for unstructured environments*. Manipal Journal of Science and Technology 3, no. 1 (June 2018). [[link](#)]
- [3] **Rajamani, D. K.** , Pitchika E. D., Dhankar K. S., & Upadhyaya Y. S. *Design and Development of a Linear Jawed Gripper for Unstructured Environments*. International Conference on Applied Sciences, Engineering & Technology. (ISBN: 978-93-5279-058-6)
- [4] **Rajamani, D. K.**, & Dhankar, K. S., Upadhyaya & Y. S.(n.d.). *A comparative Analysis of Industrial Grade Parallel Gripper and Linear Grippers*. ISAB Industrial Automation and Control TechEvent Day, ISA Bangalore. ([Best Paper Award](#))