


Rohan Sarkar

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School of Electrical and Computer Engineering, 465 Northwestern Avenue, West Lafayette, IN 47907.

COURSEWORK

GRADUATE

Robotics
Embedded Systems
Computer Vision
Statistical Machine Learning
Deep Learning
Data Mining
Artificial Intelligence
Neural Networks
Human Activity Analysis using CV & ML
Sparse Representations in Stat. Learning
Optimization for Systems & Control
Computational Methods in Optimization
Linear Algebra
Digital Image Processing
Lumped System Theory
Random Variables and Signals
Computational Methods and Models
Formal Languages Computability And Complexity

UNDERGRADUATE

Data Structures and Algorithms
Object Oriented Programming in C++
Sensors and Transducers
Microprocessors and Microcontrollers
Instrumentation & Electronics
Digital & Analog Electronics
Embedded Systems
Control Systems
Digital Signal Processing

CERTIFICATION

MACHINE LEARNING

Machine Learning by Stanford University
with course grade of 100.0% (Coursera)
Deep Learning (Udacity)
Deep Reinforcement Learning (Udemy)

ROBOTICS

Robotics with Embedded C with a course
grade of A+ at Robosapiens Technologies.

MATLAB & SIMULINK

SKILLS

PROGRAMMING

• C • C++ • Python • Matlab • Simulink •
Java • \LaTeX • Assembly • ABAP • SAP UI5

OS/META-OS

• Ubuntu • ROS • Windows • RHEL

EMBEDDED PLATFORMS

Raspberry Pi • ARM • ATMEGA • Arduino

EDUCATION

PURDUE UNIVERSITY | ROBOT VISION LAB Jan 18-Dec 21
PhD in Electrical and Computer Engineering GPA: 3.82/4
Vision based Intelligent Systems Advisor : Dr. Avinash Kak

PURDUE UNIVERSITY West Lafayette | IN | USA Aug 15 - May 17
MS in Electrical and Computer Engineering GPA: 3.8/4
• Ranked first in the courses of Computer Vision and Robotics.
• Golden Key Honor Society member for being top performing student.

JADAVPUR UNIVERSITY Kolkata | WB | India Aug 10- May 14
BE in Instrumentation & Electronics Engineering GPA: 9.52/10
• Ranked first in Department of Instrumentation & Electronics Engineering.
• Ranked second among all 16 departments in the Faculty of Engineering.

RESEARCH EXPERIENCE

INTEL CORPORATION, HILLSBORO, USA
Graduate Technical Intern (Machine Learning) May 17 - Dec 17

- **Path Planning of Autonomous Drones in a partially observable environment while avoiding moving obstacles using Deep Reinforcement Learning** and extended Deep Q-Network Algorithm to predict a sequence of future actions instead of one action given the current state of agent.
- **Developed Machine Learning based framework for creating automated test-benches for bug localization in hardware systems:**
 1. **Time series prediction of hardware states** using Deep Learning(LSTM)
 2. **Time series clustering of hardware data**
 3. **Automated time series data generation, processing and visualization.**
- Worked on **Depth Estimation from Monocular Images** and pixel-wise **Semantic Image Segmentation** using various multi-scale deep networks.
- Developed **API for controlling and recording navigation data** of drone.

ROBOT VISION LAB, PURDUE UNIVERSITY, USA
Graduate Research Assistant Jan 17 - May 17, Jan 18 - Present

- Designed and developed a Finite State Machine based **Modularized and Scalable Software Architecture for Airport Checkpoint Security**. Currently working on extending the architecture for general **vision based intelligent systems that involve human interaction with objects**.
- **Open Street Map Alignment to Satellite Images.**
- Developed Algorithms for **Road Detection from Satellite Images.**
- Developed algorithm for **tracking objects in dynamic environments.**

ASSISTIVE ROBOTICS TECHNOLOGY LABORATORY (ARTLAB), PURDUE UNIVERSITY, WEST LAFAYETTE, USA
Graduate Research Assistant Aug 15 - Dec 16

- Developed **Machine Learning Algorithms for Human Activity Analysis**, Fall Prediction and Anomaly Detection in Gait for Assisted Living.
- Worked on the following Computer Vision Projects :
 1. **3D Reconstruction of Objects** and **Estimation of Object properties**
 2. **Motion Based Multiple Object Tracking**
 3. **Object Recognition, Detection and Pose Estimation** of moving objects
 4. **Gesture Recognition and Human Activity Analysis** by tracking human skeletal movement using Kinect and Leap Motion sensor.
- Developed a real time **Virtual Reality and Vision based Internet of Things** system in ROS (Video Link : <https://youtu.be/GxsXzX1-2BA>) for:

ROBOTS

• Baxter • P3-DX • AR Drone • Darwin

SENSORS AND DEVICES

• Kinect Sensor(v1 & v2) • Leap Motion
• Google Cardboard • LIDAR • IMU
• Force Torque Acceleration Sensor
• Magnetometer • Accelerometer

SOFTWARE AND TOOLS

• **Machine Learning:**

Theano, TensorFlow, Caffe, Keras, Torch

• **Computer Vision & Virtual Reality:**

Visual Studio, OpenCV, OpenNI, NITE,
Kinect SDK, Leap Motion SDK, RTABMap,
MeshLab, GDAL, OGR.

• **Embedded Systems:**

Eclipse, Xilinx ISE, AVR Studio, Keil, Eagle

• **Robotics:**

ROS

• **MATLAB and Simulink**

COURSE PROJECTS

MACHINE LEARNING:

• Classification of Handwritten digits using various supervised classification algorithms(CNN, Neural Networks, SVM, k-NN, Logistic Regression), tuning of hyperparameters using Monte Carlo and k-Fold Cross Validation, dimensionality reduction using PCA, LDA.

COMPUTER VISION:

• 3D Reconstruction of Objects.
• Face Detection and Recognition
• Object Detection and Recognition
• Camera Calibration, Point Cloud Generation, ICP Registration, Image Segmentation, Image Mosaicing.
• Feature Extraction
• Dimensionality Reduction

DEEP LEARNING:

• Extracting Finite State Machines and rules from RNNs and LSTMs
• Deep Reinforcement Learning to solve challenges in OpenAI Gym.

EMBEDDED SYSTEMS:

• Real Time VR & Vision based IoT project on Gesture Controlled Robotics.
• Tilt compensated e-compass.

SPARSE REPRESENTATIONS:

• Informative Feature Selection for Computer Vision tasks and Object Recognition using Sparse PCA.

HOBBIES

• Singing • Gyming • Playing sports: Cricket, Table Tennis • Coordinated and participated in Robotics & IoT events

1. **Gesture Controlled Mobile Robotics:** The direction and speed of a Robotic Vehicle is controlled by a single hand's orientation and finger joint locations extracted using Leap Motion sensor.
2. **Teleoperation of a Robotic Vehicle** with position/orientation controlled by head orientation using Google Cardboard and velocity controlled by gestures using Leap Motion with live visual feedback from a Pi camera.

• Developed an **Internet of Robotic Things** framework using **AWS** and **ROS** to tele-operate and control a network of Robots and Sensors from a web browser.

• Developed **Algorithm for Conversion from Roll Pitch Yaw Convention to Denavit Hartenberg Representation** used in Humanoid Robotics.

• **RGB-D SLAM** using LIDAR, Kinect and Odometry data of mobile robot.

INSTITUTE OF AUTOMATIC CONTROL ENGINEERING (LSR), TECHNICAL UNIVERSITY MUNICH, GERMANY.

Research Assistant (DAAD WISE Scholarship)

May 13 - Jul 13

• Worked on a Robotics Project based on **Resonance-Driven Dynamic Manipulation for Dribbling, Catching, Throwing and Juggling with Elastic Beam** excited by a robot at different resonant frequencies. (IEEE ICRA 14)

SAP LABS, CUSTOM DEVELOPMENT TEAM, INDIA

Software Developer Associate

Jun 14 - Jul 15

• Developed **UI Prototypes** and **visualization tools** for data analysis.

OTHER SELECTED WORK EXPERIENCE

• **Graduate Teaching Assistant** in Electrical and Computer Engineering at **Purdue University** for **Digital Systems Senior Design** (Aug 18 - Present), **Linear Circuit Analysis** (Jan 17-May 17) and **Robotics** (Aug 16-Dec 16).

• **Internship on Sensor based Intelligent Robotics** at **Robosapiens Tech.**

• **Undergraduate Research Assistant** at **Dept. Of Instrumentation & Electronics Engineering, Jadavpur University, India** (Aug 10 - May 14). I worked on **Robotics, Sensors, Embedded Systems and Instrumentation.**

PUBLICATIONS

• **Resonance-driven dynamic manipulation for dribbling and juggling with elastic beam** (Published in IEEE ICRA 2014).

• **Arbitrary Waveform Generation Using Memristive Cross Bar Array.** (Published in IEEE ICACC 2014)

• **CheckSoft: A Modularized and Scalable Software Architecture for Airport Checkpoint Security.** (Journal paper submitted for publication)

• **Conversion from Roll Pitch Yaw Convention to Denavit Hartenberg Representation for Humanoid Robotics** (Journal paper to be submitted).

AWARDS & ACHIEVEMENTS

• Received recognition at **Intel Corporation** from **Knights Machine Learning** Team in 2017.

• Awarded **DAAD WISE Scholarship** for research in Germany in 2013.

• Awarded A.Bandhopadhyay Bronze Medal for securing the **second highest marks among all courses in B.Eng at Jadavpur University** in 2014.

• Awarded **University Gold Medal** for securing **first position in Instrumentation & Electronics Engineering** at Jadavpur University in 2014

• Golden Key International Honour Society Membership for being a **top performing Graduate Student at Purdue University, USA** in 2016.

• Awarded **University Gold Medal** (2014), M. Rani Mitra (2013) and I. & S. Putatunda Memorial Award (2012) by National Council of Education for **securing first position in B.E at Jadavpur University in every academic year**

• Secured the **second position in ICSE (96.20%) and ISC (95.25%)** in school.

LINKS:

LinkedIn: www.linkedin.com/in/rohan-sarkar

GitHub: <https://github.com/sarkar-rohan>