**Enna Sachdeva**
My Portfolio
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## Education

- **Oregon State University** — Corvallis, OR, USA
  *Master of Science in Robotics; GPA: 3.65/4.00* — *Sept. 2018– Present*
- **IIIT Hyderabad** — Hyderabad, India
  *Master of Science in Robotics; GPA: 9.50/10.00* — *Jan. 2016 – June. 2018*
- **YMCA University of Science and Technology** — Faridabad, India
  *Bachelor of Technology; Electronics and Communication Engineering; GPA: 8.85/10* — *Aug. 2010 – July. 2014*

## Work Experience

- **University of Texas at Austin** — Austin, Texas
  *Aspiring Women Entrepreneurs* — *April 2018 - June-2018*
  - **Entrepreneur**: 16 Indian Aspiring Women Entrepreneurs selected among 1400 applicants, fully funded by US State Government.
  - **Market Validation and Survey** : Commercialized Technology and developed International Business strategies for my innovation on an In-Pipe climbing robot, which could traverse small diameter complex pipe network with sharp bends.
- **Havells India Ltd** — Noida, India
  *Electronics Engineer* — *June 2014 - July 2015*
  - **Designing optimally efficient, high power-factor LED power supply:**: Addressed the challenge of designing power efficient high power-factor LED power supply within a small form-factor with a trade-off between cost and performance.
  - **Organization:**: Autonomously organized design, development, and production of one of the most sold LED products of the company.

## Research Projects and Publications

* **Generating Counterfactuals in Multiagent Tightly coupled domains** — *Autonomous Agents and Distributed Intelligence Laboratory (AADI), Oregon State University, January 2018-Present*
  - Currently working on generating counterfactuals to address structural credit assignment problem in Multiagent cooperative systems, using Autoencoders.
* **Distributed Solutions to Temporally-Coupled Sequential Tasks** — *Autonomous Agents and Distributed Intelligence Laboratory (AADI), Oregon State University, January 2018-Present*
  - Developed a hierarchical reinforcement learning based approach to solve sequential tasks in Multiagent cooperative environment.
  - This enables the agents to learn which reward to maximize at a give time, to achieve a global high level task.
* **Recurrent Multiagent Deep Deterministic Policy Gradient with Difference Rewards** — *Oregon State University, October-December-2018*
  - Multiagent Deep Determinisitic Policy Gradient algorithm - MADDPG with Recurrent Neural Networks in the actor policy, to address partial observability in multiagent environment.
  - Used reward shaping through difference rewards to address structural credit assignment problem in a partially observed environment.
* **Localization and Planning of Autonomous Car**— *IIIT-Hyderabad, May 2018 - July 2018*
  - Leveraged capabilities of ORBSLAM2 for localization and planning of a driverless car by fusing data from Stereo, LIDAR, IMU, GPS. This project was in collaboration with **MATHWORKS, India**
* **Design and Fabrication of Omnidirectional Bendable OmniCrawler modules** (*Thesis*)— *IIIT-Hyderabad, June 2016 - June 2018*
  - Design and fabrication of a novel mechanisms of reconfigurable module which exhibits hybrid locomotion modes: crawling, wheel mode, legged mode, and spokes mode by exploiting the potential advantages of each of them for all-terrain vehicles.
  - This work has been published and presented in RSS-2018 workshop (*Paper*), IROS-2017 (*Paper*), ROBIO-2017 (*Paper*) and the current work is available on arxiv.

* **VLSI architecture for semi-autonomous car parking assistance**— *IIIT-Hyderabad, March 2016 - June 2016*
  - Optimized VLSI architecture using fuzzy-logic abstraction for complex nonlinear control model of car.
  - Achieved 65.7% lesser power consumption than conventional architecture and saved 32.5% of chip area.
  - Work presented and published in INDICON-2016 (*Paper*).
* **Correcting distorted AES Keys obtained from cold boot attack**— *Scientific Analysis Group, June 2013 - Dec 2013*
  - Improved error-correcting algorithm to achieve 85% efficiency in correcting the distorted Advanced Encryption Standard (AES) keys.
  - Successfully tested in real-time on encryption system 'TrueCrypt'. Work has been published in ICECCT-2015 (Paper).

## Relevant Courseworks and Projects

- **Sequential Decision Making**- *Graduate Course, Winter-2019, Oregon State University*
  Implementation of $RRT$ for $2D$ and $A*$ for $2D$ and $4D$ maze, to optimize the distance traversed and velocity, respectively; Robotic navigation problem using Value iteration to maximize the reward, Robotics Search and Tracking problem to trace a randomly moving goal with no knowledge of the environment, using belief to update the values for each state.
- **Autonomous Multiagent Syatems**- *Graduate Course, Fall-2018, Oregon State University*
  Identifying Nash equilibrium for a Multiagent congestion problem- Arthur's bar problem, and analyzing the optimal system performance with different counterfactuals in shaped-rewards; Implemented *Q-learning* for non-stationary environment in a Grid World with 2 agents trying to catch a randomly moving target.
- **Computer Vision**- *Graduate Course, Spring-2016, IIIT-Hyderabad*
  Performed Zhang'S method and Direct Camera Calibration method using Projection Matrix for Camera Calibration.; Implemented image stitching and corrected perspective radial distortion and image rectification using homography estimation.
- **Mobile Robotics** *Graduate Course, Fall-2016, IIIT-Hyderabad*
  Implemented Extended Kalman Filter (EKF) from the scratch, Got Hands-on with GTSAM toolbox, that implements smoothing and mapping (iSAM) in robotics and vision, Batch-Mode SAM with a Levenberg-Marquardt solver; Realized Non-Holonomic trajectory Planning for Over, Under and Critically constrained Non-Holonomic systems, with Bernstein Basis Functions.

## Programming Skills

- **Languages**: Python, MATLAB, C, C++
- **Robotics**: ROS, OpenCV, SLAM, GTSAM, Cvex, fmincon optimization, SolidWorks, ADAMS- Dynamic Simulator, 3D-printing
- **Aritificial Intelligence**:TensorFlow, Pytorch, Jupyter Notebook, Open-AI Gym, Reinforcement Learning, Deep Learning, Evolutionary Algorithms
- **Electronics**: PCB Designing, Circuit components selection and Validation, Manufacturing, Verilog HDL, VHDL

## Patents

- **Telescopic Differential Screw Mechanism Based Stewart Platform to Achieve Omnidirectional Bending**, Provisional Patent filing No.- MY269008.
- **Omnidirectional Bendable OmniCrawler Module**, under filing process.

## Links

- **Github**: **https://github.com/EnnaSachdeva?tab=repositories**
- **Publications** : **https://scholar.google.com/citations?user=QIZZA0oAAAAJhl=enoi=ao**
- **LinkedIn**: **https://www.linkedin.com/in/enna-sachdeva-67030853/**
- **Website**: **https://ennasachdeva.wixsite.com/roboticist**