Saptadeep Debnath

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SUMMARY

Graduate student at the University of Michigan, Ann Arbor pursuing an MS degree in Electrical and Computer Engineering with a specialization in Robotics. Actively seeking internship opportunities for Summer 2020.

EDUCATION

University of Michigan, Ann Arbor, MI
Master of Science in Electrical and Computer Engineering (Robotics specialization) *Sept 2019 - May 2021*

- **Course Highlights:** Robotic Systems lab, Mechatronic Systems Design, Mobile Robotics, Linear Feedback Control

BITS, Pilani – Dubai Campus, Dubai, UAE
Bachelor of Engineering (with Hons.) in Electronics and Communication Engineering *Sept 2014 - May 2018*

- **Course Highlights:** Modern Control Systems, Computer based Control Systems, Artificial Intelligence, Digital Image Processing
- **Achievement:** First prize in the Drone for Good University Challenge conducted by Mohammed Bin Rashid Space Center and Government of Dubai, 2015
- **Leadership Experience:** Team Lead for Team IFOR (linkedin.com/company/team-ifor/) *(Dec 2016 – May 2018)*
  General Secretary - IEEE Power and Energy Society *(May 2016 – May 2017)*

TECHNICAL SKILLS

- Concentration Areas: Robotics, Control Systems, UAVs & UGVs, Machine Vision, Machine Learning,
- Programming Languages: Python, C, C++
- Tools and Technologies: MATLAB, Robotic Operating System (ROS), LabVIEW, SLAM, OpenCV, TensorFlow, 3D Printing, Drone Modelling

ACADEMIC PROJECTS

Hand Gesture Control of a Robot using Intelligent Techniques **Fulda, Germany**
Bachelor Thesis *Winter 2018*

- Developed a system to translate free hand gestures to motion instructions on TurtleBot running on Intel Atom.
- Recognition of free hand gestures using LSTM (TensorFlow using C++).
- Transforming the gestures to respective pre-defined motions and parsing the motion instructions via ROS messages to TurtleBot.

Keywords – RNN, LSTM, TensorFlow, SLAM, TurtleBot

Non-Linear Modelling and Simulation of Unmanned Aerial Vehicle **Dubai, UAE**
Design Project *Fall 2017*

- Studied and implemented different mechanical models for the nonlinear mathematical modelling of a UAV.
- Simulated the UAV in the MATLAB-Simulink environment.
- Designed a PID controller for controlling the attitude and position of the nonlinear model of the UAV.

Keywords –PID, Non-Linear model, UAV

Indoor Localization of an Unmanned Aerial Vehicle **Dubai, UAE**
Design Project *Winter 2017*

- Design and development of a UAV, spatially aware in an indoor environment devoid of GPS and SLAM algorithms.
- Sensor fusion using LIDAR Rangefinder and Optical Flow for indoor localization.
- Fusing the estimated states with existing odometry values to enhance the performance.

Keywords – 1D LIDAR, Optical Flow, Pixhawk, UAV

Flight Data Analysis of a Quadrotor **Dubai, UAE**
Study Project *Winter 2016*

- Modelled a quadcopter on SolidWorks platform.
- Importing the model via SimMechanics to MATLAB environment.

- Developed and designed a linear controller for the model.

Keywords – PID, linear control, UAV

Projects for IFOR (UAV Team) at BITS Pilani, Dubai Campus

SorbDrone – An Oil Spill Solution **Dubai, UAE**
Submission for Drones for Good 2017 *2017*

- A solution for modernizing the Oil Spill clean-up process.
- Inspection of affected area by UAV equipped with thermal camera.
- Use special pads filled with hydrophobic oil absorbing material, to clean oil spills.

Keywords – Oil spill, hydrophobic-oil absorbing material, UAV
(youtube.com/watch?v=GET-k7B2qjQ)

Vertical Take-off and Landing Fixed Wing Plane **Dubai, UAE**
Submission for Innovator Show 2016, Abu Dhabi *2016*

- Fabrication and modeling of a VTOL fixed-wing plane.
- The project was a contract work for a company.

Smart Inspection of Solar Panels **Dubai, UAE**
Semi-Finalist Submission for Drones for Good 2016 *2016*

- Detection of faulty solar panels in a solar farm via UAVs.
- Use of thermal camera; geo-tagging the images and communicating to a control station.
- Trial and tested prototype.

Keywords – Solar panels, thermal imaging, UAV.
(youtube.com/watch?v=3sND5i_JLQw)

WORK EXPERIENCE

FULDA UNIVERSITY OF APPLIED SCIENCES **Fulda, Germany**
Research Intern *Winter 2018*

- Under the guidance of Prof. Dr. Alexander Gepperth at the Department of Applied Computer Science
- Worked on using Machine Learning and Computer Vision application in the field of Robotics and developed a system for recognition of freehand gestures

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY (MNIT) **Jaipur, India**
Research Intern *Summer 2016*

- Worked under the guidance of Dr. Santosh Kumar Vipparthi at the Department of Computer Science
- Application of LBP and SLTP method on OpenCV and MATLAB to video files for background subtraction

TECHNICAL PUBLICATIONS

- Presented and published a technical paper on **Design and Development of a Non-Linear Controller for Quadrotor type Unmanned Aerial Vehicle** at the IEEE International Conference on Inventive Computation Technologies. Authors: Saptadeep Debnath and Mary Lourde R **Nov 2018**
- Published a technical paper on **Performance Evaluation by Image Processing Techniques in Archery – A Case Study** in the International Journal of New Technologies in Science and Engineering. Authors: Saptadeep Debnath and Subir Debnath **Oct 2018**
- Presented a technical paper on **Image based Biomechanical Case study of an International Archer** at the International Conference on Sports Engineering. Authors: Saptadeep Debnath and Subir Debnath **Oct 2017**
- Presented and published a technical paper on **Visual Odometry Data Fusion for Indoor Localization of an Unmanned Aerial Vehicle** at the IEEE International Conference on Power, Control, Signal & Instrumentation Engineering. Authors: Saptadeep Debnath and Jagadish Nayak **Sept 2017**
- Presented and published a paper on **Unmanned Aerial Vehicle of Team IFOR for the International Aerial Robotics Competition 2017** in the Association for Unmanned Vehicle Systems International (AUVSI). Authors: Saptadeep Debnath, Anudeepsekhar Bolimera et al. **July 2017**
- Published a research **Aerodorneial-4, A Space Settlement Proposal** as a book (ISBN: 978-3-659-85700-3, Lambert Academic Publishing). Authors: Saptadeep Debnath, Rahul Pareek, Naman Jain **Apr 2016**
- Presented and published a paper on **Unmanned Aerial Vehicle of BITS Pilani, Dubai Campus for the International Aerial Robotics Competition 2015** at the Association for Unmanned Vehicle Systems International (AUVSI). Authors: Ganesh Ram R K, Syed Zeeshan Ahmed, Ayanava Sarkar, Saptadeep Debnath et al. **July 2015**