



# NEHA DAS

Graduate Student



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neha191091.github.com



neha191091@gmail.com



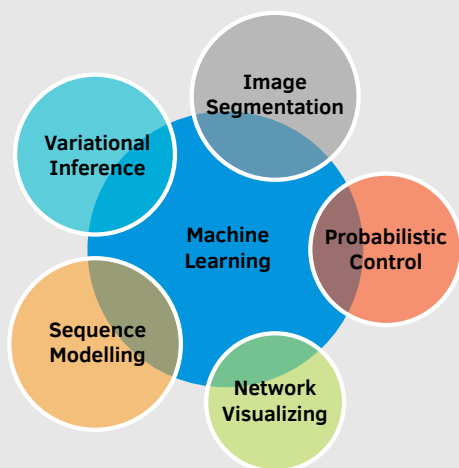
/in/neha191091



neha191091

## Technical Skills

### Research Experience and Interests



### Programming

Python • Tensorflow • Pytorch

C • C++

Javascript • Django(Python) • Docker

OpenCV • MATLAB • Simulink

## Education

Oct 2016 -  
Sep 2019

**MSc. Informatics**

Grade - 1.2, Passed with High Distinction

Technical University of Munich

Aug 2009 -  
May 2013

**BTech. Software Engineering**

Avg. - 75.48, First Division with Distinction

Delhi Technological University

## Research

Sep 2019 -  
Present

**AI Resident**

Facebook AI Research

*Representation Learning for Controlling Armed Robots*

The aim of this work is to learn a latent dynamics model of an armed robot for interaction with and manipulation of a held object/tool given visual and proprioceptive input. We postulate that a helpful step towards this is to explicitly model the object dynamics and its relationship with the interacting arm.

- **Tools:** Python, PyTorch, Visdom

Apr 2019 -  
Sep 2019

**Internship Project**

Volkswagen Group AI Research

*Combining Probabilistic Movement Primitives*

- Learning a smooth interpolation of two or more probabilistic movement primitives for feasible trajectory generation.

- **Tools:** Python, Tensorflow, Matplotlib

Nov 2018 -  
Apr 2019

**Master Thesis**

TUM, Volkswagen Group AI Research

*Learning state-space models of camera based drones for intrinsically motivated control*

This work deals with the implementation and extension of Deep Variational Bayes Filter to incorporate high-dimensional image data. This includes

- Analysis of issues arising in some of the current architectures for modeling high-dimensional sequential data.
- Developing a systematic approach towards dealing with the above issues
- Evaluation of the resultant architecture on three distinct dynamical systems both in terms of predictive quality as well as for empowerment-based control.

- **Tools:** Python, Tensorflow, OpenCV, Matplotlib

June 2017 -  
May 2018

**Inter Disciplinary Project**

Chair for CAMP@TUM

*3D Human Body Segmentation*

This work was part of a collaborative effort to provide a virtual view into a patient's body for assistance during diagnosis and surgical procedures. My contributions included:

- Devising and implementing a fast segmentation architecture for a 3D model of the human body constructed using KinectFusion SLAM from depth maps. The segmentation architecture was based on U-Net with Depthwise Separable Convolutions for added speed (50% increase over normal CNNs).
- Preparation of a synthetic dataset of Depth-Segmentation Map pairs using the Blender software and python scripts. The segmentation model was trained on synthetic data and tuned to work for real depth images.
- Implementation of the inference pipeline in C++ for integration with the rest of the project.

- **Tools:** Python, C++, Tensorflow, OpenCV, Matplotlib, Blender



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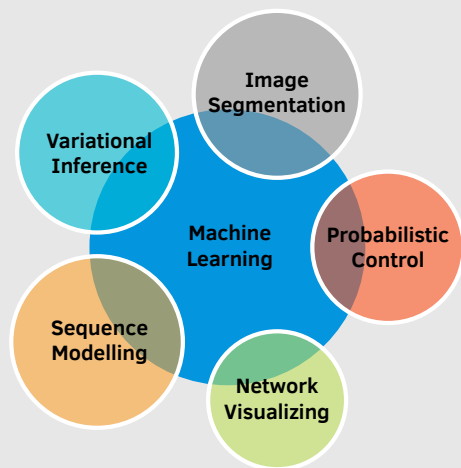
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Oct 2017 -  
Mar 2018

#### Advanced Practical Course

Computer Vision Group@TUM

*Neural Network Visualization using Guided Backpropagation*

In a team of two:

- Implemented Guided Backpropagation for visualization of the internals of a neural network. This was used to analyze and hypothesize about the workings of a neural network that used for protein structure prediction.
- Implemented a web interface that predicts the tertiary structure of a given protein.
- **Tools:** Python, PyTorch, Flask, Matplotlib

Oct 2017 -  
Feb 2018

#### Lecture Project

Chair of Computer Graphics@TUM

*Iterative Closest Point Analysis*

In a team of two:

- Implemented and analyzed several variants of the Iterative Closest Point algorithm, comparing them on the basis of execution speed and quality of the result.
- **Tools:** C++, OpenCV

June 2017 -  
Oct 2017

#### Advanced Practical Course

TUM, Volkswagen Group AI Research

*Modelling a dynamical system using Inverse Autoregressive Flow*

In a team of three:

- Proposed and implemented Inverse Autoregressive Flows for determining the state space (latents) in a dynamical system model.
- Obtained comparative results to the (then) state of the art on Pendulum data with reduced sampling complexity.
- **Tools:** Python, Tensorflow, Matplotlib

Apr 2017 -  
June 2017

#### Advanced Practical Course

TUM, Volkswagen Group AI Research

*Reimplementation of Importance Weighted Autoencoders (IWAE)*

- Reimplemented IWAE and trained the architecture on MNIST.
- Presented a theoretical and a comparative analysis of the technique.
- **Tools:** Python, Tensorflow, Matplotlib

June 2017 -  
Oct 2017

#### Lecture Project

Computer Vision Group@TUM

*Synthesis of Depth images from RGB images*

In a team of four:

- Implementation of an architecture that learns a supervised pixel to pixel mapping from an RGB image to its corresponding depth image.
- **Tools:** Python, PyTorch

## Publications & Technical Reports

Nov 2019

$\beta$ -DVBF: Learning State-Space Models for Control from High Dimensional Observations. [↗](#)

July 2018

Development of a system that allows for the semantic segmentation of a 3D model of a human body into its constituent parts [↗](#)

Jun 2018

Seminar Report: Deep Learning Sequence Modelling (Natural Language Processing) [↗](#)



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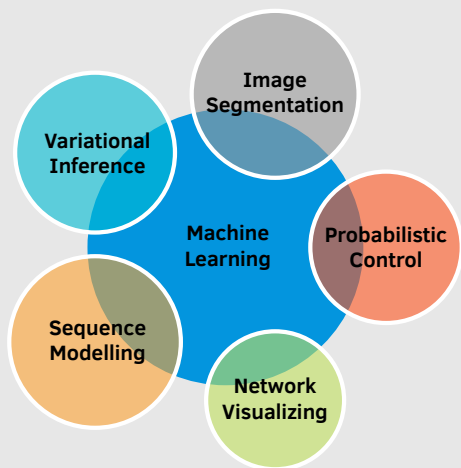
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## Additional Experience

June 2018 -  
Aug 2018

### Intern, Master's Thesis Student

Volkswagen Group AI Research

- Setup the inference model for unsupervised control in an embedded system (Jetson TX1) using Tensorflow C APIs.
- Wrote a module for retrieving and appropriately formatting data from the IMX219 cameras attached to the Jetson Module using Video4Linux APIs

June 2017 -  
Mar 2018

### Working Student

Chair of Robotics and Embedded Systems, TUM

- Modelled various example Cyber Physical Systems using MATLAB and Simulink for class tutorials.
- Set up a website for one of the projects for the Chair (Django-python, Bootstrap CSS).

Oct 2014 -  
Sep 2016

### Software Developer

Epic Systems

- Developed front-end (Javascript, CSS) and back-end (CSharp, Cache) code for Web-based applications.

July 2013 -  
Sep 2014

### Software Developer in Test

McAfee

- Debugged and Fixed critical issues including operating system crashes, performed white box testing for critical issues,
- Created a framework in C++ for stress testing the product