# BADRINATH SINGHAL

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## EDUCATION

- **Indian Institute of Technology Guwahati** July 2014 - June 2018
  Bachelor of Technology CPI: 8.36/10
  Department of Electronics and Electrical Engineering
  Minor in Computer Science and Engineering

## PUBLICATIONS

- Uddeshya Upadhyay, **Badrinath Singhal**, Meenakshi Singh, *"Spinal Stenosis Detection in MRI using Modular Coordinate Convolutional Attention Networks"*, *Oral Presentation*, **IEEE International Joint Conference on Neural Networks (IJCNN) 2019**, Budapest, Hungary.
- Shashank Huddedar, Mayank Kagliwal, **Badrinath Singhal**, *"Performance analysis of a Novel IT2 FCM Algorithm"*, *Oral Presentation*, **IEEE World Congress on Computational Intelligence (WCCI) 2018**, Rio, Brazil.

## WORK EXPERIENCE

**Synapsica Technologies - AI Scientist** Oct 2018 - Present
*Meenakshi Singh, CEO Synapsica Technologies*

· Developed *Synapsica Spindle* which is an AI reporting assistant for MRI Spine saving upto 80% of reporting time of radiologists.
· Used computer vision and deep learning techniques to identify vertebral levels measures patency of central canal and characterises disc herniation and nerve root compression.
· Product is currently validated by radiologists at medical institutes and radiology centers across country.

**Computer Vision and Fuzzy Systems Lab - Research Intern** May 2017 - July 2017
*Prof. Frank Chung-hun Rhee, Hanyang University*

· Integrated `Multi-EIASC Algorithm` with `IT2 Fuzzy C-Means Clustering Algorithm` to give `Multi-IT2 Fuzzy C-Means Algorithm`.
· Instead of using the EIASC algorithm over each of the dimensions of pattern sets separately, we used Multi-EIASC algorithm for the complete pattern set which uses n-dimensionality of pattern sets as its fundamental property.
· Our work got published in **IEEE WCCI 2018 at Rio, Brazil**.

**Ikegami Lab - Research Intern** May 2016 - July 2016
*Prof. Takashi Ikegami, The University of Tokyo*

· Worked on implementing DCGAN on celebrity faces datasets and exploring linear operations in latent vector in $z$ space. Work consists of reading, implementing research papers as well as evaluation on test dataset.

**Engineering the Eye-REDX, Hyderabad** July 2015
*Prof. Ramesh Raskar MIT Media Lab*

· Developed a device which helped calculating the percentage of damage suffered by Meibomian Gland. Project was developed using infrared camera, 3D printer and image processing. It was displayed at exhibition organized by `LV Prasad Eye Institute, Hyderabad`.

## PROJECTS

- **Detection of Spinal Stenosis from axial MRI scans.**
  *Synapsica Technologies*
  - Developed a deep learning and computer vision based 2 stage architecture which measures spinal canal diameter in axial image of MRI scan.
  - Perform training and testing on 9,000 MRI axial scans and tweaked model to improve performance of the model
  - The product is going through clinical validation by radiology centers and medical institutes across the country.
- **Listhesis evaluation from sagittal MRI scans.**
  *Synapsica Technologies*
  - Developed an approach to diagnose Listhesis in sagittal image of MRI scans
  - Detected vertebral points and integrated medical criteria to perform diagnosis.
  - Product is at the stage of clinical validation by radiology centers and medical institutes across the country.
- **Efficient VLSI Implementation of SVD**
  *Bachelor Thesis Project*
  *Prof. Shaikh Rafi Ahmed*, Dept. of EEE, IIT Guwahati
  - Used CORDIC algorithm to calculate the SVD of $n \times n$ matrix ($n > 2$) using approach proposed to calculate SVD of $2 \times 2$ matrix using operations that can be implemented in VLSI architecture.
  - Involved reading papers, implementing and tested the approach on Verilog. Achieved reduction in processing time by 2% to calculate SVD.
- **Autonomous Intelligent Robot**
  *Robotics Club, IIT Guwahati*
  - Built a self-navigating bot which is able to map the environment, localize itself and reach the given goal position autonomously.
  - Displayed at technical exhibition conducted by Techniche 2015, IIT Guwahati.

## TECHNICAL STRENGTHS

- **Programming Languages (Libraries):** C/C++, Python, HTML, Matlab, LaTeX, Pytorch
- **Miscellaneous:** Intel 8085, Xilinx, PSCAD, Simulink, ROS

## ACADEMIC ACHIEVEMENTS

- Joint Entrance Examination 2014: Secured position in top 1% among 150000 students.
- $5^{th}$ Rank in Guwahati region for AISSCE 2013.
- Offered Merit cum Means (McM) scholarship by IIT Guwahati for 3 consecutive years.
- $1^{st}$ in Algorithmic Trading competition during Kriti 2016, IIT Guwahati.
- $48^{th}$ state rank out of 80,000 students in JEE Mains 2014.