Nayan Singhal

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RESEARCH AREAS

Robotics, Artificial Intelligence, Machine Learning, Natural Language Processing, Computational Neuroscience

EDUCATION

Indian Institute of Information Technology, Allahabad, India

Bachelor of Technology (B.Tech), Information Technology — Jul, 2010 – May, 2014

Overall GPA: 9.8/10.0 (Gold Medalist)

RESEARCH EXPERIENCE

Stanford University, Stanford, USA

Robot Dynamics Engine using Spatial Vector

With Prof. Kwabena Boahen and Samir Menon — Jan, 2014 – Aug, 2014

Developed an open source robotics control and simulation software for robots having a kinematic tree or loop like structure using spatial vectors (6-Dimension vector). It simplifies the process of expressing and analyzing the dynamics of a simple rigid body system. It calculates the joint acceleration using Articulated Body algorithm and Newton Euler algorithm designed in spatial vector (6-Dimension vector) and integrates the joint acceleration using Heuns Integrator to reckon the joint position and joint velocity.

Neural Simulator

With Prof. Kwabena Boahen and Dr. Samir Menon — Jul, 2014 – Aug, 2014

Developed a neural simulator for simulating large scale neural system. It uses the leaky integrate-and-fire (LIF) neuron model to encode the current changes in the neurons soma due to dendritic input by calculating the spike rate of the neuron. It utilizes the linear decoding to estimate the magnitude that was encoded with a nonlinear process while operating in a noisy environment.

PROJECTS

Question Answering System Using Semantic Dependency Tree and State Graph

With Prof. Sudip Sanyal, Dean — Jul, 2013 – Nov, 2013

Developed a system which relates the word logically and provides an admissible answer to the user query. The system analyzes the question semantically to reduce it to a canonical form, expressed as a dependency tree. Then it extracts the answer by categorizing the type of answer expected and searching through the generated state graph using certain heuristics. Submitted a research paper in **AAAI Conference on Artificial Intelligence - 16**.

Extraction of Multiword Expression

With Prof. Sudip Sanyal, Dean — Jan, 2013 – May, 2013

Developed a fully unsupervised an automated method for the large scale extraction of multiword expressions from large corpora. Extraction was based on the linguistic and statistical filtering using Pointwise Mutual Information.

ECG Analysis and Diagnostics of Cardiac Problems

With Prof. Sudip Sanyal, Dean — Jul, 2012 – Nov, 2012

Developed a semi-automatic system which analyses the electric impulses obtained from ECG tests of human heart and diagnose them for some specific cardiac problem by implementing SVM (Support Vector Machine). The diagnosis was based on the analysis of the signal using Gaussian mixture model of each beat and feature extraction using correlation coefficient obtained after the segmentation of ECG.

Object Tracking under Cluttered Environment

Independent — Jan, 2012 – May, 2012

Developed an object tracking system used for person detection and tracking using OpenCV. The algorithm consists of events like background subtraction, connected component analysis, basic tracking, grouping people and estimation of group size.

3-D Walk-Through of CC-3 IIIT-Allahabad

With Prof. Pavan Chakraborty — Jul, 2011 – Nov, 2011

Developed a 3-D virtual walk-through of CC-3 at IIIT-A using Copper Cube & Maya and published in WebGL.

WORK EXPERIENCE

Microsoft Research & Development - Office Divison

- Software Developer, Intern — May, 2013 – Jul, 2014

  Worked on Microsoft Visio. Developed an Add-in to convert Visio shapes to PPTX using guides. Designed the tool to convert Visio Org Chart to PPTX Smart Art.

- Software Developer, Full Time — Sep, 2014 – Present

  Worked on auto snap feature for Electrical Diagrams in Microsoft Visio. Developing a probabilistic graphical model which will align the Visio Shapes drawn through ink.

RELEVANT COURSES

Design & Analysis of Algorithms, Artificial Intelligence, Operations Research & Optimization Techniques, Control Theory, System Modeling & Simulation, Distributed System, Discrete Mathematics, Formal Language & Automata Theory, Probability & Statistics, Object Oriented Methodologies, Computer Networks, Software Engineering.

HONORS AND ACHIEVEMENTS

- Insitute Gold Medal for obtaining the top rank among about 250 students in the Information Technology B.Tech (B.S.) program at IIIT-Allahabad, 2010-2014.
- Prof. Dr. Ing. Mathias Kleiner Gold Medal for overall best student based on Academic Performance and Innovative Achievements among all undergraduate program at IIIT-Allahabad, 2010-2014.
- Chancellor Gold Medal for securing first position among all undergraduate program at IIIT-Allahabad, 2010-2014.
- Shashank Verma Memorial Gold Medal for Academically best graduating student in the Information Technology B.Tech (B.S.) program at IIIT-Allahabad, 2010-2014.
- Dr. T.C.M. Pillay Memorial Gold Medal for securing Top position in the Final Year of Information Technology B.Tech (B.S.) program at IIIT-Allahabad, 2013-2014.
- Meritorious Scholarship in 1^{st}, 2^{nd}, 4^{th} and 6^{th} Semester for Academic Excellence, 2010-2014.
- Shashank Verma Memorial Gold Medal for securing Top position in Second Semester of Information Technology B.Tech (B.S.) program at IIIT-Allahabad, 2010-2011. Selected as the Treasurer of Audio-Lights Club, IIIT-A, 2012-2013.
- Selected as the Treasurer of Audio-Lights Club, IIIT-A, 2012-2013.
- Best Theme in the Fashion Show featured at the IIIT Technical Cultural Festival (as a member of the team), 2012.
- Organized Bollywood Tambola and Platzen (online event) during IIIT Technical Cultural Fest at IIIT-Allahabad, 2011-2012.
- Selected as a volunteer for 2nd Disputations on Future Technologies for Health Care, 2011.
- Certificate of Merit for being among the top 0.01% of successful candidates of All India Secondary Education Examination in Science, 2008.