

# Shikha Singh

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## EDUCATION

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- **Indian Institute of Technology Madras** Chennai, India  
*Ph.D. in Computer Science; CGPA: 8.8* July. 2016 – till date
- **Visvesvaraya National Institute Of Technology** Nagpur, India  
*Master of Technology in Computer Science; CGPA: 9.38* July. 2014 – May. 2016
- **Feroze Gandhi Institute of Engg. & Technology** Raibareilli, India  
*Bachelor of Technology in Computer Science & Engineering; 81.18 %(4059/5000)* Aug. 2010 – June. 2014
- **Air Force School** Gorakhpur, India  
*Senior School Certificate Examination (CBSE); 89.2 %(446/500)* May. 2009
- **Air Force School** Gorakhpur, India  
*Senior School Examination (CBSE); 94.2 %(471/500)* May. 2007

## PHD THESIS

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- **Planning with Higher Order Subjective Knowledge in a Multi-Agent System (Advised by: Prof. Deepak Khemani):** We look at the role of *Theory of Mind* reasoning in concocting deceptive behavior in agents, who may try to alter beliefs of other agents such that the others are inclined to act in a manner beneficial to the deceiving agent. We adapt to Epistemic logic based Knowledge Representation and Reasoning techniques towards designing (social) artificial agents which may share a common or conflicting goal with other agents in a multi-agent scenario.

## MTECH FINAL YEAR THESIS

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- **Optical Character Recognition using Generalized Representation of Geometric Boundaries of Characters for Multilingual Document Indexing(Advised by: Prof. P.S. Deshpande):** Worked on providing an automated solution for indexing of multilingual text from the scanned Indian documents having English, Devanagari, and Marathi scripts by designing a robust *Optical character recognition* system.

## BTECH FINAL YEAR THESIS

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- **Analysis of Performance of Biometric System Based on Human Emotions (Advised by: Dr. Jay Prakash Pandey):** The goal of this project was to study the state of the art Emotion Recognition Systems built using extracted features from the static facial image of people and the applicability of such systems towards building robust Biometric systems.

## OTHER KEY PROJECTS

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- **Searching & Indexing in Large Databases:** The goal of this project was to speedup Graph query processing by indexing Query graphs in order to utilize knowledge from the results of previously executed queries. The end result was a significant reduction in the number of required subgraph isomorphism tests while processing graph queries.
- **C Program Ontology:** We studied and critiqued the scope of doing *Program analysis* using a C99 ontology which had 178 concepts and 68 properties in T-Box. A C program could be converted into an A-box for further analysis. We showed that the design of the Ontology was not only incomplete but also had overlapping semantics. We concluded the work by suggesting extensions to the Ontology.
- **Discovering patterns using guided back-propagation on DNNs:** The aim of this work was to use a variation of the VGG-network proposed in *Very Deep Convolutional Networks For Large-scale Image Recognition* on CIFAR-10 dataset and run *guided back propagation* on randomly selected neurons on a selected convolution layer to discover interesting patterns that excite the respective neurons.
- **Transliteration system using Sequence to Sequence networks:** Built a transliteration system from English to Hindi using the NEWS 2012 (Named Entities Workshop) shared task dataset using Long Short Term Memory networks with attention mechanism.
- **Restricted Boltzmann machines (RBMs):** Implemented Restricted Boltzmann machines (RBMs) using only python and numpy and trained the network using the Contrastive Divergence (CD) algorithm. The goal of this exercise was to write an unsupervised learning architecture which learns hidden representations from the raw features without using Tensorflow, Theano or any package which supports automatic differentiation.

## EXPERIENCE

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- **Indian Institute of Technology Madras**  
*Teaching Asst.: Artificial Intelligence, Knowledge Representation & Reasoning, Computational Engineering* July 2016 - May 2020
- **Indian Institute of Technology Mandi**  
*Teaching Asst.: Paradigms of Programming, Constraint Satisfaction Problems, Artificial Intelligence* May 2017 - Dec 2018
- **Indian Institute of Technology Dharwad**  
*Teaching Asst.: Artificial Intelligence* Jan 2019 - May 2019
- **National Programme for Technology Enhanced Learning**  
*Teaching Asst.: The courses offered by Prof. Deepak Khemani, IITM* July 2017 - Dec 2019
- **The Second Summer School on Representation in Artificial Intelligence (RinAI-2019)**  
*Organizing team* June 6-13, 2019
- **The IIT Mandi Summer School on Representation in Artificial Intelligence (RinAI-2017)**  
*Local organizing team* July 19-28, 2017

## PUBLICATIONS

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1. Shikha Singh and Deepak Khemani (2020). Planning with Subjective Knowledge in a Multi-Agent Scenario. (To appear) In 11th Hellenic Conference on Artificial Intelligence (SETN 2020), September 24, 2020, Athens, Greece. ACM, New York, NY, USA.
2. Singh, S., and Khemani, D. (2019). Planning to deceive in a multi-agent scenario. In M. T. Cox (Ed.), Proceedings of the Seventh Annual Conference on Advances in Cognitive Systems (pp. 473-491). Tech. Rep. No. COLAB2-TR-4. Dayton, OH: Wright State University, Collaboration and Cognition Laboratory.
3. Singh, S. and Khemani, D. (2019). Deception: An Epistemic Planned Event? Extended Abstract in Logic and Cognition Workshop, Eighth Indian Conference on Logic and Its Applications. Delhi, India.
4. Khemani, D. and Singh, S. (2018). Contract Bridge: Multi-agent Adversarial Planning in an Uncertain Environment. Poster Collection of the Sixth Annual Conference on Advances in Cognitive Systems (pp. 161-180). Stanford, CA: ACS.

## SKILLS

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- **Programming Languages:** C, C++, Java, Python, Prolog, Haskell, PDDL, JavaScript, PL/SQL, Matlab, R, Visual Basic
- **Other Tools:** NetBeans/Eclipse, Tensor-flow, Weka, MEAN stack, DEMO Model checker, Git, CVS
- **Technical Writing and Publishing:** Latex