SHIVAM HANDA

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ACADEMIC DETAILS

- Ph.D., Electrical Engineering and Computer Science, **Massachusetts Institute of Technology**   (2019-Ongoing)
  Areas: Program Synthesis, Formal Methods, Formal Approaches to Machine Learning and System Design.   GPA: 4.8
- M.S., Electrical Engineering and Computer Science, **Massachusetts Institute of Technology**   (2016-2019)
  Thesis: Composable Inference Metaprogramming using Subproblems.   GPA: 4.7
- B.Tech, Computer Science and Engineering, **Indian Institute of Technology, Delhi**   (2010-2014)
  Thesis: Remote Desktop using Virtual Machine (VM) Record and Replay.   GPA: 9.183/10

WORK EXPERIENCE

- Research Assistant, **MIT Center for Deployable Machine Learning**, **MIT**   Sept 2016-Current
  Projects: Noisy Program Synthesis, Composable Probabilistic Programming, and Distributed Systems.
- Research Fellow, Programming Languages and Tools Group, **Microsoft Research India**, Bangalore, India   June 2014-June 2016
  Project: CScale: Distributed Stream Processing Engine.
  Designed data processing systems which can handle data at line rate (10Gbps). Advised product team to integrate these ideas.
- Research Intern, **Social Team**, **Adobe Advanced Technology Labs**, Delhi, India   May 2013-July 2013
  Project: Content Ideation.   **Patent** on a part of this work: **Hierarchy Similarity Measure**, Shukla et.al.
  Constructed a ML based model which helps companies create engaging content for their social media followers, allowing them to predict performance of their posts and provides suggestions on mode of content delivery and optimum time to post.
- NIUS Researcher in **Physics**, **HBCSE, Tata Institute of Fundamental Research**, Mumbai, India   May 2012-July 2012
  Landau quantization of a circular Quantum Dot using the Ben-Daniel Duke boundary condition, Superlatices and Microstructures.
- Advisor to the Dean of Engineering, **GradSAGE**, **MIT**   Feb 2021-Current
- Advisor/Mentor to startup **Aldrich**, **MIT Entrepreneurship Forum**   Nov 2020-Current
- Peer, **iREFS**, **MIT**   Sept 2020-Current

CONSULTING PROJECTS

- **Epitome Global**, Singapore   Global Entrepreneurship Lab, MIT
  - Epitome aims to revolutionize workforce analytics in partnership with governments and government agencies.
  - Created a framework for Epitome's expansion strategy. Shortlisted the next two countries, Epitome can start negotiations with.
- **Teratonix**, USA   Entrepreneurship Lab, MIT
  - Teratonix has built and patented a RF energy harvester, battery powered from radio waves in the air.
  - Found a consumer side market for Teratonix, and connected them to an Industry Partner to collaborate with.
- **Vitalize Health**, USA   MIT DesignWorks
  - Vytalize Health partners with independent primary care physicians (PCPs) to help them upgrade their care for senior patients.
  - Working with **Continuum (the design consultancy firm)** to help redesign Vytalize's RPM services to improve compliance.

SELECTED RESEARCH WORK

- **Inductive Program Synthesis over Noisy Data**   FSE 2020.
  - Synthesis of programs over noisy input-output examples. These programs in general are more **interpretable than ML models**.
- **Automatic Synthesis of Parallel and Distributed Unix Commands and Pipelines**   Under submission, PLDI 2021
  - Synthesizes Parallel and Distributed versions of Shell Commands using **Active program synthesis** (variant of Active ML).
- **A Dataflow Model for Extracting Shell Script Parallelism**   Under submission, PLDI 2021
  - Transforms shell scripts into their **parallel** and **distributed versions**, with **guarantees**, using light weight annotations.
- **Compositional Inference Metaprogramming**
  - Inference Metaprogramming allows developers to dynamically decompose **general bayesian inference problems** into smaller subproblems to solve. Our work formalizes inference metaprogramming and provides **convergence guarantees**.
  - Probabilistic programming with programmable inference, PLDI 2018.
  - Compositional Inference Metaprogramming with Convergence Guarantees, arxiv 2019.

SCHOLASTIC ACHIEVEMENTS

- Won the **Adam Smith Case Competition**, 2021.
- Awarded **Aditya Birla Scholarship** for **4 consecutive years; 1 among 11** scholars from all over India.
- Won **Silver Medal** for India at **International Physics Olympiad (IPhO)** 2010, held at Zagreb, Croatia.
  Honored by **Ministry of Science and Technology** and Tata Institute of Fundamental Research for the same.
- Secured **All India Rank 37** in **IIT-JEE** entrance examination, among more than 500,000 students.
- Awarded **AIEEE Merit Scholarship** for securing **All India Rank 9 in AIEEE** qualifying exams.

SELECTED PROJECTS

- **Learning Discrete Structures using Gumbel-Ellipsoid**: Learning ML models which output complicated Discrete structures.
- **Automated Requirement Document Analysis**: NLP to check completeness and consistency of requirement specifications.

RELEVANT COURSE WORK

New Enterprises, Corporate Financial Accounting, Machine Learning, Statistical Learning Theory, Topics in Deployable Machine Learning, Quantum Mechanics, Relativistic Quantum Mechanics, Optics, Special Topics in Optics.