Syed Tousif Ahmed

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September 9, 2019

`http://syed-ahmed.github.io`

Education

- **University of Pennsylvania** — Philadelphia, PA
  Ph.D. Electrical and Systems Engineering — *August 2019 - Present*
  - Working on research problems in Computer Architecture at the Implementation of Computation Group (`https://ic.seas.ese.upenn.edu`). Advised by Dr. André DeHon.
  - Topics include design-space exploration, partial reconfiguration, high level synthesis, code generation and silicon compilers, system-on-chip architectures, reconfigurable computing with FPGAs.
- **Rochester Institute of Technology** — Rochester, NY
  B.S. Computer Engineering, Mathematics Minor — *August 2013 - May 2018*
  - Strong emphasis on Machine Intelligence, High Performance Computing and Hardware/Software Co-design.

Professional Experience

- **NVIDIA Corporation, Deep Learning Frameworks Team** — Santa Clara, CA
  Deep Learning Software Engineer — *June 2018 - August 2019*
  - Worked on different projects for PyTorch in the Deep Learning Frameworks Team.
  - Resolved several bugs and performance issues on both CPU and CUDA. Improved performance of several Random Number Generation kernels by upto 3x.
  - Participated in several code reviews and collaborated with third party contributors.
  - A full list of contributions can be seen here: `https://github.com/pytorch/pytorch/commits?author=syed-ahmed`.
  - Managed Continuous Integration test environment and released NVIDIA GPU Cloud PyTorch docker container on a monthly basis.
  - Got into top 100 PyTorch contributors list within 7 months of joining the team and currently a module level maintainer of the CUDA backend.
  - Languages/Technologies used: C++, Python, CUDA, PyTorch, Docker.
- **NVIDIA Corporation, Deep Learning Frameworks Team** — Santa Clara, CA
  Deep Learning Software Intern — *May 2017 - August 2017*
  - Worked on different projects for Caffe2 and Tensorflow in the Deep Learning Frameworks Team.
  - Designed and implemented Universal Framework Format Format (UFF) Converters for TensorFlow and Caffe2, released in TensorRT 3.0 RC.
  - Wrote Sequence to Sequence Framework for Caffe2.
  - Analyzed performance of Caffe2 kernels for Seq2Seq models and made optimizations.
  - Languages/Technologies used: C++, Python, Protobuf, CUDA, Caffe2, TensorFlow.
- **NextDroid, LLC (Startup)** — Cambridge, MA
  Deep Learning Engineering Intern — *June 2016 - August 2016*

- Wrote neural network models for road image segmentation for a semi-autonomous/self-driving car at NextDroid LLC., a startup based in Cambridge, MA.
- Wrote image segmentation web interface for mass data collection, that decreased data collection cost by 60%.
- Wrote models in caffe, torch and tensorflow.
- Wrote unit tests in tensorflow.
- Wrote custom operation layer in tensorflow.
- Platforms/Frameworks used: Caffe, Tensorflow, Torch, CUDA, NVIDIA Jetson TX1, NVIDIA DRIVE PX.
- Languages used: Python, C++, Lua.

• **Ahold Delhaize** Quincy, MA
Computer Vision Developer (Co-op) *January 2016 - May 2016*

- Worked on computer vision related projects at the Propulsion Labs at Ahold USA.
- Used tensorflow and caffe to do transfer learning for proof of concept on product image recognition.
- Used OpenCV for data augmentation and production of synthetic images.
- Used OpenCV and OpenGL ES to make an augmented really iOS app that gives a location-aware shopping experience. Wrote UI elements and their functionality in Redux.js and React.js.
- Languages used: Python, C++, Objective-C, JavaScript.

Research Experience

• **Center on Access Technology, NTID, RIT** Rochester, NY
Research Assistant *September 2016 - May 2017; August 2017 - May 2018*

- Worked on developing a research tool that investigates the different needs of the deaf/hard of hearing population, under Dr. Michael Stinson.
- Integrated Automatic Speech Recognition Engines into the tool.
- Worked on Video to Text model for American Sign Language.
- Languages/Platforms used: TensorFlow, Android Development, Node.js.

• **FETLab, GCCIS, RIT** Rochester, NY
Research Assistant *September 2015 - December 2015; August 2016 - May 2017*

- Assisted in research projects in the area of human-computer interaction under Dr. Daniel Ashbrook. The focus of the research projects was on wearable and mobile computing and how to make personal fabrication technology such as 3D printers, laser cutters, and CNC routers easier to use by non-experts.
- Wrote code for a kinect and projector based project for augmenting fabrication in laser cutters, 3D printers etc.
- Built an automatic speech recognition system that classifies sounds of actions on everyday objects.
- Wrote Android Wear applications.
- Languages/Technologies used: Python, C#, Java, Android Development.

• **Discover Lab, School of Media Sciences, RIT** Rochester, NY
Computer Vision Research Assistant *June 2015 - December 2015*

- Developed, debugged, and optimized an augmented reality app, called RocreadAR for a research project aiming at integrating different media for publishing and communication, under Dr Elena Fedorovskaya.
- Wrote Image Processing algorithms in OpenCV and Python to enhance detection and tracking of target images.
- Received NSF I-Corps Funding and assigned as the Student Team Leader to commercialize prototypes.
- Technologies used: OpenGL, OpenCV, Unity3D, Vuforia SDK, Wikitude SDK, Git, Android, iOS, Google Glass.

Papers/Posters

1. Lisa Elliot, Michael Stinson, **Syed Ahmed**, Donna Easton. *User Experiences When Testing a Messaging App for Communication Between Individuals who are Hearing and Deaf or Hard of Hearing*. In the 19th International ACM SIGACCESS Conference on Computers and Accessibility, October 2017. [**poster**] demo: `https://www.youtube.com/watch?v=tUPMTaWp5VY`

2. Michael Stinson, **Syed Ahmed**, Lisa Elliot, Donna Easton. *Using Automatic Speech Recognition to Facilitate Communication Between an Individual who is Hearing and One who is Deaf or Hard of Hearing*. In the 19th International ACM SIGACCESS Conference on Computers and Accessibility, October 2017. [**poster**] Featured in BBC Click: `https://youtu.be/RNp4OpToAdQ?t=5m8s`

3. Dhwanit Mehta, Patrick C Shih, **Syed Ahmed**, Daniel Ashbrook. *Further Investigations into Round Touchscreen Wristwatch Interaction*. In FETlab, GCCIS, RIT, Spring 2017. [**unpublished**] demo: `https://www.youtube.com/watch?v=fS7GmoO4gSo`

4. **Syed Ahmed**. *One Shot Learning for Acoustic Recognition*. In Western New York Image and Signal Processing Workshop, November 2016. [**poster**] paper: `https://goo.gl/HS6K6F` code: `https://github.com/syed-ahmed/MatchingNetworks-OSL`

5. **Syed Ahmed**, Suresh Jothilingam, Yogesh Jagadeesan, Elena Fedorovskaya. *RocReadAR*. In Discover Lab, School of Media Sciences, RIT, Fall 2015. [**unpublished**] demo: `https://www.youtube.com/watch?v=1c7FHzpTL7A`

6. **Syed Ahmed**, Sourabh Kulhare, Ameya Lonkar, Daniel Ashbrook. *Augmented Fabrication*. In FETlab, GCCIS, RIT, Fall 2015. [**unpublished**] demo: `https://www.youtube.com/watch?v=PkiIUjMjcUs`

7. **Syed Ahmed**. *Out of trial division algorithm for finding primes and Lucas-Lehmer algorithm for finding Mersenne primes, which algorithm would yield a big prime number faster?*. In International Baccalaureate Extended Essay, Spring 2013. paper: `https://goo.gl/0Hm7y6`

8. **Syed Ahmed**. *Patterns in Complex Numbers*. In International Baccalaureate, Fall 2012. paper: `https://goo.gl/zKBYhd`

9. **Syed Ahmed**. *Probabilities in Games of Tennis*. In International Baccalaureate, Spring 2012. paper: `https://goo.gl/yUDUu9`

Talks

- *TensorFlow Tutorial*
  - Invited Speaker, Western New York Image and Signal Processing Workshop 2017, Rochester, NY (November 2017).
  - RIT Scientific Computing Group, Rochester, NY (October 2016).
  - Tutorial: `https://syed-ahmed.github.io/tensorflow-tutorial/`
- *Real Time American Sign Language Video Captioning using Deep Neural Networks*
  - NVIDIA GPU Technology Conference, San Jose, CA (May 2017).
  - Recording: `https://goo.gl/VaDFJx`
  - Slides: `https://goo.gl/nhDj1o`
  - NVIDIA Blog Feature Story: `https://goo.gl/jk3wYd`
- *Transfer Learning on Tensorflow in 30 minutes*
  - TensorFlow Boston Meetup, Boston, MA (May 2016).
  - Recording: `https://youtu.be/QaoBXMu_l50`
  - Slides: `https://goo.gl/tvGR5q`

Teaching

- *Teaching Assistant, CMPE 679 Deep Learning by Dr Ray Ptucha, RIT, Spring 2018*
  - Develop homework assignments.
  - Hold recitation sessions.
- *CMPE 789 Special Topics (Deep Learning) by Dr Ray Ptucha, RIT, Spring 2017*
  - Authored homework assignment on TensorFlow.
- *Supplemental Instruction Leader, Academic Support Center, RIT, Spring 2015*
  - Conducted an hour long study session twice a week, through the last day of classes per semester, to guide students with historically difficult courses (courses with high rates of D, F and withdrawal).
  - Planned and marketed SI Sessions through weekly session announcements in class and through email.
  - Engaged with faculty partner and devised SI session strategies using different learning techniques.
  - Attended weekly staff training, evaluated and reflected on SI sessions conducted by colleagues.

Awards, Grants & Honors

NSF I-Corps Funding 2015
RIT International Student Scholarship 2013-2018

Projects

- **Real Time American Sign Language (ASL) Video Captioning** Python, C++
  Sequence to Sequence Neural Network for translating ASL video to text *2017*
  - Code: `https://github.com/syed-ahmed/seq2seq.git`
- **Savage Valhalla: Building a Fast Autonomous Car** C, Python
  Autonomous car that can follow a white track bounded by two black lines on the side *2017*
  - Demo: `https://www.youtube.com/watch?v=BF77ZOPg4lw`
- **Open source contributions in Deep Learning Research**
  - PyTorch - `https://github.com/pytorch/pytorch/commits?author=syed-ahmed`
  - Caffe2 - Solved several bugs in Seq2Seq. Commit #35dc34
  - TensorFlow - Solved bug in Android Demo. Issue #1371
  - TensorFlow - Implement Max Unpooling Op - Issue #2169
  - elab/Torch7-profiling -Solved bug-Commit #7fdb7af and #0e64c08
  - elab/ENet-Training - Improved code - Pull request #9
- **AResume** Android Development
  Augmented Reality app for interactive resume review. *2015*
  - Code: `https://github.com/syed-ahmed/AResume.git`
  - Google Play Store: `https://www.goo.gl/RNB2Tx`
- **Click Wars - RIT iOS App Challenge Hackathon** iOS Development
  Uses face detection and bluetooth to connect multiple players to play a game. *2015*
  - Code: `https://github.com/syed-ahmed/ClickWars-iOSApp`
  - Devpost: `http://www.goo.gl/4qX6sA`

Skills

- **Computer Engineering:** Digital IC Design, System-on-Chip Architecture design, Compilers, Assembly Programming, Deep Learning, Operating Systems, Reconfigurable Computing (FPGA), Combinatorial Game Theory, Numerical Analysis, Circuits, Electronics, Digital Signal Processing.
- **Programming Languages:**
  - Proficient with: C/C++, Python, Java, Verilog, VHDL, ARM Assembly.
  - Familiar with: RISC-V ISA, SystemVerilog, PHP, JavaScript, Swift, MySQL, C#, Matlab, HTML, CSS.
- **Software and Development Tools:**

  - Proficient with: PyTorch, Tensorflow, CUDA, Android Studio, Git, Docker, CVS, Unity3D, XCode, Xilinx Vivado, CMake.
  - Familiar with: OpenGL, OpenCV, Cadence Tools, Synopsis Tools, PSpice, Multisim, React.

- **Operating Systems:**
  - Proficient with: Linux, Mac OS, Windows.

- **Hardware:**
  - Familiar with: Oscilloscope, Function Generator, Multimeter, Spectrum Analyzer, Breadboard, Soldering, Modern SoC boards like Ultra96, NVIDIA Jetson, ARM Cortex Microcontrollers.