

# SATYA NARAYAN SHUKLA

81 Belchertown Road, 160 Colonial Village, Amherst, MA, 01002

snshukla@cs.umass.edu, +1 413-461-8468

<https://sites.google.com/site/snshuklakgp/>

## EDUCATION

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**University of Massachusetts Amherst**

**Fall 2016 - Present**

MS/Ph.D. in Computer Science

CGPA - 4.0/4.0

**Indian Institute of Technology Kharagpur**

**July 2010 - May 2015**

Dual Degree: Bachelors - Electrical Engineering, Masters - Instrumentation & Signal Processing

CGPA - 9.25/10.0 (Rank - 1/30)

## EMPLOYMENT

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**Research Assistant**

**University of Massachusetts Amherst**

**Fall 2016 - Present**

**Recurrent Neural Networks for irregularly sampled Time Series with Missing Values**

- Interpolated the time-series data to a fixed set of reference points, allowing sparse and irregularly sampled data to be fed into any black-box classifier learnable using gradient descent while preserving uncertainty.
- Experimented with a simple RBF kernel as interpolation model and Gated Recurrent Unit as the classifier.
- Achieved 10% increase in the state-of-the-art results for predicting mortality on the MIMIC database.

**Learning Shallow Detection Cascades for Wearable Mobile Health Applications**

- Proposed a new approach to cascaded classifier learning using an architecture that better matches the hard decisions that are made when the cascade is applied at detection time.
- Our architecture outperforms the soft cascade architecture in terms of a speed-accuracy trade-off.

**Research Intern**

**Xerox Research Centre India**

**Summer 2015**

- Improved the prediction results in modeling irregularly sampled physiological signals over the state-of-the-art Multi Task Gaussian Process method which inherently fit the irregular sampling through temporal kernels.
- Addressed the challenge of irregular sampling by incorporating a temporal difference variable within the state equation of the Kalman filter model whose parameters are estimated using observed data.

**Research Intern**

**Samsung Electronics, Korea**

**Summer 2013**

- Developed an emotion detection system based on Active Shape Models to identify human alertness and emotions.

## PUBLICATIONS AND PATENTS

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- Prediction and Imputation in Irregularly Sampled Clinical Time Series Data using Hierarchical Linear Dynamical Models. (EMBC '17, Korea)
- Estimation of Blood Pressure from Non-invasive Data. (EMBC '17, Korea)
- Non-invasive Cuffless Blood Pressure Measurement by Vascular Transit Time. (VLSID '15, India)
- System and Method of Modeling Irregularly Sampled Temporal Data using Kalman Filters - US Patent
- Forecasting Patient Vital Measurements for Healthcare Analytics - US Patent

## PROJECTS

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**Analysis of Dropout in Deep Networks**

**Oct 2017 - Dec 2017**

- Exposed surprising differences between the behavior of dropout and more traditional regularizers like weight decay.
- Presented a counterpoint to the suggestion that dropout discourages co-adaptation of weights.

**Deep Learning Approach to Generate Image Captions**

**Oct 2016 - Dec 2016**

- Developed a model with Deep Convolutional network to encode an image into a fixed-length vector representation and Long Short Term Memory (also experimented with RNNs) to decode this representation into a caption.
- Our model with LSTM as language model yielded comparable results with the state-of-the-art models.

**Aspect Based Sentiment Analysis using Deep Learning**

**Oct 2016 - Dec 2016**

- Implemented a Convolutional Neural Network to identify the aspects present in a review and predicted their sentiment/polarity; and also experimented with adding additional features such as POS tags.
- Our model yielded better results than the top teams at Semantic Evaluation 2015 Competition in aspect identification task for Laptop domain data while ranked 3rd for Restaurant domain data.

**Blood Pressure Estimation from Photoplethysmogram signal**(Master's Thesis)

**Aug 2014 - Apr 2015**

- Estimated blood pressure (BP) from the features of the PPG using NNs and Multi-Task Gaussian Processes.
- Evaluated both the models on 100 patient data extracted from the MIMIC database and found that the proposed methods give better results in comparison to other non-invasive techniques used for BP estimation.

**Non-invasive Cuffless Blood Pressure Measurement**(Bachelor's Thesis)

**Aug 2013 - Apr 2014**

- Project deals with the estimation of human blood pressure from using PCG and PPG signals.
- Estimated the BP with an accuracy of more than 94% when compared to conventional BP measuring devices.

## AWARDS AND HONORS

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Institute Silver Medal; Best Project Award for Master's Thesis; Samsung Innovation Award 2014; WISE Scholarship

## TECHNICAL SKILLS

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Python; Keras; TensorFlow; Torch; SQL; C; Perl; Java; MATLAB; R; Verilog; GIT; L<sup>A</sup>T<sub>E</sub>X; Solidworks; LabVIEW