

Asif Hanif

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Education

- 2018-2020 **Information Technology University (ITU), Lahore**
MS Electrical Engineering (3.87 /4.00)
- 2011-2015 **University of Engineering & Technology (UET), Lahore**
B.Sc. Electrical Engineering (3.42 /4.00)
- 2009-2011 **M. Public Higher Secondary School, Multan**
F.Sc. Pre-Engineering (1018 / 1100)
- 2007-2009 **Govt. High School, Vehari**
Matriculation (986 / 1050)

Experience

Research

Keywords RF Sensing, Machine/Deep Learning, Digital Signal Processing, Fourier Ptychography, Bayesian Networks, Causal Inference, Graph Neural Networks

2018 – Present
@ ITU Currently, I am working on graph neural networks (GNNs) to learn expressive graph/node embeddings using neural networks. Previously, I have worked on Fourier Ptychography (reconstruction of high resolution source image from multiple low-resolution images) using deep neural networks.

In my MS thesis, I worked on devising a method for density estimation of a continuous Bayesian network using neural networks. Using learned Bayesian network and concepts from causal inference, I performed root-cause-analysis (RCA) to identify root-cause of a fault in an industrial plant.

MS Thesis Title: Parameter Estimation and Inference in Bayesian Network using Neural Networks

Sep 2015- Dec 2018
@ LUMS I worked as research assistant at Lahore University of Management Sciences (LUMS). My research revolved around RF sensing applications. I studied wireless channel conditions/perturbations under different circumstances and used them for environmental sensing such as non-invasive breathing rate monitoring, intrusion detection, through-wall movement detection, non-obtrusive detection of concealed metallic objects. I used commodity off-the-shelf hardware (Intel 5300 WiFi Card) to implement above mentioned tasks. Following are the research projects that I worked on;

- * Preparation of sensing nodes using commodity off-the-shelf hardware (Intel 5300 WiFi Radio)
- * Intrusion detection using channel state information (CSI) extracted from WiFi Radio
- * Through wall human motion detection by exploiting channel state information
- * Non-invasive monitoring and estimation of breathing rate with channel state information
- * Non-obtrusive detection of concealed metallic object with WiFi radios
- * Angle-of-arrival(AoA) and time-of-flight(ToF) estimation of WiFi signal for indoor localization

Teaching I was part-time teaching assistant in the following courses;

Fall 2015	Computer Organization & Assembly Language
Fall 2016	Topics in RF Sensing †
Fall 2017	Topics in RF Sensing †
Fall 2018	Electromagnetic Field Theory
SP 2019	Solid State Electronics
Fall 2019	Signals and Systems
SP 2020	Machine Learning

† This was a grad-level course intended to introduce RF sensing applications. Research papers related to RF sensing were presented in class. I mentored multiple course projects too.

Publications

- ▶ Non-Obtrusive Detection of Concealed Metallic Objects Using Commodity WiFi Radios ([IEEE GLOBECOM, 2018](#))
- ▶ WiSpy: Through-Wall Movement Sensing and Person Counting using Commodity WiFi Signals ([IEEE SENSORS, 2018](#))
- ▶ Adaptive Ptych: Leveraging Image Adaptive Generative Priors for Subsampled Fourier Ptychography ([ICCV, Learning for Computational Imaging, 2019](#))
- ▶ Subsampled Fourier Ptychography via Pretrained Invertible and Untrained Network Priors ([NIPS 2019: Workshop on Deep Learning and Inverse Problems](#))

Projects

- Final Year Project Following notable projects were completed during BS degree:
SLAM based Self-navigating and Mapping Robot
A robot equipped with ultrasonic sensors explored obstacle-free path, calculated its current coordinates using differential-drive position estimation and finally transmitted its location and distance from obstacles to a remote server using IEEE 802.15.4a based ZigBee device. GUI on remote server displayed real-time map of explored area, robot's current location, orientation and position of surrounding obstacles while robot explored unknown area.
- MIPS Architecture Simulation of a processor—based on MIPS architecture—in Proteus
- Viterbi Decoder Implementation of Viterbi decoder in MATLAB
- IEEE 802.11a Tx Implementation of IEEE 802.11a standard transmitter in MATLAB

Skills

- Languages MATLAB, Python, R, C++, C, Shell-Scripting
- Operating Systems Windows, GNU/Linux(Ubuntu)
- Machine Learning PyTorch, Tensorflow, Scikitlearn, Fully-Connected and Masked Neural Networks, Bayesian Networks, CNNs, RNNs, SVM, K-NN, K-Means Clustering
- Software & IDEs MATLAB, JupyterNotebook, Proteus, LaTeX(TexStudio), MS(Word, Power, Excel, Visio), Visual Studio, Qt Creator, ANSYS HFSS
- Embedded Systems ARDUINO, STM Microcontroller(Keil), TI LaunchPad, ARM, MIPS

- Major Subjects** Topics in RF Sensing Digital Signal Processing Communication Systems
Digital Communication Computer Vision Machine/Deep Learning
Microwave Engineering (Active & Passive Devices)

- Non-Academic Accomplishments**
- * Editor-in-Chief of IET UET Chapter monthly news journal **“SPOTLIET”**
 - * Former head of “Documentation Team” at IET UET Chapter
 - * Interviewed many worthy and renowned professors of UET for **“SPOTLIET”**
 - * 3rd Position in Matriculation on district level, BISE Multan
 - * 5th Position in F.Sc. Pre-Engineering(overall), BISE Multan
 - * Published an article on ‘Religious Intolerance’ in college annual magazine
 - * “Quad-e-Azam Scouts” badge holder
 - * Winner of “Science Quiz Competition” on division level, 2009
 - * Got 1st position in “Annual Judo Karate Championship” 2006

- Events**
- * International Conference on Open Source Systems and Technologies, 2014
 - * IET UET Chapter ARDUINO Workshop (organizer)
 - * Organized “IET UET Chapter, LaTeX Workshop”
 - * IEEE UET Lahore, 3G & Higher Generation Systems Workshop
 - * IEEE UET Lahore, Junkyard Wars (served as organizer in this recreational event)
 - * IEEE INMIC 2014, UET Lahore
 - * Organized “Annual University Sports Event” 2014 UET Lahore (Chief Organizer)
 - * Organized “UET MEDIA Festival” 2015 (Finance Manager)