Hamad Ahmed

CONTACT INFORMATION

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RESEARCH INTERESTS

Statistical Signal Processing, Optimal Estimation Theory (KF, EKF, UKF, PF), Control Systems, Networked Dynamic Systems, Wireless Sensor Networks, Autnomous Systems, Distributed Systems, Localization Techniques and Machine Learning

EDUCATION

University of Engineering & Technology, Lahore, Pakistan
Bachelor of Science in Electrical Engineering September 2011 – June 2015

- CGPA : 3.508 / 4.0
- Specialization : Electronics & Telecommunication Engineering
  Major Courses : Digital Communication, Communication Systems, Digital Signal Processing, Computer Networks, Machine Learning, Power Electronics, Integrated Electronic Circuits, Control Systems, Microprocessor Systems.

Government College University, Lahore, Pakistan
F.Sc Pre-Engineering (High School Equivalent) September 2009 – August 2011

- Marks : 1011/1100
- Percentile : 99% in approximately 100,000 students

RESEARCH EXPERIENCE

Lahore University of Management Sciences (LUMS), Signal Processing Group, Department of Electrical Engineering, Syed Baber Ali School of Science & Engineering.
Research Assistant September 2015– Present

- Worked on GPS independent vehicle localization using IMU sensors. I fused the data from inertial sensors using **Kalman Filter** and employed **Particle Filter** to localize a vehicle with submeter accuracy. This work has been submitted to IEEE Vehicular Technology Conference, 2016.
- Created a novel **Kalman Filter** for determining the attitude of a land vehicle from only MEMS sensor under dynamic conditions, when the sensor is subject to external accelerations. This work has been submitted to IEEE Transactions on Intelligent Transportation Systems.

Center for Language Engineering, Al-Khawarizmi Institute of Comupter Science, University of Engineering & Technology, Lahore, Pakistan
Research Intern May 2015– August 2015

- Applied Supervised Machine Learning on Urdu Language Processing task "Word Sense Disambiguation". I used **Naïve Bayes** & **Support Vector Machines** to classify the data and explored the effect of different data representations on the classification accuracy. This work has been submitted to Scientia Iranica Journal (Impact Factor 1.05).
- Wrote a proposal for research grant worth 2 Million Rupees for the extension of above mentioned project and submitted to Pakistan Science Foundation (PSF).

Center for System Simulation & Visual Analytics, Al-Khawarizmi Institute of Comupter Science, University of Engineering & Technology, Lahore, Pakistan
Research Intern July 2014 – October 2014

- Worked with the research group developing 'Dengue View': Dengue Epidemic Surveillance Modeling, Visualization and Response Management System.
- Did extensive programming for creating graphics using OpenGL library to create spatio-temporal visualizations of the patient count on the google map.

RESEARCH PUBLICATIONS

- **Hamad Ahmed**, Maryam Khalid & Muhammad Tahir "A wireless multi-modal sensing network for online driving behavior classification" submitted to IEEE Transactions on Intelligent Transportation Systems (I.F. 2.4).
- **Hamad Ahmed** & Muhammad Tahir "Accurate attitude estimation of a land vehicle under dynamic conditions using only low cost MEMS IMU sensors" submitted to IEEE Transactions on Intelligent Transportation Systems (I.F. 2.4).
- **Hamad Ahmed**, Omar Salman, Ehsan Ul Haq, Kashif Javed, Sana Shams & Sarmad Hussain "A Comparative Study of Two Different Data Representations for Urdu Word Sense Disambiguation" submitted to Scientia Iranica journal (I.F. 1.05).
- **Hamad Ahmed** & Muhammad Tahir "Terrain Based Vehicle Localization using Low Cost MEMS IMU Sensors" submitted to IEEE Vehicular Technology Conference (Spring 2016).

MAJOR PROJECTS

Multi-sensor based Modeling and Detection of Abnormal Car Driving Behavior May 2014 – June 2015

- Developed a **wireless sensor network** consisting of 7 sensors on the car: Accelerometer, Gyroscope, Magnetometer, Laser Range Finder, Sonar Range Finder, Camera and GPS and used 1 in-built sensor (speed sensor) of the car.
- Implemented a **wireless data collection scheme** to collect the values from all the sensors and **fused** them through **Kalman Filter** to obtain the parameters of interest: speed and heading of the car and the distance of surrounding traffic.
- Applied **Machine Learning** to predict lane changes, dangerous maneuvers, risk of accidents and developed an LCD plus GSM based notification system.
- This work has been submitted to IEEE Transactions on Intelligent Transportation Systems.

Eye-gaze tracker May 2015

- Interfaced a webcam with Raspberry-PI board and performed **image processing** in OpenCV to accurately track the eye pupil and estimate the gaze position of the user.

IEEE 802.11a WiFi/WiMAX Transmitter April 2015

- Implemented the standard access point transmitter used in Wifi Modems and 4G cellular networks.
- Complete back-end software of the transmitter from preamble and data packet to coding, puncturing, scrambling, interleaving, modulation, OFDM mapping and pilot insertion.

IEEE 802.11a WiFi/WiMAX OFDM Packet Receiver April 2015

- Designed and coded the receiver for the OFDM packet used in Wifi and 4G technologies.
- Timing and Frequency Offset estimation from the Preamble, Viterbi's Decoder and Demodulator.

Reliable Data Transfer Protocol 2.1 for Reliable Communication Between more than 2 Wireless Nodes March 2015

- Implemented the famous rdt2.1 protocol on Texas Instruments' CC1101 RF modules.
- Error free communication between three wireless nodes without any packet loss using acknowledgements and packet repeats upon failure.

Distance and phase measurement of obstacles using Ultrasonic Sonar Sensors Array March 2015

- Designed 150 dB amplifiers for sonar receivers and created an array of such receivers for measuring the distance and phase of obstacles.

Design and Implementation of Inverted Pendulum May 2014

- Designed the model for an inverted pendulum using a two wheeled robot with geared motors. Implemented a PID control algorithm for maintaining the inverted pendulum position.

Line Following Robot Using P.I.D. Controller March 2014 – June 2014

- Mechanical design of a two wheel differential drive robot.
- Implemented a P.I.D. controller on the microcontroller to allow the robot to follow the line.

MINOR PROJECTS

- Fabricated Broadband 5GHz 20dB Low Noise Amplifier on FR4 substrate
- Differential Amplifier using 741 op-amps
- Variable Voltage Power Supply with 1 Ampere current rating and over-heat protection
- 4-bit Arithmetic Logic Unit capable of 6 arithmetic functionalities
- 8-bit Synchronous Multiplier
- Simulation of DLD circuits on Verilog
- Audio Amplifier using discrete analog components
- Designed a Traffic Signal System on LABVIEW
- Modelled and designed the complete software architecture for an ATM machine.
- Implemented algorithms of infix and postfix expressions on various data structures (lists, stacks, queues, heaps, trees)
- Implemented Buck, Boost and Buck-Boost converters
- Design and Implementation of a quadrature hybrid coupler at 4 GHz
- Design and Implementation of low-pass and band pass micro-strip filters in the GHz range using stepped impedance, coupled line and stubs techniques on FR4 substrate
- Performance Analysis of M-PAM, M-PSK & M-QAM modulation techniques used in telecommunication.

AWARDS & HONORS

- Appointed as the Chairperson of IEEE-UET student branch due to outstanding voluntary services.
- Ranked 1st in Pakistan in IEEE XTREME 24 hour programming competition
- Received an award of recognition on the 16th International Multi-Topic Conference (INMIC '13) held at the Department of Electrical Engineering, UET Lahore due to outstanding services in organizing the conference.
- Received an award of appreciation on the 8th International Conference on Open Source Systems and Technologies (ICOSST '14) held at the Al-Khawarizmi Institute of Computer Science, UET Lahore due to outstanding services in organizing the conference.
- Founder of IEEE Computer Society Chapter and IEEE Industrial Applications Society Chapter at UET.
- Selected as the Class Representative in 2nd Semester due to highest CGPA.
- Received merit based Quaid-e-Azam scholarship from Lahore Board due to outstanding performance in F.Sc exam.

TECHNICAL SKILLS

- **Programming:** C#, ,C++, C, Java, Assembly, Matlab, Simulink, HTML, CSS, OpenGL, OpenCV, LaTeX
- **Software Development:** UML, Visual Paradigm, Qt Creator
- **Design**: Adobe Photoshop, Adobe After-effects, Microsoft Visio
- **Softwares:** Xilinx, LabView, Proteus, Etap, Multi-Sim, Ansoft Serenade, PWS, MS-Office

PROFESSIONAL AFFILIATIONS

• Chairperson IEEE-UET Student Branch	June 2014 – June 2015
• General Secretary IEEE-UET Computer Society	January 2014 – June 2014
• Member IEEE	June 2013 – Present
• Member IEEE-Computer Society	January 2014 – March 2015
• Member IEEE-Robotics & Automation Society	December 2014 – Present
• Member IEEE-Communications Society	January 2014 – March 2015

REFEREES

DR. M. TAHIR (Ph.D. U.I.C.)
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DEPT. OF ELECTRICAL ENGG.
U.E.T. LAHORE
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