Nauman Shahid

Department of Computer Engineering
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Research Interests

Reconfigurable Computer Architecture, System on a Chip, Signal Processing, Networking Paradigms, Embedded Software

Education

Bachelor of Engineering with majors in Computer Engineering 2014
National University of Sciences and Technology, Islamabad, Pakistan
College of Electrical and Mechanical Engineering
CGPA: 3.68/4.00 Major GPA: 3.79/4.00
Senior year thesis: An FPGA based approach to deep packet inspection for the purpose of Application Aware Routing in multi-gigabit content-delivery networks

University of Cambridge International Examinations GCE A-Levels 2010
St. Anthony's College, Lawrence Road, Lahore, Pakistan
Pre-Engineering: A*AAA (Gold Medal)

University of Cambridge International Examinations GCE O-Levels 2008
St. Anthony's College, Lawrence Road, Lahore, Pakistan
Sciences: 5A 3B

Work Experience

Associate Engineer August 2014 - Present
u-blox Lahore, Pakistan (A subsidiary of u-blox AG, Thalwil, Switzerland)
http://www.u-blox.com/
Department: 4G LTE-A Protocol Stack Development
Division: Embedded Software Development
Current Project: Optimizing the code-base for dual-core ARM Cortex-R4 Platform

Business Automation Intern July 2014 - August 2014
Telenor Pakistan Pvt. Ltd. (A subsidiary of Telenor Group Norway)
http://www.telenor.com.pk/
Project: Sales pipeline web portal development and centralization across Telenor Pakistan intranet

Research Assistant (Part-time) October 2013 - June 2014
Center for Advanced Research in Engineering Pvt. Ltd. Islamabad, Pakistan (C@RE)
http://www.carepvtltd.com/
Research: Reconfigurable Networking Architectures

Business Intelligence Intern June 2013 - August 2013
Techlogix Lahore Pvt. Ltd.
http://www.techlogix.com/
Project: Business Intelligence Reporting for Gulf International Bank, Bahrain

Electrical Engineering Intern July 2012 - August 2012
Siemens Pakistan Engineering Co. Ltd. (A subsidiary of Siemens AG Berlin, Germany)
http://www.siemens.com.pk/
Business Unit: Transformers; Power Transmission Division

Research Projects

An FPGA based approach to deep packet inspection for the purpose of Application Aware Routing in multi-gigabit content-delivery networks
Supervisors: Brig. Dr. Shoab Ahmed Khan (Ph.D. ECE GeorgiaTech) & Dr. Zaheer Ahmed (Center for Advanced Research in Engineering, Islamabad, Pakistan)
Design and Implementation of an IEEE 802.3 packet routing mechanism in Verilog and VHDL. Deep packet inspection extracts OSI Layer 4 and 7 features (Protocol and URL) from incoming packets. Packets are then routed to designated output ports depending upon required bandwidth to achieve better QoS. The design is prototyped on NetFPGA 10G Development Board (Xilinx Virtex 5 FPGA Processor).

Multi-threaded client-server communication protocol
Supervisor: Dr. Usman Qamar (Ph.D., Post Doc. Manchester)
Implementation of a multi-threaded client-server communication environment without any limit on number of clients. System implemented using C#, TCP Client and Socket objects. Zero packet loss achieved.

Compiler Design
Supervisor: Dr. Farhan Riaz (MSCE Technical University Munich, Ph.D. Portugal)
Design and implementation of a GUI Compiler by employing L-R Parsing using self-defined grammar. The compiler is able to eradicate comments, white spaces, initialize variables and subsequently evaluate expressions of all lengths.

Speaker Recognition
Supervisor: Dr. Usman Akram (National University of Sciences and Technology, Islamabad, Pakistan)
Recognition of speaker (person; irrespective of what they speak) by extracting features (Mel-Frequency Cepstral/Cepstrum Coefficients) from recorded voice segments. Close to perfect results achieved by employing Naïve Bayes Classifier model over a small training dataset.

Feature Recognition and Tracking in real-time video feed
Supervisor: Dr. Arslan Shaukat (Ph.D. Manchester) & Mr. Ameer Hamza (M.S. University of Southern California)
Rapid object recognition and tracking using OpenCV's Haar-Cascade libraries for haar-like-feature detection. Implemented using C++. The aim of this project is to detect signs of fatigue in drivers by following their blinking motion and count. This full-fledged solution generates output faster than a simple colour-tracking algorithm implemented using MATLAB.

Search Algorithms

Supervisor: Dr. Aasia Khanum (Forman Christian College, Lahore, Pakistan)
This project involves exploring different search algorithms used to sort and produce results from large datasets. This project involves the implementation of splay-tree algorithm to witness the sorting mechanism (zig, zig-zig, zig-zag) which occurs upon data entry, deletion and extraction.

Remote Circuit Control and Actuation

Supervisor: Asst. Prof. Sajid Gul Khawaja (National University of Sciences and Technology, Islamabad, Pakistan), Mr. Umer Farooq (Center for Advanced Research in Engineering, Islamabad, Pakistan)
This project involves coming up with a solution to take full control of electronic circuits placed in harsh-environments from safer distances. Several solutions were explored (Bluetooth Modules, GSM Modules, WLAN Modules). After a thorough feasibility study, a solution was developed using Microchip's PIC18 microcontroller, a WLAN module, UART-TTL interface and a WiFi router. The circuit was operative from distances as vast as 300 meters in the open. Zero data loss was achieved in this radius.

Stock Exchange Trend Logging and Analysis

Supervisor: Asst. Prof. Wasi Haider Butt (National University of Sciences and Technology)
Karachi Stock Exchange's website does not offer RSS feeds. An efficient approach to webpage-scraping and webpage-parsing was explored in this project. Html Agility Pack and XPATH proved to be helpful in achieving this goal. Data was logged in a background thread from KSE website after 5 minute intervals and trend graphs plotted to ease analysis.

Course Projects

- **Quad-Core Micro-Coded State Machine**
  B.E. Semester: 7 - Digital System Design | Xilinx ISE Design Suite | Mentor Graphics ModelSim | Verilog
- **Quadrature Phase Shift Keying Digital modulation Scheme implementation**
  B.E. Semester: 7 | Digital Communication | MATLAB | Microsoft Visual C#
- **DC Motor Position Control using PID Algorithm**
  B.E. Semester: 7 | Control/Feedback Control Systems | DC Motor with Encoder | Microchip MPLAB (C++) Compiler |Microcontroller: Microchip PIC18F4520 | L293D Half-Bridge DC Motor Driver | Simulation: Proteus | MATLAB Single-Input-Single-Output System Tool
- **ARMv4T Assembler**
  B.E. Semester: 6 - Microprocessor Based Design | Microsoft Visual C#
- **Audio Equalizer**
  B.E. Semester: 5 - Signals and Linear Systems | MATLAB GUI
- **Spam Filter (Naïve Bayes Classifier)**
  B.E. Semester: 6 - Artificial Intelligence | MATLAB
- **Management Information System and its complete SRS Document**
  B.E. Semester: 5 - Software Engineering | Microsoft Access
- **UML Modeling**
  B.E. Semester: 4 - Object Oriented Programming | Microsoft Visio
- **2D Drawing Application**
  B.E. Semester: 4 - Computer Graphics | Microsoft Visual C#
- **Audio Amplifier**
  B.E. Semester: 3 - Electronic Circuits Lab | Circuit: Design: Proteus | Texas Instruments LM386 Low Voltage Audio Power Amplifier IC
- **Power Supply**
  B.E. Semester: 3 - Electronics 1 | Circuit Design: Proteus | Etched on Printed Circuit Board

- **Data transfer between two terminals over Parallel Port (Interfacing) using C++**
  B.E. Semester: 2 - Algorithms and Computing | Turbo C++
- **Management Information System**
  A-Level Computing | Microsoft Access (Tables, Queries, Reports, Forms)
- **Text Editor with Encryption**
  A-Level Computing | Microsoft Visual Basic .NET
- **Payroll Management System**
  O-Level Computer Studies | Backend: Microsoft Access Database | Frontend: Microsoft Visual Basic 6 Forms (ActiveX Data Object)

Skills

Electronics/Embedded Systems:
PCB design, simulation and etching; Electrical Circuit Analysis, Design and simulation: Proteus, PSPICE, ARES
Microcontroller programming (Atmel 8051, Microchip PIC18, Raspberry pi), Assembly Language (ARM MPUs), ARM DS-5, Texas Instruments Discrete-Time Signal Processor Kits (Floating-point and Fixed-point i.e. DSK 6713 and DSK 6416)
FPGA Programming (Xilinx Spartan 3, Virtex 2, Virtex 5, XAUI, XGMAC), simulation and debugging: Verilog, Mentor Graphics ModelSim, Xilinx ISE Design Suite, Xilinx IP CoreGenerator, Chipscope Pro
4G LTE-A: ENKI LTE Air Interface ELP 4003 Certified, ROHDE & SCHWARZ CMW500, ANITE
Programming Languages, Environments and Libraries (Beginner/Intermediate Level): C, Embedded C, C++, VB6, VB.NET, C#, OpenCV, MATLAB, OpenGL, Python, Microsoft VISIO, LINUX VI Editor, Linux Shell, CBS, CMAKE, Perforce, Jira, Swarm, Jenkins, Writing Robust Code according to MISRA Specifications
Web Development and Computer Networks (Beginner Level): HTML, CSS, ASP.NET, CISCO Packet Tracer
Database Engineering (Beginner Level): Microsoft VISIO (Design - ERD, EERD), Microsoft Access (VBA), Oracle 11g, Oracle Business Intelligence, Microsoft SQL Server

Awards

- GPA Based Merit Scholarship throughout engineering school (Dean's Honor Roll)
- 5th position in entire batch of 70
- Senior Year Project nominated for Rector's Gold Medal
- Gold Medal for Best Pre-Engineering score in GCE A-Levels

References

Brig. Dr. Shoab Ahmed Khan
Ph.D. ECE GeorgiaTech
Head of Department Computer Engineering, College of Electrical & Mechanical Engineering, National University of Sciences & Technology, Islamabad, Pakistan
CEO, Center for Advanced Research in Engineering (C@RE), Islamabad, Pakistan
Assistant Adjunct Professor, Michigan State University, USA
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Dr. Khurram Muhammad
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