

Muhammad Ahsan

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EDUCATION

Virginia Commonwealth University (VCU)

PhD in Computer Science (CGPA: 4.00)

Richmond, Virginia USA

Continued

University of Engineering and Technology

Master of Electrical Engineering (CGPA: 3.75)

Lahore, Pakistan

June 2018

University of Engineering and Technology

B.Sc. Electrical Engineering (CGPA: 3.70)

Lahore, Pakistan

June 2014

M.Sc. THESIS

Title: Buffer Overflow Attacks and their Software assisted Protection in Computer Systems

- Exploited 32-bit Operating Systems by attacking buffer overflow vulnerable applications
- Used penetration testing tools including Kali Linux and Immunity Debugger
- Proposed an Encryption Algorithm as an attack prevention mechanism
- Analyzed proposed algorithm using different attack vectors

B.Sc. FINAL YEAR PROJECT

Title: Next generation Unmanned Ground Vehicle

The project includes the following Features:

Autonomous mode, Wireless and Voice operated, Live Video stream, Real Time Image Processing, Car No. Plate Recognition, Image Database, Calculate Object Distance from Camera.

EXPERIENCE

Security and Forensics Engineering (SAFE) LAB

VCU, Richmond

Position: Graduate Assistant

Aug 2021 - Current

Project

Side Channels in Cyber Physical Systems (CPS).

Al-Khwarizmi Institute of Computer Science (KICS)

UET, Lahore

Position: Team Lead

Oct 2014 - July 2021

Project OneM2M

Worked on the Interoperability and Security challenges associated with IoT devices following OneM2M specification. The project includes the following specifications

- Implementation of Horizontal Layer OneM2M Standard Framework for M2M and IoTs
- Sensor Nodes on MbedOS running over Nucleo STM32 L476rg boards
- MQTT client/broker model implementation on Raspbian Jessie OS running over Raspberry Pi 3
- Gateway design for IoT Applications which supports multiple service functionalities including
 - Registration
 - Security Association and Establishment (SAE)
 - Data Management and Repository (DMR)
 - Access Control Policies (ACPs)
 - Subscription and Notification
 - Secure MQTT/MQTT-SN Binding

- Transport Layer Protocol DTLS/UDP and TLS/TCP implementation.
- Serialization/de-serialization of JSON request/response packets
- DTLS Support for MQTT-SN Multi-threaded Gateway Application

GitHub Link: <https://github.com/AikM2M>

Projects Undertaken:

- Firewall rules Analyzing, Writing and Testing for SCADA/IoT Protocols
- Use of different tools for Scanning, Sniffing, Spoofing, MITM and other Attack Vectors generation.
- Common Vulnerabilities and Exposures (CVE) reproduction for generation of different attacks on network to test Firewall rules
- Automation of Paddy Dryer for Rice Mill industry and UET Water Tanks
- Simulation and Modeling of Solar angles for Tracking Surface in MATLAB
- PLC SCADA control for Dual Axis Solar Tracking System
- Design and Development of Motor Test Bench for PCSIR Laboratories
- Short Course Instructor for Programmable Logic Controller (PLC)
- Development of Energy Efficiency Advisory course in collaboration with sequa gGmbH – GiZ

SKILLS

STM32 Nucleo-64 boards	Raspberry Pi 3
Embedded C	Python
Mbed OS (Open-Source Embedded Operating System)	Arduino Boards
USART, SPI and ADC/DAC protocol for sensor interfacing	ESP8266 Module

MAJOR SUBJECTS

Network Security	Design and Analysis of Algorithms
Simulation Modeling and Analysis	Machine Learning
Image and Video Processing	Advance Operating System
Data Structures	Digital Electronic Circuits
Optimization Theory	Computer Networking

PUBLICATIONS

- Bilal Imran, Muhammad Ahsan, Ali Hammad Akbar, Ghalib A. Shah, "SecGW: On Providing DTLS based Multi-threading in MQTT-SN Gateway Application", (Under-Review)
- Muhammad Rais, Muhammad Ahsan, Vaibhav Sharma, Radhika Barua, Robert Prins and Irfan Ahmed, "Low-Magnitude Infill Structure Manipulation Attacks on Fused Filament Fabrication Printers", International Conference on Critical Infrastructure Protection. Springer, Cham, 2022
- Muhammad Ahsan, Bilal Afzal, Bilal Imran, Asim Tanwir, Ali Hammad Akbar and Galib. A. Shah. "OneM2M Architecture Based Secure MQTT Binding in Mbed OS", SSIoT 2019 - IEEE Euro S&P Workshop on Software Security for Internet of Things.
- Bilal Imran, Bilal Afzal, Dr. Ali Hammad Akbar, Muhammad Ahsan, Dr. Ghalib A. Shah. "MISA: Minimalist Implementation of oneM2M Security Architecture for Constrained IoT Devices", IEEE Globecom 2019.
- Muhammad Ahsan, Naseer Ahmad, Waqas Badar. "Simulation of Solar angles for maximizing Efficiency of Solar Thermal Collectors", 3rd International Conference on Energy Conservation and Efficiency (ICECE), 2019.

EXTRA CURRICULAR ACTIVITIES

- ICOSST'16, ICOSST'17, ICOSST'18 and ICOSST'19 Event Organizer.
- ICECE'17 and ICECE'18 Event Organizer.

AWARDS AND ACHIEVEMENTS

- Awarded 5 times dean's honor certificate in B.Sc. for 1st, 2nd, 3rd, 6th and 7th semester.
- Received Degree in B.Sc. Electrical Engineering with Honors.