

## FIRM

Consultant to Soteria Company, LLC  
2014 - Present

## EDUCATION

- M.S. in Electronics Engineering, Northrop University, Inglewood, CA, 1984
- B.S. in Electronics Engineering, Northrop University, Inglewood, CA, 1980

## AREAS OF EXPERTISE

- System Safety and Security Certification for LRTs
- Threat and Vulnerability Assessments for transit projects
- Rail, bus and aviation system safety and security planning
- System and Software Verification and Validation
- System Integration
- Network Design
- Software Development
- Infrastructure Security

## YEARS OF EXPERIENCE

37 Years

## REGISTRATIONS & CERTIFICATIONS

CCNA/CCNP Certification Class, CBootcamp, Henderson, NV, 2009

## EMPLOYMENT

- Systra Consulting USA  
2018 - 2019
- Zsquare Solutions, LLC  
2015 – Present
- Kansas City Southern Rail  
2015 – 2018
- Soteria Company  
2014 - Present
- Greenwave Systems  
2014 – 2015
- Parsons Corporation  
2011 - 2013
- Cisco Systems – Consumer Product Division  
2010 – 2011
- Booz Allen Hamilton  
2008 - 2010
- Raptor Networks Technology  
2004 – 2008

## TECHNICAL EXPERIENCE

Mr. Matin has 37 years of experience in software and electronics engineering, and six years of experience consulting for Soteria. He has extensive experience in software engineering for transit systems.

## SUMMARY OF EXPERIENCE

Mr. Matin's rail transit experience includes the following projects and activities:

- Metro Crenshaw/LAX Transit Corridor Project - Currently working with Soteria to develop Software and Network Security Plan and Software Verification and Validation Plan
- LAX Automated People Mover Project - Currently working with Soteria to develop Systems and Software Security Plan and Systems and Software Verification and Validation Plan
- Successfully Architected and implemented two Positive Train Control (PTC) projects for Southern California Railroad Authority (Metrolink) and Kansas City Southern Rails (KCS) from concept to production
- Successfully Architected, Designed and Implemented several L2/L3 Stackable Ethernet Switches at speeds of 1G/10G running on VxWorks RTOS and Broadcom XGSII/III switching chipsets
- Successfully developed and installed QA Automation projects for use in a set-top box and a range of IoT (Internet of Things) products
- Please see last two pages for expertise in languages, processors, operating systems, and more.

## RELEVANT AND RELATED EXPERIENCE WITH SOTERIA

### LAX Automated People Mover Project

October 2017 - Present

The Los Angeles International Airport (LAX) Automated People Mover (APM) is a major component of the Landside Access Modernization Program (LAMP). The APM Project will provide an elevated guideway with an at-grade Maintenance and Storage Facility and six stations, connecting to CTA passenger terminals through a network of elevated pedestrian walkways and a vehicle system. The APM Project also includes procurement of the Bombardier INNOVIA APM vehicle, and operating systems and infrastructure to support the system.

In the role of subcontractor to LAX Integrated Express Solutions (LINXS), Soteria has an extensive role in ensuring system safety. Among other roles, Soteria is managing the System Safety Program Plan, additional Safety Plans, performing Threat and Vulnerability Assessment, and managing Certification.

### Mr. Matin's Role: Software Engineer

- Developing a Systems and Software Security plan as part of the early works phase of the project. This plan will include Physical Security, Software Security and Network Security as well as considering methods of testing for vulnerability, methods to prevent attacks and mitigate attacks
- Developing a Systems and Software Verification and Validation Plan which includes Configuration Management and Acceptance procedures

## **Metro Crenshaw/LAX Transit Corridor Project, Los Angeles, CA**

September 2013 – Present

The Metro Crenshaw/LAX Transit Corridor project is an 8.5-mile light rail line that will run between the Expo Line on Exposition Boulevard and the METRO Green Line. Soteria Company is leading the system safety, security and assurance planning, analysis and certification for all phases of the safety and security certification process, through design and construction and startup. Soteria is also responsible for the reliability and maintainability planning, analysis and demonstration program.

### **Mr. Matin's Role:** Software Engineer

- Developed a Security Plan that covered Software and Network for vulnerability
- Developed a Software Verification and Validation Plan for the systems used in their architecture that are processor controlled. These systems include but are not limited to:
  - Communications Devices used in the back office designed by Cisco, Fujitsu
  - Train Control Switches used for Signaling designed by Ansaldo (MICROLOK family of products)
- Prepared responses to the Client's questions on the delivered Software Validation and Verification Plan and the Software Security Plan

## **ADDITIONAL RELEVANT AND RELATED EXPERIENCE**

### **PTC (Positive Train Project) Project, Kansas City Southern Rail**

September 2015 – September 2018

As Founder and CTO of Zsquare Solutions, developed and architected system safety software solutions.

- Developed a Systems Performance Test Application for end-to-end performance testing and finding the bottlenecks and failure points in the PTC network. This application tested all the Waysides, the TMC (Train Management Control), Back office and WSRS
- Setup, integrated and tested the Systems Management Gateway to support the status of all remote assets such as Waysides and Locomotives in compliance with the ITCSM (Interoperable Train Control Systems Management) ICD. Created all test plans and test applications
- Prepared ITCM back office environment and all required model files for the Development, Field Test, Production and RSD testing including federation testing with other Class-1 railroads such as BNSF, UP, CN and CSX
- Responsible for Integration, Support and Management of the Systems Management Software from Lilee Systems.
- Tested and Integrated the WSRS application in the back office. This software was developed in-house
- Federation and Interoperability Planning with other Railroads
- Developed WMS, Locomotive, Stand-alone & Clustered back office ITCM messaging model files. Model files are all done in ruby. Locomotive ITCM runs on the Slot10 card of the TMC
- Developed software for testing the ITCM messaging system with EMP and AMQP protocols through the ITCM stack. Development is done in python, ruby and C/C++ languages
- Architected a Clustered PTC back office system with High Availability in a Virtual Environment. This system includes all the PTC components in the back office and remote areas. Back office includes ITCM messaging system and the supporting applications such as BOS, MDM, CAD, WSRS, LSS, WSS and IC3. Remote areas include WMS and WIU for signaling and TMC in the Locomotive for train management.
- Designed a custom ITCM messaging software for use in LIEE testing. This messaging system works along with the ARINC WIU simulator to test signaling across multiple subdivisions and multiple Locomotives to support an end-to-end test with respect to the Rail operations
- Installed and configured the Lilee Systems ZCC tool to Load and upgrade all waysides with messaging system and systems management agent
- Tested and supported the LIEE (Lab Integration End-to-End) test phase. Used real TMC in this test phase
- Developed project plans for design and test phases
- Installed and configured Wayside Management Server (WMS) at the site locations along the railroad tracks and interfacing them to the Wayside Interface Unit (WIU)
- Created software automation scripts for configuration of Wayside Management Servers using the Ansible software package. This scripts loads the WMS with its ITCM messaging image, an excel spreadsheet of information for all sites on all subdivs and setup of certain services that should be running to detect runtime failures.

## Secure Wireless PTC System, Systra Consulting USA

2018 – 2019

Worked on the design and architecture of a Secure Wireless PTC System as an add-on to the existing Alstom ACSES Automatic Train Control system for Amtrak. This design focused on maintaining the existing operation of the Amtrak while adding the Key Management System software add-on. This system provides secure operation between the Mobile Communications Manager (MCM) onboard the train and the Waysides via Base Radio Communication Module (BRCM). The equipment used are from Alstom and Lilee Systems, who provide ACSES and the MCM and BRCM respectively.

## Greenwave Systems

2014 - 2015

**Mr. Matin's Role:** Senior Software Engineer

- Developed a QA Test Platform in Javascript and HTML5/CSS3 for testing a set of APIs for a wireless set-top box to control Audio, Video, DLNA, Networking (WiFi/MoCA), Code Download, TR69, closed-caption, tab-management, logging and also testing for network performance using the WiFi and MoCA interfaces
- Developed stand-alone application for Auto Provisioning, Code Download, UPnP, WiFi and System Management of the IP Client set-top box. This was done in HTML5/CSS3/Javascript
- Developed test cases using Test Rail test framework for testing the overall system functions and well as testing the client APIs that covered Audio/Video, MoCA and 802.11a/b/g/n/ac networking, UPnP, TR69 and Code Download

## Parsons Corporation

2011 - 2013

**Mr. Matin's Role:** Senior Network Software Engineer

- Implemented a migration plan to move the clustered back office to the production environment with High Availability infrastructure. Developed all test and turn up plans for normal operation as well as Failover scenarios
- Planned all phases of the project for testing and implementation including LINN, LIEE, FIT, FQT and RSD
- Developed a two office virtualized model with clustered back office and failover capability in both network and ITCM layers in support of High Availability. This model is a simulation of a working PTC system running on a Virtualized Linux system
- Implemented and Integrated Wayside Status Relay Services (WSRS) in the Metrolink's PTC Back Office
- Successfully did PTC interoperability tests between Metrolink, Union Pacific (UP) and BNSF Railroads
- Developed several scripts for automating the test and system startup of the remote devices running on Linux. The scripts are written in bash shell and python
- Successfully completed end-to-end testing of PTC system using messaging test software between Wayside Management Servers (WMS), Train Management Control (TMC) and Back Office using all interfaces (IP, WiFi, Cell and 220MHz Radio), signaling and switching test between WIU, WMS, and TMC through Back Office or in a peer-to-peer fashion. Also completed train initialization using the BOS application and the AIM dispatch software in the Back Office
- Developed scripts for automatic failover between all available communications interfaces on the Onboard Train Control System. This script was done in bash shell script
- Installed and configured the BOS application server. BOS software is the interface between the AIM dispatch software and the ITCM Messaging System. BOS used EMP/ClassD protocol
- Design an Interoperable Messaging Architecture for use in the Positive Train Control (PTC) project using Red Hat Enterprise Linux, Messaging and Interoperable Train Control Messaging (ITCM) software. This design can run stand-alone or in a clustered architecture using Red Hat Clustering Suite for High Availability requirement. This messaging system can accept applications running either EMP or AMQP protocols over TCP/IP using WiFi, Cell and 220MHz Radios
- Created a custom Red Hat Linux (RHEL) kernel for the TMC communications card (Slot10) based on Intel 32-bit ATOM processor
- Developed shell scripts to enable WLAN functionality on the Train Management Control (TMC) system
- Designed an Internal Lab for testing the PTC messaging system and other PTC applications. This Lab is built using Cisco switches, routers and Red Hat Linux Servers. The design is a routed Layer3 network on EIGRP with a T1 & DS3 lines for WAN connectivity, created a segmented architecture using VLANs for multiple groups. Responsible for maintaining, configuring and managing this network
- Managed all Wayside and WIUs across all Metrolink subdivisions. This projects included setup, configuration and test of all Wayside Management Servers (WMS), GE VHLC Wayside Interface Units (Vital and Non-Vital) and conducted signaling using a signaling simulator in the lab and field testing.

## Cisco System – Consumer Products Division

2010 – 2011

### Mr. Matin's Role: Software Architect

- Designed a client/server messaging software using the open source OpenFire XMPP server. This was used to test the XMPP protocol implementation on the Cisco wireless routers
- Developed an application in C to allow a wireless router to become a HotSpot or a Bridge

## Booz Allen Hamilton

2008 – 2010

### Mr. Matin's Role: Senior Network Consultant

- Designed a new Wireshark dissector for the ISAKMP on IKEv2 Security protocol to support the HAIPE Interoperability Specification special payloads. This software was developed in C and tested on Linux
- Designed a QA network lab with segmented Layer2/Layer3 LANs running OSPF routing and T1 and DS3 WAN drops. This lab is used for designing network architectures and testing network protocols and applications with numerous networking equipment including Cisco and Juniper Networks
- Developed and implemented routing software on a Dell PE-R710 Server using the GreenHills RTOS and Multi2000 tools and NextHop GateD network stack.

## Raptor Networks

2004 – 2008

### Mr. Matin's Role: Director of Software Engineering

- Management of all software development activities and interfacing to hardware engineering team.
- Created and expanded the software engineering team to 35 software engineers
- Design and Architecture of the next generation EtherRaptor Multi-Gigabit Ethernet Switches using Multi-Core PowerPC processors and new family of Broadcom StrataXGS-III and IV SoCs
- Developed an SNMP-based host program using the OEM version of the SNMPc Network Management Software and the InstallShield software package.
- Developed a Web-Managed GUI for configuration of the switches in HTML/CSS/Javascript
- Integrated and ported the LVL7 Systems protocol stack to EtherRaptor Multi-Gigabit Ethernet Switches based on the PowerPC processors and Broadcom StrataXGS-II switching family chipset. Used Wind River Systems WIND-ICE JTAG debugger. This was done in C.
- Developed a complete engineering and manufacturing diagnostics and QA test platform in C and Visual Basic.

## SPECIFIC AREAS OF EXPERTISE

- Languages: C, C++, Visual Basic, Python, Ruby, HTML5/CSS3/Javascript, Java, Bash Shell, tcl/tk
- Processors: X86, MIPS, ARM, PowerPC
- Operating Systems: Window, Linux, VxWorks, Nucleus, IntegrityOS
- Networking: L2/L3 Architecture, Installation, Configuration
- Network Protocols: TCP, UDP, IP, HTTP, Multicasting
- Routing Protocols: RIP, OSPF, EIGRP, BGP, MPLS, Multicast
- Switching Protocols: STP, RSTP, Trill, Bridging, IGMP
- Network Management: SNMP, MIBs, HP OpenView, CastleRock SNMPc
- Messaging Protocols: Advances Message Queueing Protocol (AMQP)
- Wireless LAN: 802.11a/b/g/n/ac
- Wireless Protocols: ZigBee, ZWave, Bluetooth, LoraWAN
- Driver Development: VxWorks, Nucleus, NDIS, ODI, Linux
- Embedded Systems Development: Networking Equipment, Set-top boxes, Wireless Routers, Internet of Things (IoT) products
- Railroad Specific Communications Protocols: EMP, ClassC/ClassD
- Virtualization: VMWare, VirtualBox

- Hardware: Dell PE-R710, Dell M1000e/M950 Blade Server, Cisco 3750 switch, Cisco 3945 router, Cisco 2960 switch, Aruba Access Point, Lilee Systems (WMS, MCM and BRCM), Wabtec TMC, GE WIU, Alstom ACSES
- QA Tools and Framework: TestRail, Selenium
- Bug Tracking Software: JIRA, Bugzilla
- Source Control Software: SVN, CVS, Git
- IBM Rational Rose: ClearCase/ClearQuest
- System Integration and Test: Software Verification & Validation
- Project & Product Engineering Management: Microsoft Project
- Website Development Frameworks: Wordpress, Bootstrap
- Automation Tools: Ansible