

**Khawaja Muhammad Umar Suleman, PhD**

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## Objective

To excel in whatever I do.

## Summary

A PhD in AI and Robotics from LUMS, BS and MS from FAST, with around 20 years of rigorous experience in both software industry and academics, puts me in a unique position to contribute effectively. In my industry experience, I worked more in technical design and development and less in project management. I co-founded three software companies in the process. I am on the board of one such company Automatrix specializing in IOT products and I also advice different ICT related companies and individuals on technical matters. I have been in charge of entire software development setup of MetaApp which became part of a multi-million dollar acquisition of Zenrise by world renowned Citrix Systems. I have advised numerous small academic projects in close collaboration with the industry.

My academic career started in the fifth semester of my bachelors as a mentor for junior students and carries on to this day without a mentionable break. Before joining academics full-time, I remained continuously attached with several academic activities part-time, including teaching several undergraduate computer science courses, supervising numerous projects, and conducting faculty and student training workshops at several universities and colleges. I have worked as an Assistant Professor at FAST-NU and UMT for most of my full-time academics experience spanning around 8 years.

A chronological summary of my experience is given as under.

Tenure	Role	Organization
Dec 17 – date	Assistant Professor	Automatrix Pakistan
Sep 16 – date	Assistant Professor	UMT
Dec 15 – Jul 16	Assistant Professor	UCP
Sep 12 – Jan 16	Assistant Professor	FAST-NU
Mar 12 – Nov 17	Director	Isotrix LLC
Feb 11 – Sep 12	Part-time Lecturer	GIFT University
Jan 11 – Feb 12	Senior Technical Manager	Electrix Engineering
Jul 09 – Dec 10	Development Manager	Suleman Automation
Dec 05 – Dec 06	Research Assistant	LUMS
Jul 04 – Dec 07	Manager Software Development	MetaApp (Pvt) Limited
Jul 02 – Jul 04	Architect, Project Manager	Simitrix (Private) Limited
Summer 01	Team lead for Academic Automation project	FAST-NU
01 – 11	Several teaching and assistantship jobs for courses: <ul style="list-style-type: none"><li>▪ Programming Fundamentals, OOP, Data Structures, &amp; Applied Programming.</li><li>▪ Artificial intelligence, Robotics, &amp; Pervasive Smart Environments.</li><li>▪ Assembly Language, Operating Systems</li><li>▪ Automata, Compiler &amp; Laboratory Physics</li></ul>	UMT, UCP, FAST-NU, The Virtual University, Beaconhouse Informatics,, The University of Lahore, BNU, GIFT University, LUMS
03-16	Numerous Senior Projects advice, related to mobile robots, computer vision, image processing, medical image analysis, embedded and IOT systems, audio processing, OCR etc.	UMT, FAST-NU, UCP Beaconhouse, Kinnaird College, GIFT University.
Jan 00 – May 01	Programmer	Systems (Pvt) Limited

## Academics and Research

I have done my BS and MS from FAST-NU Lahore, and a PhD from LUMS. I had the honor of being amongst the top 3% in BS and being the pioneer Masters' graduate at the university. Technically, my academic and research works have been related to intelligent/embedded systems, system programming and robotics. In the last few years I have conducted a joint research with University of Kaiserslautern Germany as co-investigator of a DAAD funded project related to agricultural health analysis using autonomous drones. Simultaneously, I have conducted research for diabetic retinopathy grading in collaboration with two leading hospitals of Lahore. Following is the list of publications, and summary of my academics. The agricultural robotics and retinopathy research is still being worked upon and hence has not been published yet.

### Publications

1. Mahmood, U., & Suleman, K. M. (2016). A Hybrid P2P Storage Scheme Based on Erasure Coding and Replication. *World Academy of Science, Engineering and Technology, International Journal of Computer, Electrical, Automation, Control and Information Engineering*, 10(1), 218-223.
2. Suleman, K.M.U.; Awais, M.M. Learning from Demonstration in Robots using the Shared Circuits Model. Autonomous Mental Development, IEEE Transactions on, vol.6, no.4, pp.244,258, Dec. 2014.
3. Suleman, M. U.; Awais, M. M. Learning from Demonstration in Robots: Experimental Comparison of Neural Architectures. *Robotics and Computer Integrated Manufacturing* 27, 794-801, 2011.
4. Suleman, M. U.; Awais, M. M.; Baig, A. R. Learning by Imitation: A Scheme for Offline Learning of Robot Control through Demonstration by Other Robot. *IJCAI-07 Workshop on Multirobotic Systems for Societal Applications*, Haidarabad, 2007.

### Academic Background

Event	Brief
<i>PhD (Artificial Intelligence) LUMS</i> 06-13	Thesis revolves around the application of the Shared Circuits Model, a theory in cognitive psychology, to robot learning from demonstration. Mobile robots (Pioneer P2DX) were shown to learn navigation behaviors efficiently using the imported model.
<i>MS (Computer Science) FAST National University (FAST-NU)</i> 01 - 03	Specialization in AI Robotics. See Learning by Imitation in Robot.
<i>Learning by Imitation in Robots: A scheme for robot control learning from other robots</i> 01-03	This is an MS thesis work. Outlines a generic and novel scheme for robot control programming. A genetic algorithms approach is applied in a homogeneous robot to robot offline learning scenario through imitation. This research is realized and tested on Sony Aibo robots ERS-220 and demonstrates successful auto-programming for medium complexity, non-trivial tasks.
<i>BS (Computer Science) FAST-NU</i> 97-01	CGPA 3.5
<i>Autonomous Vehicle</i> 99	AV is an indigenous algorithm equipped software interfaced with a three-wheeled robot, applied on search for a path towards a relative destination, without any prior knowledge of the environment
<i>Intelligent Conversational Agent</i> 99	ICA is a Prolog rule-based leisure-time natural language conversational agent with cartoon-character animated interfaces, speech recognition and ability to converse.

## Projects

During my professional tenure I have worked on many challenging and versatile projects.

Project	Tools Techs	Year	Role	Brief
Carton Quality Monitor	C, image processing	20	RnD	POC for smart assembly line sensor to detect manufacturing and expiry dates legibility and presence and to compliance of package art with provided template. Tested on small juice drinks cartons setup.
Chick Count and Health Monitoring	C	18	RnD	Product and algorithm development for thermal and color camera based robotic sensor to count chicks on entire control shed. This product is able to tell dead and sick chicks from healthy ones. Provides 24/7 farm statistics over internet. Ongoing development, which will move into health informatics for epidemic detection and control.
Hot Pursuit	C++ OpenCV C	18	Advisor	Helped design a facial recognition quadcopter on top of standard kits. Once locked on a target person can chase it down.
Fuel and Power IOT	C	18	Developer	Industrial product development for blast proof, IOT enables range of sensors, which measure different fuel aspects, including stock volume, generator fuel consumption, and fuel dispensation.
E-jalbhuji	C	18	Developer	Firmware redesign of commercial remotely controllable high wattage switching device.
Mall Navigation	C# Unity3D	18	Developer	Simple touch friendly Windows app in a Kiosk, for Animated navigational directions from Kiosk to user specified outlets or public areas like parking, food court, ATM and washroom.
Telepresence Robot	Android C	17	Team Lead	Mechanical, Electrical, Firmware and Software development of human sized treaded robot with Android as face. Capable of two way audio and video streaming between robot and an Android control app.
Smart Board	C	17	Designer Developer	Design and development of a 4 switch touch buttons product which is remotely controllable over internet on App as well. Has fancy reports over the internet
Airport Queue Counter	C	17	Developer	Design and development of immigration queue length counting using minimal sensors for Dubai international airport.
Superbike Wear Sensor	Android C	17	Developer	POC of wearable sensor as part of heavy bike gear with graphic visualization on an Android Tablet.
Face Attendance Gadget	OpenCV	17	Developer	Attendance system with off-the-shelf algorithms for face detection and recognition using raspberry pi with camera.
Smart Commercial Fridge	C	17	Developer	Complete IOT kit product design and development for commercial fridges, to report abuse, temperature log, etc, and for temperature control.
Water Treatment Cloud	node.js	16	Developer	Reporting and remote control tool for a sizeable network of automated water treatment plants with state of the art instrumentation in Pakistan given as a scalable web application.

Project	Tools Techs	Year	Role	Brief
ANPR	C++	16	Developer	Intelligent OCR for standard and non-standard number plates passing through high-way toll plazas in Pakistan. Estimated to supersede any competitive software in the market.
Keyfob Emergency gear	C, TI Bluetooth platform	15	Developer	Programming and hardware troubleshooting of a keyfob shaped gadget to connect with iOS phones via Bluetooth low-energy (BLE). Pressing buttons in a specific manner, generates emergency call to saved number. The product is initially funded at kickstarter.
Number plate reader for Punjab plates	Matlab	14	Consultant Developer	RnD and prototype development for Teradata for their potential partnership with the Government of the Punjab. Logs the incoming cars registration numbers inside parking of a building.
Jalbhuji	C	13	Consultant Developer	An Android controlled, via Bluetooth low energy, snap-on gadget for the conventional domestic hot water geizer that controls the temperature of water according to given schedule.
Android test report tool	ASP.Net	12	Consultant	Front-end development and integration with backend web services for another company for a product of Android application testing and benchmarking.
VLC maintenance	C/C++	11	Consultant Developer	Removal of few bugs in the latest version of that time and few tweaks.
Weigh Fill	C	09-11	Developer	Weigh Fill is a by-weight filling machine with a small foot print, an efficient mechanical and electrical design and high affordability.
Research Sharing web-portal	ASP.Net 2.0 C# Javascript Java	06-07	Director Engineering, Architect, Developer	RSWP is a large-scale public specialized user-base web-based product. It is a web 2.0 concept application to allow collaboration in research and documentation. It includes multiple collaborative sub-applications like research content capturing, editing, calendaring, tutoring, etc.
Corporate E-mail Search and Recovery	.Net VC undecided	05	Manager, Team Lead	CESAR is an intelligent corporate-level searching and archiving product for e-mail data. It is aware of discussion threads throughout the corporate and hence can bring out entire picture of a communication incidence of interest. Additionally, it can reliably backup and instantly restore e-mail data in case of a disaster. It also provides traditional style but intelligent searching and lost e-mail recovery for end-users.
Zenprise	XML C# .Net	04-05	Manager Development, Knowledge engineer	Zenprise is a Microsoft Exchange Auto-diagnosis and Remedial System, Windows ® operating system-level expert system to 'auto-pilot' complex and costly large corporations MS Exchange infrastructure. Expert knowledge is the heart of this software and is divisible into classical sense expert rules to diagnose malfunction of any kind and remedial scripts aimed to rectify diagnosed ailments.
USTAD	VC	04	Project Manager & System Analyst	Urdu Speech Training Aid for the Deaf is a Windows ® based 3-D face animation and rendering system to aid deaf school children in learning to speak or utter common Urdu language in Pakistan.

<b>Project</b>	<b>Tools Techs</b>	<b>Year</b>	<b>Role</b>	<b>Brief</b>
<i>Rate Tracking Application</i>	<i>VB MS Office</i>	<i>04</i>	<i>Architect and Lead Developer</i>	RTA is a small application for stock businessmen. It takes and interprets feeds from local markets and displays in real-time. Inputs personalized user rules through legacy tabular Excel sheets and generates alarms and triggers with sounds and/or familiar visuals for optimal and automated, buying and selling of stocks.
<i>Bluetooth Pagers</i>	<i>C++</i>	<i>03-04</i>	<i>Architect &amp; Lead</i>	Bluetooth pager is a complete Bluetooth wireless communication embedded device for vicinity based preference matching and wireless gaming. Includes complete hardware and software design and full featured prototype development. These pagers work within the Bluetooth standard range e.g. 10 meters for class C Bluetooth model.
<i>Acutus Video Conferencing</i>	<i>C/VC++</i>	<i>02-03</i>	<i>Developer</i>	Acutus Video Conferencing project is an enhancement and development of 'Net meeting' type video conferencing software based on Acutus Inc. PCI video cards, for all major Windows platforms. The project includes debugging of Acutus PCI card device driver for Windows ® 2000.
<i>Bar-code Readers</i>	<i>C++</i>	<i>02-03</i>	<i>Lead Engineer</i>	Bar-code Readers project includes research and prototype development of CCD based PC-interfaced bar code scanners.
<i>Gas Station Tracking System</i>	<i>VC Access</i>	<i>02</i>	<i>Architect &amp; Lead</i>	Gas Station Tracking system includes software and hardware prototype development for a comprehensive and automatic gas station monitoring, quality control and accounting purposes.
<i>CPen</i>	<i>VC++</i>	<i>02</i>	<i>Development Consultant</i>	CPen basically includes consultancy in development and enhancement of standard software application of CPen's standalone data acquisition gadgetry. This effort includes CPen SDK study and straw man application development.
<i>AAS</i>	<i>JSP MySQL</i>	<i>01</i>	<i>Lead &amp; Developer</i>	Development of Registration module of the Academic Automation System at the FAST National University.
<i>National ID Card</i>	<i>C++</i>	<i>01</i>	<i>Developer</i>	Some core image processing research and utilities development for the National ID card computerization project.
<i>Wireless Enterprise Proxy</i>	<i>VC++ ISAPI</i>	<i>00-01</i>	<i>System Analyst &amp; Developer</i>	Wireless Enterprise proxy is an intelligent protocol translation 'proxy' software to link wireless/hand-held devices with existing http based websites on the run. The idea behind this proxy is to avoid costly redundant development and maintenance of http and WAP-based websites. The challenge is to intelligently convert larger, more graphical dynamic pages into multiple smaller and connecting mobile device-compatible WAP pages.
<i>Raakim</i>	<i>VC++</i>	<i>00</i>	<i>Developer</i>	Enhancement of an Urdu editor active-x control, including addition of few graphical features.
<i>CDAS2000</i>	<i>VC++</i>	<i>00</i>	<i>Developer</i>	CDAS2000 is a telephone data enquiry and database maintenance system developed over a legacy enquiry system used in the capital and other cities of Pakistan, to port on to windows environment using visual C.

## Technical Expertise

During the course of professional work and teaching, I have developed expertise in the following.

Tools / Languages	Domains
<ul style="list-style-type: none"><li>• C</li><li>• C++</li><li>• C#</li><li>• Prolog, CLIPS, LISP</li><li>• Matlab</li><li>• Assembly language</li><li>• Specific SDKs (Netmeeting SDK, OPEN-R SDK, CPen SDK)</li><li>• Visual Programming (Win 32, MFC)</li><li>• UML</li><li>• Java / JSP</li><li>• Visual Basic</li><li>• Oracle, SQL Server, MySQL etc.</li></ul>	<ul style="list-style-type: none"><li>▪ Robotics &amp; embedded systems</li><li>▪ Aerial robotics</li><li>▪ Bio-medical engineering</li><li>▪ Machine learning</li><li>▪ Computer vision</li></ul>

## Extra-curricular and co-curricular

I am the founding Regional Contest Director of ACM International Collegiate Programming Contest (ACM-ICPC) in Pakistan, which is the most prestigious international programming competition for university students. I have been member of the executive committee of the alumni body of FAST National University. I had been elected as the President of this body for the two consecutive terms. I had been the founding President of STARfALL for two consecutive years, an NGO focused on STEM recognition in youth, which played the role of the Pakistan chapter for the famous First Lego League (FLL). I am also member of the program committee of FIT and WFAR technical conferences in Pakistan. I have been involved in one or the other form of sports including volleyball, basketball, badminton, table tennis, tennis and football throughout. I have been member of FAST-NU volleyball and football teams, and also LUMS volleyball team during my studies.

## References

To be furnished on demand.