

# Minahil RAZA

## Electrical Engineer

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Lahore, Pakistan



Passionate Computer Vision Researcher with strong technical knowledge, programming, and design skills who always looks forward to taking initiatives and trying out new things. Interested in **Embedded Systems** and **Computer Vision**. Equipped with strong leadership and interpersonal skills.

## EDUCATION

Present September 2016	<b>Bachelor of Electrical Engineering</b> National University of Sciences and Technology (NUST), Pakistan <ul style="list-style-type: none"><li>&gt; CGPA : <b>3.98</b> / 4.00</li><li>&gt; Received "Academic Excellence Award", ranked 3rd in the batch</li><li>&gt; Relevant course work and projects in Programming (C++, MATLAB and Assembly Language), Micro-controllers, Internet of Things, Computer Vision, Embedded Systems and Digital Logic Design</li></ul>
May 2019 January 2019	<b>Exchange Semester on Global Undergraduate Exchange Program</b> Western Carolina University (WCU), Cullowhee, NC, USA <ul style="list-style-type: none"><li>&gt; CGPA : <b>4.00</b> / 4.00</li><li>&gt; Admitted to "Chancellor's and Dean's List"</li><li>&gt; Received full tuition waiver and stipend from United States Government's Bureau of Educational and Cultural Affairs under UGRAD program</li><li>&gt; Relevant course work and projects in Javascript and Entrepreneurship</li></ul>
May 2016 September 2014	<b>Intermediate (Pre-Engineering)</b> Kinnaird College for Women University (KCWU), Pakistan <ul style="list-style-type: none"><li>&gt; Marks : <b>1041</b> / 1100</li><li>&gt; Awarded Silver Medal for securing 2nd position among Pre-Engineering Girls Group in Lahore Board.</li></ul>

## WORK EXPERIENCE

Present June 2018	<b>Deep Learning Research Intern</b> TUKL NUST RnD Lab for Artificial Intelligence and Machine Learning, Pakistan <b>Key Responsibilities</b> <ul style="list-style-type: none"><li>&gt; Implemented popular Deep Learning topologies for Computer Vision on Embedded Platforms using Xilinx's libraries</li><li>&gt; Successfully trained and implemented Tiny YOLO for Real-Time Object Detection on Xilinx's ZC706 Evaluation board.</li><li>&gt; Worked as an immediate supervisor to 3 interns for "ML on Chip" project since June 2019</li></ul> <b>Skills Acquired and Honed :</b> <a href="#">Machine Learning in Python</a> , <a href="#">FPGA development in C++</a> , <a href="#">Pytorch</a> , <a href="#">Tensorflow</a> , <a href="#">Keras</a> , <a href="#">BNN-PYNQ</a>
August 2019 June 2019	<b>Deep Learning Research Intern</b> Micro-Electronics Design Research Group at TU Kaiserslautern, Germany <i>Summer internship funded by DAAD (German Academic Exchange Service) under German-Pakistani Research Collaboration Program</i> <b>Key Responsibilities</b> <ul style="list-style-type: none"><li>&gt; Trained Deep Learning Networks with Brevitas and transformed them for Winograd Convolutions.</li><li>&gt; Designed IP cores for Fast Convolution Algorithms using Vivado HLS.</li></ul> <b>Skills Acquired and Honed :</b> <a href="#">Brevitas (framework for Quantized Training)</a> , <a href="#">High Level Synthesis in C++</a> , <a href="#">Vivado HLS Design Suite</a>

## SKILLS

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**Technical skills**    **Embedded Platforms and Microprocessors**- ARM, Arduino and FPGAs (Intel and Xilinx)  
**Hardware Design** using Verilog and High Level Synthesis in C++  
**Signal Processing and Control Systems** in MATLAB and Simulink  
**Circuit Design** in PSPIICE and LTSPICE  
**Computer Vision and AI** in Python and Javascript

**Organizational skills**    **Coaching skills** acquired from volunteering as an instructor at Beaconsfields High School  
**Analytical Leadership skills** acquired by participating in leadership workshops by PEEF and IREX  
**Collaboration and Teamwork** gained by working in teams at student organizations and for course projects  
**Adaptability** gained by working in multicultural environments

## PROGRAMMING LANGUAGES

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C, C++ and Embedded C    ● ● ● ● ○  
Python and related frameworks for AI    ● ● ● ● ●  
Javascript and js frameworks for AI    ● ● ● ○ ○  
MATLAB    ● ● ● ● ●

## OS PREFERENCE

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Linux    ● ● ● ● ●  
Windows    ● ● ● ○ ○

## PROJECTS

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### **AUTONOMOUS LANDING OF FIXED WING UAV ON RUNWAYS USING COMPUTER VISION TECHNIQUES** - *Undergraduate Thesis*

I worked on the training an Object Detection deep learning algorithm on a dataset comprising of runway images. The algorithm was binarized to improve throughput and power efficiency so that it could be deployed on reconfigurable logic. A real-time performance of 13 FPS was achieved.

### **WINOGRAD-BASED HARDWARE ACCELERATOR FOR CNNs** - *Microelectronic Design Research Group, TUKL, Germany*

I worked on hardware-aware quantized training of Convolution Neural Networks and transformed them according to Winograd Algorithm to deploy them on FPGAs. I also wrote Python scripts for writing flexible C++ header files for high-level synthesis in Vivado

### **DATASET FOR INTERACTION DETECTION USING CONVOLUTIONAL NEURAL NETWORKS** - *Computer Vision*

I worked on the collection of a dataset for an Anti-Theft Algorithm which uses a video feed to detect if someone interacts with an object. My group identified the weaknesses of the algorithm and improved it by extending the data-set and modifying the hyper-parameters. Moreover, we collected a dataset with images of Development Kits. Accuracy of over 95% was achieved in both cases.

### **DATASET FOR IMAGE SEGMENTATION** - *In collaboration with Dr. Naeem-Ullah Khan from Torr Vision Group at University of Oxford*

I am working on the development of a segmentation benchmark by collecting images with complex texture. Moreover, a set of metrics for performance and an evaluation server will also be developed.

### **WILDET - AN IOT BASED REAL-TIME WILDFIRE DETECTION SYSTEM** - *Embedded System Design*

I worked on mbedOS for deploying a Real Time Operating System (RTOS) on ARM-Cortex M4 to detect wildfires and communicate the fire alerts over long distance through LoRaWAN protocol. ARM acts as the mother node while Dragino shields are used as daughter nodes for the Wireless Sensing Network.

### **MARVIN- THE CLEANING ROBOT** - *Microprocessor Systems*

I design an automatic cleaning robot using an 8051 microcontroller and infrared sensors. The robot was able to clean the room while avoiding obstacles in its path. The code was written in assembly language.