

# Mamona Awan

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## EDUCATION

### Gwangju Institute of Science and Technology, (GIST), South Korea

M.SC in MECHATRONICS

RESEARCH in COMPUTER

VISION/ GRAPHICS

OFFICIAL GPA: 3.88 / 4.5

From: Mar 2014 to Mar 2016

### University of Engineering and Technology, (UET) Lahore, Pakistan

B.SC in MECHATRONICS

OFFICIAL GPA: 3.55 / 4.0

From: Sep 2009 to Sep 2013

## COURSEWORK

Computer Vision, Advanced Computer Graphics, Photorealistic Rendering and Global Illumination, Machine Learning/ Artificial Intelligence, Computer Programming, Data Structures & Algorithms, Advanced Automatic Control, Computer Interfacing & Networks Linear Algebra & Calculus, Applied Engineering Mathematics.

## SKILLS

### Programming Languages

C++ • Python • MATLAB • SQL • HTML/CSS • Arduino

### Software/Tools/Libraries

Visual Studio • Jupyter NB • OpenCV • OpenGL • Numpy • Scikit learn • Scipy • Unity3D • CUDA • GPU Programming • Latex • Keil Uvision • Microchip MPLAB • Proteus ISIS • Proteus ARES

### Certificates

Python 3 Fundamentals – Aug 2020

SQL Fundamentals Course – Jul 2020

Machine Learning Course – May 2020

### Linguistics

English (8 Band ILETS GT & Academic) • Urdu (Native) • Korean (Beginner)

## EXPERIENCE

### National University of Computer & Emerging Sciences Lahore, Pakistan

LECTURER- COMPUTER SCIENCE DEPARTMENT

Jul 2016 - Dec 2017

- Deliver **Lectures** related to Electrical and Electromagnetic courses such as Basic Electronics, Digital Logic Design and Computer Vision.
- Actively participate in various committees for administrative and academic activities.
- Contribute to **Robotics Research Group** along with other colleagues to supervise Robotics related projects in research and development.
- **Supervisory** for research projects of final year students in product designing, development and reform strategy – with research interests of 3D object reconstruction, Augmented Reality and Computer Vision.
- Held Lab **Programming Sessions/ Workshops** for Circuit Simulations via MATLAB for 180+ students per semester.

### Gwangju Institute of Science and Technology

Gwangju, South Korea

RESEARCH ASSISTANT- MODELING & SIMULATION LAB

Mar 2014 - Mar 2016

- Research in **Computer vision** and **Spatial Augmented/Virtual Reality** in order to form immersive and interactive projection.
- Worked on diverse projects related to AR and Computer Vision, such as **Ship Block detection** and **pose estimation** with Augmented Reality & Shadow **Gesture based Interactive Projection** System to name a few.
- Actively contributed to collective research projects under collaborated Labs.
- Prepared documentation, presentations and highlighted findings to support leads of laboratory projects.
- Teaching Assistant for **Computer Graphics** Course.

### Descon Integrated Projects Limited

Lahore, Pakistan

ENGINEERING INTERN

Jul 2012 - Aug 2012

- Understanding the engineering processes, large scale actuators and sensors used in Industrial Plants.
- Worked with engineers and customers to review existing projects and make documents for potential future projects and products.
- Data Handling for Instrumentation management and Information Extraction from Product & Instrumentation Diagrams for sensors/actuator to be used in Industrial Plants
- Developed documentations and presentations to resource vendors and contractors for project.

## PROJECTS

### Undistorted Projection over Mobile Region using Uncalibrated Camera |

C++, OpenCV, OpenGL, Visual Studio

- Developed a real-time application for Projection mapping over mobile region of interest with correct alignment to achieve better visual perception and interaction.
- Projection mapping over steadily moving region of interest while estimating and calculating shape of the region of interest.
- Used kalman filters for steady movement of the projection. Formed projected reality via least possible equipment and minimal pre-given data.
- Used OpenCV for image processing and projection mapping with exceptional time response to fit the area of interest.
- Analytically compared to reform methodical approach for improved projection.

## AWARDS

- 2017 Inclusion in GIST's WHO with Honorary Doctorate Title for Out-Performing Research Contribution.
- 2014 Won 1st Prize in Samsung Innovative Idea of the Year 2014.
- 2014 Got Korean Government Full Scholarship for Masters Studies along with Stipend.

## PUBLICATIONS

- **Mamona Awan**, Kwang Hee Ko, "Using an Uncalibrated Camera for Undistorted Projection over a Mobile Region of Interest". International Journal of Computers and Their Applications (ISCA Publication), Vol. 24, No. 3, Sept 2017, 120-132
- **Mamona Awan**, Hyounggap An, Seonghyun Moon, JinEon Park, Kwanghee Ko. "Undistorted Projection over Mobile Region of Interest Using an Uncalibrated Camera". Society for Computational Design and Engineering (CDE), 2016.1, 941-943
- Daewoon Kim, Joonghyun Ji, Dongho Yun, Hyonggap An, Galam Song, S.M. Abid Hasan, **Mamona Awan**, Kwanghee Ko. "Ship Block Detection and Pose Estimation with Augmented Reality". Society for Computational Design and Engineering (CDE), 2015.2, 988-991
- Hyunwoo Ha, Daewoon Kim, Joonghyun Ji, Dongho Yun, Abid Hasan, **Mamona Awan**, Kwanghee Ko. "A Vision-based Shadow Gesture Recognition for Interactive Projection System". Society for Computational Design and Engineering (CDE), 2014.8, 502-509

### Ray Tracing Engine for Image Rendering | C++, Visual Studio

- Implementation of the ray tracing algorithm, Using Russian roulette technique to render an image pixel by pixel taking variable samples per pixel. By increasing the number of samples, fairly good quality images can be rendered by this algorithm, while taking relatively more rendering time.
- Unsuitable for real-time applications and efficiently used to render images for non- real time applications.

### Improving Dense Stereo Correspondences | MATLAB

- Improved implementation for 3D Stereo Disparity, and the wrapper function of the edge detection and image segmentation system (EDISON).
- Obtained disparity map and computed occlusions. Used occlusion values to obtain an improved disparity map.

### Shadow Gesture Recognition for Interactive Projection | C++, OpenCV, OpenGL, Visual Studio

- Vision-based shadow gesture recognition for interactive projection system. Recognition method separates only the shadow area by combining the binary image with learning algorithm on isolated background from the input image.
- Distinguished hand gestures and made algorithm for tracking the fingertip. Finally used OpenGL to represent the result of rendered projection.

### Automatic Height and Inclination Adjusting Table | Samsung Innovative Idea of the Year 2014

Arduino, IR sensors, Gyro, Accelerometer, Linear Actuators

- Automatic Height and Self-adjusting Table to improve consumer usability. Height and Inclination adjustment for personal preference regarding variable circumstances like reading, sketching, etc.
- Used accelerometer and gyro to measure the tilt and inclination of table, while measuring the leg length using IR sensors, microprocessor/ chip of Arduino UNO to program the project and get input from sensors, using linear motor on legs of table.

### Wirelessly Communicating Self-Reconfigurable Modular Robot (WISCER) | Arduino, IR sensors, Servo Motors, RF communication Chips.

- A modular robot capable of reconfiguring itself to adapt to the changing environment. Simulating 3 different gait behaviors.
- Used Arduino UNO as the main processor per module (2 modules). IR sensor as proximity sensor to calculate distance between modules before combining. Modular synchronization via wireless communication using RF chips, to execute particular motion we used servo motors.