

Ahbab Al Mohammad Siddiquee

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Education

New York University Abu Dhabi

Major: Electrical Engineering, Class of 2027

August 2023 - Present

Abu Dhabi, UAE

Notre Dame College

Higher Secondary School Certificate

June 2020 - June 2022

Dhaka, Bangladesh

Research Experience

VR/AR Research Intern

Summer, 2026

Immersive Computing Lab, Prof. Qi Sun

NYU Tandon School of Engineering

- Researching perception-aware 3D Gaussian Splatting optimization for real-time VR/AR rendering, implementing foveated rendering strategies driven by eye-tracking data from VR headsets
- Developing adaptive level-of-detail mechanisms and benchmarking rendering performance (FPS, latency) using perceptual quality metrics across varying scene complexities in Python/CUDA
- Building Unity VR prototypes with XR Interaction Toolkit to conduct within-subjects user studies evaluating perceived visual quality, presence, and comfort across baseline and perception-optimized 3DGS configurations

Robotics Research Assistant

August, 2025 - Present

iCAS, eBRAIN Lab

New York University Abu Dhabi

- Led development of autonomous navigation system for AgileX LIMO UGV, implementing SLAM (RTAB-Map/Cartographer), sensor fusion (LiDAR + RGB camera), and ROS 2 Nav2 stack across Gazebo/Isaac Sim simulation environments
- Deployed open-vocabulary object detection pipeline using Grounding-DINO and YOLO-World, enabling natural language queries for object localization and semantic 3D mapping through VLM with CLIP feature embeddings
- Engineered vision-language navigation system with Text2Pose and Behavior Tree architecture for autonomous goal-directed navigation to user-specified objects (e.g., "go to the black chair")
- Validated sim-to-real transfer and conducted performance benchmarking across 10+ test scenarios, measuring success rates, path efficiency, and end-to-end latency for object detection, localization, and autonomous navigation
- Developed Unity synthetic dataset (1,500 images, 22 classes) and validated open-vocabulary models across multiple benchmarks (COCO, LVIS, 12 ODinW datasets)

VR Summer Research Assistant

Summer, 2025 - Present

Virtual Reality, Advanced Manufacturing Lab

CTP, New York University Abu Dhabi

- Developed immersive VR application in Unity using XR Interaction Toolkit and C# scripting to create interactive digital exhibitions of archaeological sites and prehistoric rock art across Arabia
- Engineered seamless user navigation and interaction mechanics by integrating photogrammetry-reconstructed 3D assets from Blender, optimizing rendering performance and designing intuitive spatial UI for scholarly exploration
- Utilized 3D printing and advanced manufacturing techniques to fabricate physical replicas of archaeological artifacts, bridging digital preservation with tangible research applications and enhancing accessibility for tactile analysis

Projects

Prodigy Robotics - Soft Robotic Rehabilitation System

2025

KUEC Robothon

RoboCup UAE

- Developed cable-driven soft robotic exoskeleton with multi-degree-of-freedom actuation system using servo motors to apply corrective forces for kyphosis posture rehabilitation
- Modeled flexible TPU-based soft actuator geometry in SolidWorks, optimizing material compliance and cable attachment points for distributed load application across thoracic spine
- Performed physics-based simulation in SOFA framework with SoftRobotics Plugin to validate deformation behavior, force-displacement characteristics, and biomechanical efficacy under patient loading conditions

ECG Acquisition System: End-to-End Hardware Development

2025

Electronics Lab

New York University Abu Dhabi

- Designed and fabricated complete ECG acquisition system from breadboard prototype to final PCB, implementing modular circuit architecture with instrumentation amplifier (INA121, gain 500V/V), active band-pass filter (0.3-100Hz), and Twin-T notch filter (50Hz) for noise rejection
- Developed and simulated ECG signal processing pipeline in Cadence including body model analysis, component mismatch evaluation, and Driven Right Leg (DRL) circuit for common-mode rejection, achieving optimal CMRR performance
- Designed compact PCB (<70x70mm) in Altium Designer with 0805 SMD components, audio jack interface, and CR2032 battery power system, ensuring manufacturability with 0.12mm trace spacing and proper decoupling capacitor placement
- Performed SMD soldering, circuit troubleshooting, and signal validation to deliver fully functional wearable ECG device, demonstrating end-to-end hardware development from schematic design to working prototype

Off-Grid Microcontroller System

2024

Superlab

New York University Abu Dhabi

- Designed & fabricated an off-grid microcontroller system from concept to working prototype
- Created custom PCB with ESP32 microcontroller using EasyEDA and simulated in Arduino IDE
- Engineered UV-stable, waterproof 3D-printed enclosure with proper mounting systems for electronics, battery, and solar panel using OnShape and rendered in Fusion360
- Implemented embedded software for autonomous operation and data collection

Biomimetic Impact-Absorption System

2024

Bioinspiration Engineering Project

New York University Abu Dhabi

- Developed biomimetic shoe sole mimicking multi-layered biological structure of cat paws to improve landing safety for high-altitude jumps
- Designed and fabricated shoe prototypes implementing triply periodic minimal surfaces (TPMS) in Onshape with nSlattice software
- Conducted experimental mechanical testing including compression testing to evaluate material properties and achieved 5x improvement in Young's modulus (1,624 kPa vs 329 kPa) with gradient design

Maze Walker VR Game

2023

Unity Development Project

New York University Abu Dhabi

- Developed "Maze Walker," an immersive VR puzzle game for Meta Quest 2 using Unity Game Engine and Oculus Integration SDK with C++ and C#
- Implemented procedural maze generation algorithm using depth-first search to create unique maze layouts for each playthrough
- Integrated intuitive player navigation systems including minimap functionality and NPC interaction mechanics
- Created scene management and collider-based event triggering system for seamless gameplay transitions and riddle interactions

Awards & Honors

Runner-Up, KUEC Robothon (\$7,000 Prize)

RoboCup UAE

2025

IOAA National Camper - Top 5% nationally

International Olympiad on Astronomy and Astrophysics

2022

3rd/1,619 entries in NSS Space Settlement Contest

National Space Society and NASA Ames Research Center

2022

1st Place, Cities in Space - first to achieve this honor for the nation

Settlement Design Category - STEAMSpace

2021

Specialized Skills

Programming: C++, C#, Python, MATLAB

Robotics: ROS1/ROS2, Unity, Gazebo, Isaac-Sim

CAD and 3D: Solidworks - CSWA Certified, Onshape, Fusion360, Blender

PCB Design: Xilinx FPGA, Cadence, EasyEDA, Altium, Logicworks-5

Design: Da Vinci Resolve, Adobe Photoshoph, Figma, Canva