Abdul Jawad

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Work Experience

Graduate Researcher | Computational Media, UCSC 09/2018 – Present

- Developed **open-source** simulation and modeling tools for Autonomous Vehicle (AV) development and testing
- Authored behavior modeling framework named CogMod for surrounding vehicle (NPC) to create realistic **simulated driver agent**
- Designed emergent critical scenario generation tool with realistic **procedural road and agents** in **Unreal game engine** using **C++**
- Developed procedural **HD road network** generation tool for city-scale network creation in **ASAM OpenDRIVE** format
- Mentored high school and undergraduate students and initiated a number of research initiatives and workshops

Teaching Assistant | Computational Media, UCSC 09/2018 – Present

- Served as a teaching assistant in over ten classes focused on **game design**, **game technology** and **game AI**
- Advised game teams, delivered lectures, and designed lab exercises in my capacity as a TA and instructor
- Helped students with troubleshooting and bug fixing in **Unreal**, **Unity**, and **Phaser** game engines

Co-founder | Portbliss Inc., Bangladesh 10/2015 – 05/2018

- Published four **mobile games** with total of **30 million+** downloads, featured in national and international news
- Assisted in finding and securing angel investors and led programming teams on several projects

Game Developer | Portbliss Inc., Bangladesh 10/2015 – 05/2018

- Collaborated with multidisciplinary teams as a **developer**, **gameplay designer**, and **particle effect expert** on game projects
- Created a **code obfuscation** tool for **Unity** to counteract MonoDevelop's vulnerability to reverse engineering
- Improved **cross-platform** game performance by optimizing asset management, achieving **30% reduction** in load times
- Designed cross-platform **3D** and **2D mobile games** in **Unity** for **Android**, **iOS**, and **Windows**, enhancing gaming experience

Web Developer | Shapla IT, Bangladesh 04/2013 – 09/2015

- Developed multi-device responsive websites using **PHP**, **C#,.Net**, and **MySQL**
- Designed and implemented **DBMS** for an educational institute with student record, classwise syllabus and assignment features

Projects

MRA | Multi-scale Region Attention Learning for Scalable Semantic Segmentation

- Trained an efficient segmentation transformer in **PyTorch,** with **60% less computation** and **78.2% mIoU** on **CityScapes** dataset
- Used **Nautilus**, a **cloud-based infrastructure**, to train large-scale dataset using **Kubernetes** and **Docker**

CogMod | Cognitive modeling of human driving behavior

- Developed a **driver model** that simulates human behavior to create realistic **driving agents** for **Scenario-based AV testing**
- Employed the model in **UE4** and **Carla** to generate critical (e.g. cut-in) emergent AV testing scenarios

JunctionArt | Procedural road network generation tool

- Developed a toolset for a Ford-funded project that generates **synthetic roads** with **complex intersections** to test **AV path planners**
- Generated roads are importable in different simulation tools, such as **Carla**, **SUMO**, and **RoadRunner**

CruzWay | A modular architecture for AV simulation

- Created **behavior-tree-based pedestrian** and **driver** for NPC agents to generate **emergent critical scenarios** for AV testing
- Developed **modular simulation framework** for AV; authored two open-source **UE4 plugins** for **road** and **behavior generation**

3D Saqqara | An Immersive and Interactive Experience

- Historical visualization in **VR**, focusing on the ancient site of Saqqara across different timelines covering 3000 years of history
- Designed **navigation system**, **UI**, and **3D immersive sounds** for **microsoft mixed reality headset** in **Unity**

MuktiCamp | A strategy-based Mobile game

- Designed **level** and **terrain design** tool, **code obfuscator** and **inventory module** in **Unity**
- Optimized game **performance** and **memory usage, reducing load times** by **35%,** and improving overall game stability

Heroes of 71 | Third-person shooter game on Android

- Designed the **game's enemy AI**, **NPC manager**, **grenade throwing mechanics**, and **level design** tool in **Unity**
- Integrated **game analytics** tools, **Ad modules**, and **in-app purchases** in the subsequent versions of the game

Education

University of California, Santa Cruz | PhD, Computational Media 09/2018 – 12/2024

University of California, Santa Cruz | MSc, Computational Media 09/2018 – 06/2023

Bangladesh University of Engineering and Technology | BSc, Computer Science and Engineering 05/2012 – 02/2017

Skills

- Python, C++, C#, JavaScript, CUDA, SQL, Git, Linux, Kubernetes, Docker
- Unreal, Unity, Phaser.JS, GDevelop, Blender, Twine, Construct
- OpenDRIVE, OpenSCENARIO, Carla, ApolloAuto, SUMO
- PyTorch, Scikit-learn, Keras, Matplotlib, Pandas, NumPy, OpenCV
- PHP, CodeIgnitor, Flutter, .Net, Flask, HTML, CSS
- Data structure & algorithm, Linear algebra, Numerical methods, Neural network

Notable Publications

- CogMod: Driver Model for Augmenting Scenario Criticality; *IEEE ITSC 2023*
- PedGrid-A Simple yet Expressive Simulation Environment for Pedestrian Behavior Modeling, *IEEE ITSC 2023*
- Procedural Generation of High-Definition Road Networks for AV Testing and Traffic Simulations; *SAE IJCAV 2023*
- CogMod: Simulating Human Information Processing Limitations While Driving; *IEEE IV Symposium 2022*
- A Modular Architecture for Procedural Generation of Towns, Intersections and Scenarios for Testing AV; *IEEE IV Symposium 2020*

Activities and Awards

- Organizer 1st SceGen workshop in IEEE IV 2023
- Reviewer: IEEE IV 2023, IEEE ITSC 2022, IEEE TOG 2021
- Created "Collaborative Research with BUET Alumni." forum 2022
- Attended International Summer School on AI and Games, NYU, 2019
- Recipient Campus2Career Youth Award 2016 and National ICT Award 2016