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

MuktiCamp | A strategy-based Mobile game

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

Heroes of 71 | Third-person shooter game on Andriod

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

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

- Trained an efficient segmentation transformer requiring 60% less computation with 78.2% mIoU on CityScapes dataset
- Actively extending the application of multi-scale region attention to classification tasks

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

CogMod | Cognitive modeling of human driving behavior

- Developed a driver model that mimics human limitations to create more realistic driving agents for scenario-based AV testing
- Employed the model to simulate surrounding vehicle (NPC) vehicles and 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 generated synthetic roads with complex intersections to test AV path planners
- Constructed a framework to quantify the complexity of the procedurally generated intersections

CruzWay | A modular architecture for AV simulation

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

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
- 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