

Kenechukwu C. Mbanisi

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SUMMARY

Robotics Research & Software Engineer. Specialties in safe motion planning and autonomous navigation, assisted driving, shared autonomy, reinforcement learning, computer vision, driver behavior modeling, human motion modeling.

EXPERIENCE

Research Assistant, Human-Inspired Robotics (HiRO) Lab, WPI *May 2017 - Apr 2021*

- Building shared autonomy frameworks for safe navigation of mobile robots using classical and RL approaches
- Developed an integrated human driver simulation framework for studying realistic human-vehicle interaction

PROJECTS

Robust Navigation in Indoor Cluttered Environments using 3D Mapping | C++, ROS, Python, PCL, RTAB-Map

- Integrating the navigation stack for robust path planning in clutter using RTAB-Map and A*, RRT*
- Implementing dynamic collision avoidance algorithms using Velocity Obstacle-based approaches

Shared Autonomy for Socially-Aware Robot Navigation | C++, ROS, Python, OpenCV

- Developing a haptic shared control framework for enabling remote teleoperation of mobile telepresence robots
- Developing dynamic collision avoidance algorithms with social navigation constraints using Velocity Obstacle-based and reinforcement learning approaches

RoboNav: Mapless Indoor Navigation using Deep Reinforcement Learning | Python, PyTorch, ROS, Gazebo

- Enabled end-to-end learning for dynamic collision avoidance for a mobile robot using only raw 2D lidar inputs
- Successfully implemented and trained models using Deep Q-Learning and DDPG algorithms

Driver Behavior Modeling via Imitation Learning | Python, MoCap, OpenSim, MATLAB

- Developed a Learning from Demonstration approach (using DMP and GMM/GMR) to analyze human driver behavior and to build a motion library of driving styles
- Designed and conducted a fixed cockpit driving user study to collect vehicle maneuver motion data

Human Force Anticipation Analysis in Human Motion Control | EMG Analysis, MoCap, MATLAB

- Implemented a human motion study to gain insights into how human motor system coordinates feed-forward and feedback control strategies to achieve fast and agile motions

Surgical Robotics using an Industrial Manipulator Robot | ROS, Arduino, Python

- Developed mechanism to enable mounting a da Vinci Research Kit insertion tool on an ABB Industrial robot
- Developed a software package consisting of kinematics, trajectory generation, and teleoperation functionality

EDUCATION

Doctor of Philosophy (PhD), Robotics Engineering *Aug 2016 - Dec 2021*

Worcester Polytechnic Institute, MA, USA

Master of Science, Robotics Engineering *Aug 2016 - May 2018*

Worcester Polytechnic Institute, MA, USA

Bachelor of Engineering, Electrical and Electronics Engineering *Sep 2008 - Jul 2013*

Covenant University, Nigeria

SKILLS

Robotics Tools: ROS, Gazebo, RViz

Programming: C++, Python, MATLAB, LaTeX, R

Software Tools: VSCode, OpenSim, Git, PyTorch, OpenAI Gym, CARLA, Simbody, Linux

Hardware & Robots: Rethink Baxter, Universal Robot (UR5), ABB IRB 120, VEX Robot Kit, Arduino

SELECTED PUBLICATIONS

- K. C. Mbanisi, et. al, **Learning Coordinated Vehicle Maneuver Motion Primitives from Human Demonstration**, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Madrid, Italy, 2018.
- H. Kimpara, K. C. Mbanisi, et. al, **Human model-based active driving system in vehicular dynamic simulation**, IEEE Transactions on Intelligent Transportation Systems, vol. 21, no. 5, pp. 1903-1914, May 2020

ACTIVITIES

- Organizing Team Member, 2021 [Pan-African Robotics Competition \(PARC\)](#)
- Invited Panelist at [Society, Robots and Us](#) program by Silicon Valley Robotics
- Invited Reviewer: IEEE T-ITS (2019), IEEE IROS (2018)