

## Computer Science Seminar Series

### National Capital Region

## Deployable Robots that Learn

**Speaker: Prof. Xuesu Xiao**

**George Mason University**

**Friday, March 15, 2024**

**11:15AM- 12:15PM, NVC 213**

### Abstract

While many robots are currently deployable in factories, warehouses, and homes, their autonomous deployment requires either the deployment environments to be highly controlled, or the deployment to only entail executing one single preprogrammed task. These deployable robots do not learn to address changes and to improve performance. For uncontrolled environments and for novel tasks, current robots must seek help from highly skilled robot operators for teleoperated (not autonomous) deployment.

In this talk, I will present three approaches to removing these limitations by learning to enable autonomous deployment in the context of mobile robot navigation, a common core capability for deployable robots: (1) Adaptive Planner Parameter Learning fine-tunes existing motion planners by learning from simple interactions with non-expert users before autonomous deployment and adapts to different deployment scenarios; (2) Learning Inverse Kinodynamics allows robots to learn from in-situ vehicle-terrain interactions during deployment and accurately navigate at high speeds on unstructured off-road terrain; (3) Learning from Hallucination enables agile navigation in highly-constrained deployment environments by reflecting on previous deployment experiences and creating synthetic obstacle configurations to learn from. Building on robust autonomous navigation, I will discuss my vision toward a hardened, reliable, and resilient robot fleet which is also task-efficient and continually learns from each other and from humans.

### Biography



Xuesu Xiao is an Assistant Professor in the Department of Computer Science at George Mason University. Xuesu (Prof. XX) directs the RobotiXX lab, in which researchers (XX-Men) and robots (XX-Bots) work together at the intersection of motion planning and machine learning with a specific focus on developing highly capable and intelligent mobile robots that are robustly deployable in the real world with minimal human supervision. Xuesu's work has been deployed in real-world robot field missions, including search and rescue effort in the Mexico City earthquake and the Greece refugee crisis, decommissioning effort in the Fukushima nuclear disaster, and multiple search and rescue exercises in the US. Xuesu's research has been featured by Google AI Blog, Clearpath Robotics, IEEE Spectrum, US Army, Robotics Business Review, Tech Briefs, NSF Science Nation, WIRED, and KBTX-TV.