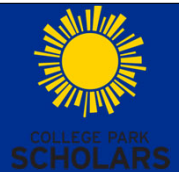# Aerial Deployment Systems for Robots

Daniel Hu

College Park Scholars – Science & Global Change Program
Computer Science
dhu123@umd.edu
College Park Scholars Academic Showcase, May 5, 2023

Introduction

At ARL, I worked along student researchers and defense contractors through the UMD partnered ArtIAMAS program to complete a project or "deliverable" to showcase to military officials.

During my Summer with ARL, my work consisted of two parts: developing a four legged (quadruped) robot and a system meant to protect it from being dropped out of an airplane. My personal design was the one chosen to implement for the drop system.

An image of our prototype drop assembly mechanism design in various stages of deployment, as shown from left to right: fully deployed, undeployed for storage or transportation, and partially deployed.

Site Information:

U.S. Army Research Laboratory (ARL)

2800 Powder Mill Road, Adelphi, MD

Monica Viz & Sean Gart

ARL's research and development greatly improves the Army's chances of surviving and winning any future conflicts

ARL partners with leading researchers in industry and academia to produce advanced technologies that support Soldiers in the field today and in the future.

Issues Confronting Site:

There were no serious issues in our site, though documenting our testing at Graces Quarters was hard because we weren't allowed to record pictures or videos in a secure facility.

Activities:

At ARL, I used CAD software like Fusion360 and 3D printers to develop parts for our robot and drop mechanism. During the planning phase of our design process, I was tasked with producing a design to protect our robot from a high fall that did not rely on a parachute. I also was involved in programming the robot and developing better all-terrain feet for it. I would take part in testing of the mechanism and robot periodically throughout the summer to test our progress.

Impact:

My help in creating these systems have provided a substantial mechanical and coding base for future iterations of ARL robotics programs based on my design. I hope to one day see my design fully and thoroughly developed and adopted by the military as I believe it can make a meaningful impact on the ease and effectiveness of logistics.

Images of our quadruped robot (left), me and another student researcher handling our drop mechanism assembly during our presentation at Aberdeen Proving Ground

Future Work:

By helping to develop this robotic system and its protective container, I am helping to pave the way for the integration of robotic systems into our modern army. Future ARL programs will continue to improve upon this design and in the future, these containers will be used to quickly and covertly resupply soldiers or deliver similar robots for search and rescue missions. This will have a positive impact on the ability of the military to function in dangerous areas such as war zones or natural disasters and could potentially save lives that would be otherwise risked performing duties the robot or container could serve instead.

Acknowledgments:

I would like to acknowledge my ArtIAMAS advisor Monica Viz for her guidance as well as my ARL advisor, Sean Gart.