

# Senior Design Project Report

CSE 499

## **RER: Recycled Experience Replay with Dual Memory Architecture for Path Planning of a Moving Target using Deep Reinforcement Learning**



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**ELECTRICAL AND COMPUTER ENGINEERING**

**NORTH SOUTH UNIVERSITY**

SPRING 2021

## Agreement Form

We take great pleasure in submitting our senior design project report on "RER: Recycled Experience Replay with dual memory architecture for path planning of a moving target using Deep Reinforcement Learning". This report is prepared as a requirement of the Capstone Design Project CSE499 A & B which is a two semester long senior design course. This course involves multidisciplinary teams of students who build and test custom designed systems, components or engineering processes. We would like to request you to accept this report as a partial fulfillment of Bachelor of Science degree under Electrical and Computer Engineering Department of North South University.

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# **RER: Recycled Experience Replay with Dual Memory Architecture for Path Planning of a Moving Target using Deep Reinforcement Learning**

## **Abstract**

In all over the world, SAR operations are carried out to assist people in life risks. To search the person in life-threatening situation, the use of Unmanned Aerial Vehicles (UAVs) has increased drastically for different search and rescue missions to find the person at the earliest over the past few years. As UAVs are getting cheaper with advanced features like high-resolution cameras and long-lasting batteries, these devices are being used for autonomous search and rescue operations in different types of terrains and environments. These autonomous devices use artificial intelligence methods such as deep reinforcement learning algorithms for finding the optimal path and tracking the target. For marine-based environments, the target is continuously drifting with the ocean current which makes quite difficult for the UAV to search the lost victim. In this project, we have made a simulation of a custom 2D marine environment and developed a dual memory architecture for finding the optimal path of a moving target to improve the learning of UAV. We have incorporated our algorithm on popular deep reinforcement learning algorithms and improved the performance of classical algorithms by using our recycled experience replay. The results delineates that with simple dual memory structure immense progress in stable learning behavior can be obtained. The main goal of this project is to enhance the performance of prevalent deep reinforcement learning algorithms and test their performance in a simulated marine environment.