

My proposal is based on the paper "**3D Simulation for Robot Arm Control with Deep Q-Learning**"[\[link\]](#). This paper describes the use of Q-learning with deep neural networks to train a robot arm (in simulation) to perform simple manipulation tasks. They also show how can we transfer the acquired knowledge to real world robot.

The approach described uses the images of the environment as the only input, and outputs motor actions for the given task. The paper proposes a new architecture of the deep network and the simulation was trained using TensorFlow.

My goal:

- 1) The approach used only images as input. But i think that along with vision, tactile sensing is also very important. My aim is to extend this approach by using tactile pressure values on the arm head along with the environment images as the input. This will result in better performance and faster convergence.
- 2) There is a lot of scope to play with the architecture of deep network for this case. I will try to improve the design of existing network.
- 3) Extending this paper to more complex pick and place tasks.
- 4) I will implement the complete model described in the paper and train with TensorFlow + apply the proposed improvements

Technical details:

- 1) Language: python
- 2) I will use an existing simulation library (Open AI gym) in python or create a custom library for the project depending on the need
- 3) TensorFlow will be used to train the network

This project can serve as good example for people trying to train their agents in a 3d simulation environment. Currently there is a lack of open source resources for this purpose.