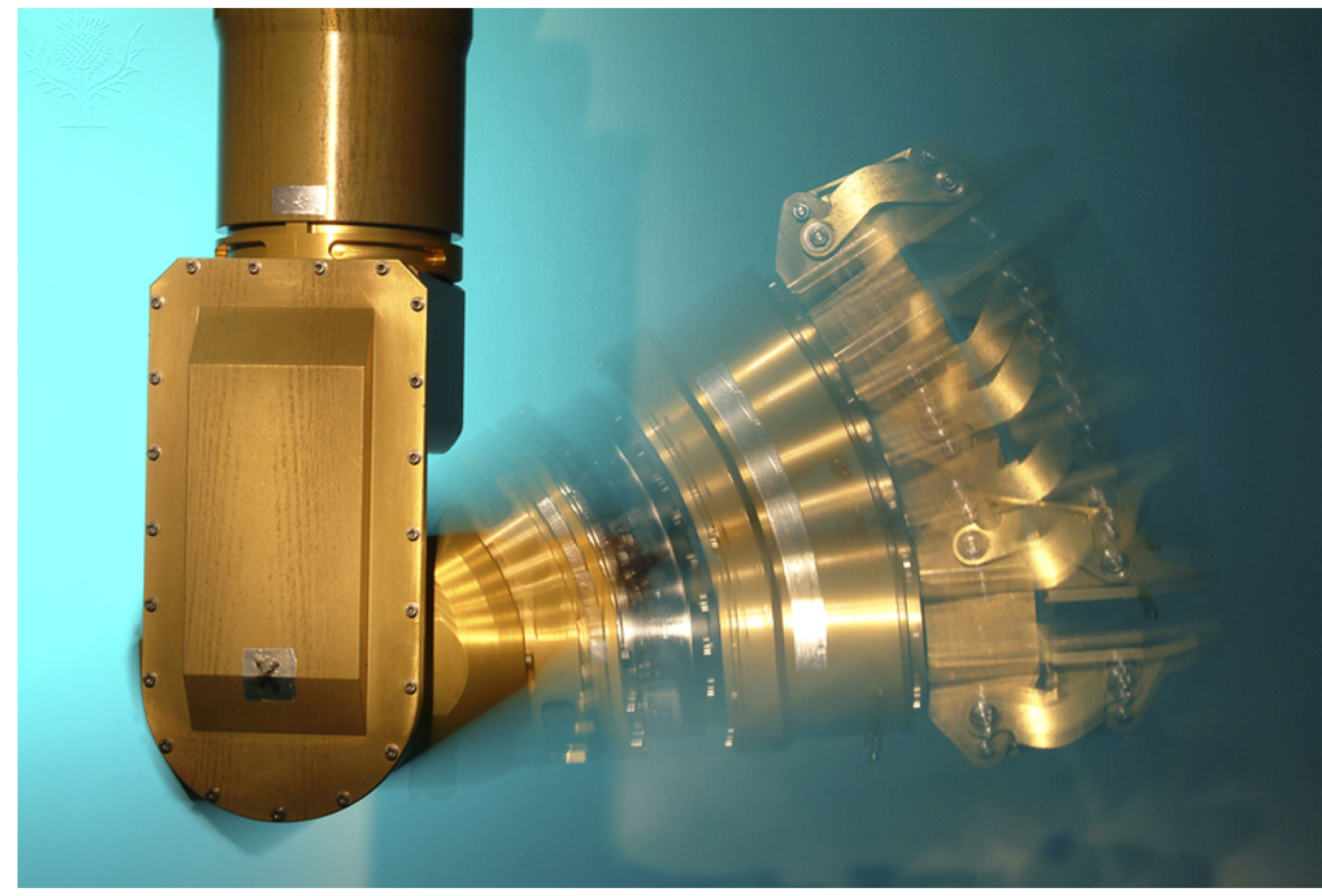
OPTIMIZATION OF KINETIC MOTION

Sander Miller
Dhara Patel

APPLICATIONS IN THE FIELD OF ROBOTICS

In the world of robotics, precision is key. To achieve this order of precision, there are infinite parameters we need to optimize. Using reinforcement learning we can optimize a robot's performance within minutes. Many robotic motion can use reinforcement learning to optimize.



THE SOLUTION: REINFORCEMENT LEARNING

A Deep Q-Network (DQN) is a reinforcement learning model that evaluates the benefit of a particular action given the current state and its future states. It uses experiences to learn first-hand what the best way of achieving a particular goal is. It assigns rewards to actions that lead to more optimal states. This model can be applied to any environment.

EXAMPLE: INVERTED PEDULUM MODEL

We used OpenAI Gym's 'Carpole v1' environment. It consists of an inverted pendulum mounted on a cart that can move left or right on a frictionless cart. The system is controlled by applying a force of +/- 1 on the cart. The goal of the cart (agent) is to keep the pendulum upright. We optimized the gamma rate to create a model that learns efficiently.