

Maldon Owen Engineering Prize 2025

This award (of £250) is given to the best graduating student on an M Eng programme at the University of York

Winner: Sam Locock

Title:

Development of a ballistic projectile demonstration with object tracking using AI computer vision techniques

Description:

This report details the creation of an autonomous turret that utilises AI pose recognition to detect and track targets so that a ball can be launched directly into the hand of a demonstrator for the purposes of teaching projectile motion to new undergraduate engineering students. It does this by combining the physical demonstration with a computer application designed to give an insight into the underlying concepts involved of projectile motion, drag, and computer vision. The spirit of this report is to highlight the engineering methods utilised in demonstration of the project conductor's proficiency within the subject. The design and manufacture of each system subsection is discussed, focusing on explaining the decisions made, the reasonings behind them and any possible additional work and improvements that could be conducted. Results of the physical system include the ability to track a demonstrator moving one meter per second at five meters away and launch projectiles at them within catching height. By utilising projectile motion and drag compensation calculated by the Runge-Kutta method, projectiles launched will collide with the target providing they remain stationary. The application results include real time detection and display of essential pose positions, such as the hands or chest, of up to six human targets. Additionally, the interface displays graphics of the trajectory under the influence of projectile motion and drag with customisable inputs including drag coefficient, mass, size and time step accuracy. This report and the system it details will provide a useful example to anyone who wishes to conduct a similar experiment or learn more about engineering principles and the basics of projectile motion and drag.