Swimming Tracking Technology and Performance Analytics

Overview

Athletes all across the world struggle with adequate access to coaching (O'sullivan). Our project aims to combat this struggle, helping provide analytical coaching to swimmers through motion analysis, analytical computation, and engineering. Our project is to make a physical apparatus to attach to lane lines to record a swimmer, uploading this video to our software which will analyze this video footage of a swimmer in order to provide data to the swimmer regarding their performance. It will then use principles of hydrodynamics to provide corrections to enhance the swimmer's stroke efficiency and speed (Drag).

Current Progress

So far, our team has found, tested, and implemented a pose recognition algorithm that can successfully turn video footage into coordinate based wireframes that a computer can interpret (Gupta). The design we made has cameras on the swimmer at 4 diagonals to avoid distortion from cameras at water level. Further progress was writing formulas to convert these 4 diagonal x and y coordinates to a single x -y- z 3 dimensional set of coordinates to make up our wireframe. We also made this process more efficient through multithreading ("Geeks"). We have also begun research into accounting for perspective distortion, a side effect of the slight fish-eyeing of all cameras ("Overview"), and the implementation of analysis through hydrodynamics.

Next Steps

The biggest most glaring step is to collect data. We have access to a pool and this will likely happen in the next few weeks along with completion of building the apparatus. Next, code must be implemented to track a swimmer's forward movement and their location on the waterline to augment the data of the swimmer's relative position since this is necessary to analyze drag ("Drag"). After we have not only data but the full code to create the moving wireframe with reference to the waterline, we will begin to implement analysis through physics.

Sources:

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