

Dylan Sellers

*A Boat Built for Kicks: Using the Flutter Kick for Propulsion*

The objective was to build an apparatus to quantify the thrust produced by varying dive fins. This project is important because having more efficient fins helps scuba divers conserve oxygen. Currently, consumers can only get qualitative and sometimes conflicting information on fins, based on discussions and reviews. This method doesn't provide the objective, quantitative information which is needed to make a fully informed choice. A mechanical way to measure the thrust of different fins, in the form of a boat, was designed and built using recycled materials. The boat converts the circular motion of a motor into the kicking motion of a human. To do this, a power window motor from a junkyard drives a bicycle sprocket via 3D printed adapter. A chain goes over the sprocket and is driven by the motor. The chain drives a bicycle crank with the pedals removed. Connecting rods attach where the pedals used to be. Pivot points allow them to move freely as they go up and down as the gear turns. The connecting rods then move up and down, creating a force on the legs which drives the fins. The boat provides the ability to collect thrust data, leading directly to a better way to compare fins. The tests were each conducted using a fully charged 12V battery attached to the boat. The Cressi Frog Plus' average thrust was 1.3 pounds, a significantly better thrust than next best brand's thrust of 1.16 pounds.