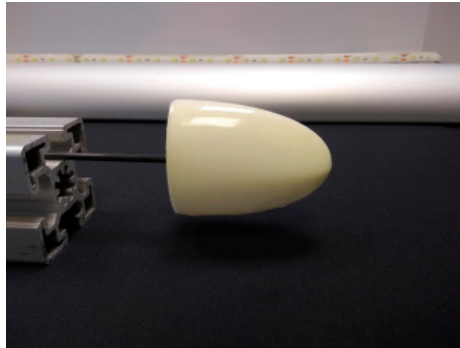
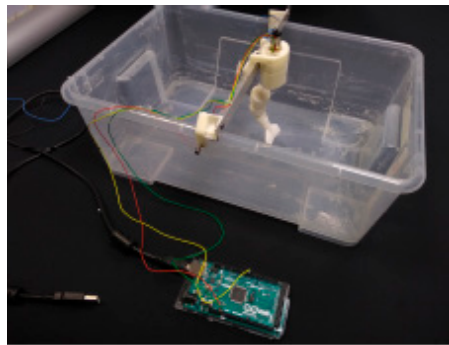


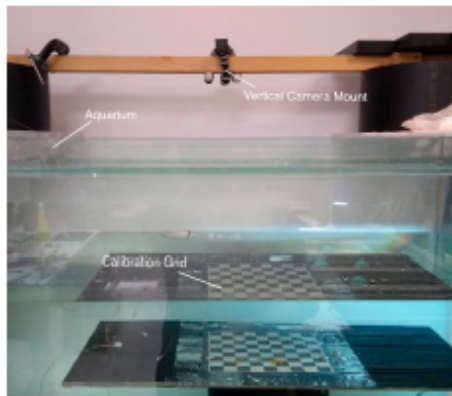
# Development of a novel under-actuated robotic fish with magnetic transmission system



**Figure S1.** Curing of the silicone sleeve for the robotic fish head. The 3D printed fish head was periodically rotated for a uniform silicone coating.



**Figure S2.** Set up for mapping the motor voltage to tail beat frequency.



(a)

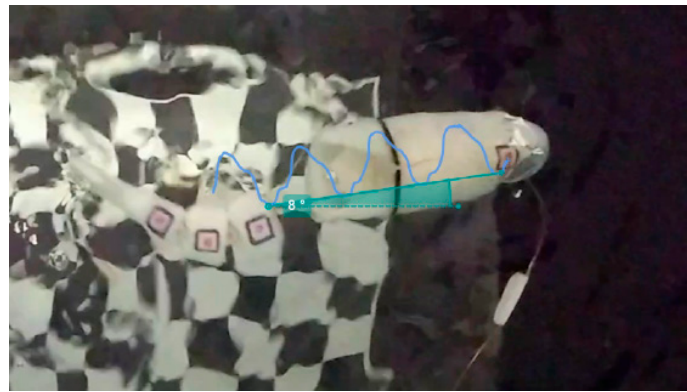


(b)

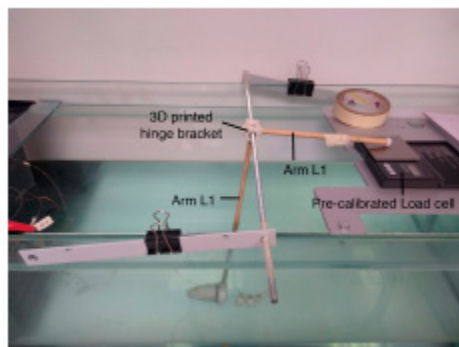
**Figure S3.** Setup for measuring the swimming speed, Work Per Meter and Strouhal Number. It consists of an aquarium, a calibration grid, some portable led lights, a top mounted camera, power source and digital multimeters for measuring voltage and current.



**Figure S4.** Tracking of the robotic fish's tail tip by exploiting the calibrated plane. The fish in this picture is swimming with a 2 Hz tail beat frequency.



**Figure S5.** Tracking of the robotic fish using Kinovea for swimming speed calculation and correction angle. The tracked marker is the one on the fish head. The fish in this picture is swimming with a tail beat frequency of 2.5 Hz.



**Figure S6.** Set up for measuring the generated thrust. A pre-calibrated load cell was used.