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DESIGN AND CONSTRUCTION OF A ROBOTIC SURVEILLANCE FISH

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ABSTRACT

The use of robots has increased exponentially in the 21st century due to improvement in the design of drives, actuators and control electronics. Bio-inspired robots are robots which use electro-mechanical motion to achieve near natural movement of the animal they represent. Stealth and energy efficiency are amongst qualities obtainable from nature inspired movements.

The design and construction of a robot fish is an attempt into bio-mimicry. This project entails the use of conventional, cheap and off the shelf mechanical mechanisms to achieve the anguilliform motion of a typical African Catfish. A geared motor driven crank and telescopic connecting rod mechanism is used to achieve the undulating motion of the tail. This created the propulsion needed to achieve the surging motion. The pectoral (right and left) fins are controlled by two (2) independent geared DC (direct current) motors. Moving the right or the left fins to a position tangential to the fish body generates drag which steers (yaws) the fish to the right or left direction respectively. Plastic containers are used as the ballast tanks through which two (2) DC submersible water pumps vary the buoyancy of the robot for both surface and subsurface swimming thereby achieving the pitching motion. Light weight hollow Aluminium (aerosol can) is used for the rib cage (core) of the fish. This Aluminium core encloses the ballast containers, propulsion motor and the crank/connecting rod assemble. Light weight synthetic rubber is used to enclose the body of the fish making it water proof and flexible. The center of gravity of the fish was maintained just under the fish head and upper frame region using the weight of the battery and propulsion motor to maintain the fish stability.

The fish was able to achieve a speed of 0.1m/s and submerged in 4 secs during the tests. The test was done in non-flowing water. The fin movement, buoyancy variation and propulsion were achieved during the test.

KEYWORDS: *Design of Drives, Actuators and Control Electronics, To Achieve the Surging Motion*

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