Conceptual development of an autonomous underwater robot design for monitoring and harvesting invasive weeds

Dithoto Modungwa
Defence & Security, CSIR, Pretoria, South Africa
dmodungwa@csir.co.za

Fisseha Mekuria
Defence & Security, CSIR, Pretoria, South Africa
fmekuria@csir.co.za

Mzuziwezulu Kekana
Nextgen Enterprise & Institutions, CSIR, Pretoria, South Africa
mkekana@csir.co.za

Abstract

The design of an autonomous underwater robot based on biomimicry is presented in this paper. The systematic design of the robot focuses on integrating 5G-AI-IoT- as effective technological tools to autonomously monitor and harvest invasive weeds in order to replace traditional weed control approaches. The robustness and versatility of the robotic platform structural topology and autonomous navigation related technology will be demonstrated. The following robotic solution concept design will investigate real-time sensing, mapping and visualization of the invasive weeds. The system based on real-time mapping information obtained from the swarm of drones will also manage the control of underwater robots equipped with smart networked sensors using state of the art IoT technologies. The mechanical dislodging machine will be guided to the mapped areas and accurately controlled and guided through smart sensors via an URLLC and tactile control system to dislodge the invasive weed. The biomimetic underwater robot will also be equipped with sensors to guide and accurately uproot the invasive weed with no impact on other organisms and the bio-diversity of the lake.