Advanced sensor technology for robotic lawn mowers: ROS WiFi teleop design

**Background** – Robotic lawn mowers are big business in Europe. Global sales of these robots are expected to surpass $3 billion by 2023. One of the reasons people still are reticent about investing in a robotic lawnmower are concerns over safety and security. To deliver outstanding peace of mind, modern robot mower design takes at least as much account of safety as it does grass cutting.

**Subject** – As cities grow larger and more populous, also the importance of parks and other green spaces is increasing, opening unique opportunities for application of robotic mowers in public spaces. Swarms of professional robotic lawn mowers, operating unsupervised throughout public spaces within the middle of highly urbanized environments, demand a fundamental revision of all product safety aspects. To fulfill this vision and to deal with some of the most demanding challenges in the future of green spaces, robotic lawn mowers need to become even smarter with more intelligent onboard solutions, and more advanced sensors to interact safely with their environment at all times.

Effective collision avoidance systems featuring hi-tech sensors will enable future generation robotic mowers to retain minimal safety clearances at all times, alleviating the risks of accidents and injuries for people as well as animals. For future application in residential and professional robot lawn mowers, VUB spinoff company eXia Belgium N.V. is partnering with the world’s largest outdoor robotics company to evaluate its unique biometric sensing technology to avoid near-field collisions.

**Thesis** – To support more extensive field tests, with eXia Belgium’s electrostatic sensor technology installed on a state-of-the-art professional lawnmower platform, a ROS (Robot Operating System) WiFi teleop node is currently under development. Combining live streaming of sensorics data with high-resolution FPV (First Person View) imaginary and accurate geotagging, the bidirectional wireless data channel also supports tele-operation and remote ‘over the air’ configuration of sensor electronics. With its core software running on an embedded RPI (Raspberry Pi) target computer, thesis work involves code development across a heterogeneous computer cluster: RPI (Magic ROS node), Android (teleop, FPV) and Linux (data acquisition, real-time off-platform signal processing). All software components should seamlessly integrate in the ROS environment and interface to Gazebo, an open-source 3D robotics simulator.

**eXia Belgium N.V.** – As a spin-off company of the Vrije Universiteit Brussel in collaboration with Imec vzw, eXia Belgium is a global pioneer in the development of electrostatic sensor solutions for near-field collision avoidance. eXia sensors are applied in assisted driving, autonomous vehicles, automotive comfort features and machine safety. With its Active Sideguard turn assist sensors, addressing the risks and dangers of urban traffic, eXia has the aspiration to revolutionize road safety. As a trusted partner for global suppliers and leading technology corporations, eXia also facilitates the development of tailored products to meet specific customer needs.

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