IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 4, June 2023

A Personal Robot Assistant for Human-Robot Interaction and Care Applications

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Abstract: *Lio is a mobile robot platform with a multi- functional arm explicitly designed for human-robot interaction and personal care assistant tasks. The robot has already been deployed in several health care facilities, where it is functioning autonomously, assisting staff and patients on an everyday basis. Lio is intrinsically safe by having full coverage in soft artificial- leather material as well as collision detection, limited speed and forces. Furthermore, the robot has a compliant motion controller. A combination of visual, audio, laser, ultrasound and mechanical sensors are used for safe navigation and environment understanding. The ROS-enabled setup allows researchers to access raw sensor data as well as have direct control of the robot. The friendly appearance of Lio has resulted in the robot being well accepted by health care staff and patients. Fully autonomous operation is made possible by a flexible decision engine, autonomous navigation and automatic recharging. Combined with time-scheduled task triggers, this allows Lio to operate throughout the day, with a battery life of up to 8 hours and recharging during idle times. A combination of powerful computing units provides enough processing power to deploy artificial intelligence and deep learning-based solutions on-board the robot without the need to send any sensitive data to cloud services, guaranteeing compliance with privacy requirements. During the COVID-19 pandemic, Lio was rapidly adjusted to perform additional functionality like disinfection and remote elevated body temperature detection. It complies with ISO13482 Safety requirements for personal care robots, meaning it can be directly tested and deployed in care facilities.*

Keywords: *Service Robotics, Autonomous Agents, Human- Centered Robotics, Physical Human-Robot Interaction, Automation in Life Sciences: Biotechnology, Pharmaceutical and Health Care.*

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