Stretch robot projects and thesis at TalTech IT College

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Keywords:
Robot, mobile manipulator, biologically inspired design, student projects, thesis

Abstract

Hello Robot's Stretch 3 is "one-handed" innovative telescopic remote controllable service robot, studied thanks to open platform in many universities around the globe. It's two-finger gripper, connected to agile wrist, is designed to be as universal as possible, and is capable of handling hard, soft and fairy heavy (around 2kg) objects. Still, there are application areas and conditions where universal gripper is not effective enough. In TalTech IT College, we have investigated under student projects and thesis work the usability of service robots in different environments. E.g. in laboratory environment, where even simple actions, such as handling a banana plug, can be a challenge to conventional robotic grippers. From there, the students have developed a gripper inspired by a bird's beak, capable for greater force and precision, making it suitable for handling small socketed objects, buttons, rotating knobs etc. Another study is related to applicability of the Stretch platform e.g. in kindergarten playroom environment that challenge its sensors and processing capabilities till AI model deployment. The possible solutions were explored through semester projects and individual thesis.
Finally, the Stretch 3 robot was used at PhD-level to study of behavioural signals under remote control for operator identification and continuous authentication. Resulting research paper is at submission stage.
There has been positive feedback from students who were eager to explore topics beyond of their regular curricula, such as RTOS, AI model development, materials science, data analysis, etc. The diversity of topics favours multidisciplinary teams.
At the same time, immaturity of open tools, despite generally good documentation and community support, remains a challenge. Addressing the complexity of both the problem and solution spaces requires a step-wise approach and dedicated time for experimentation. On the positive side, every successful solution paves a way for new challenges and learning opportunities.