

Indoor Human Following Assistive Robot with Fall Detection Capability for the Elderly and the Differently Abled

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Abstract

The number of falls among the elderly people increase each year and the lack of appropriate care and support leads to serious injuries that could also cost lives. Therefore, the elderly and the differently abled people require constant monitoring. It is too costly to hire a caretaker or move the person to a nursing home or to an elder care home. To minimize the risks faced by the person due to falls, to remind the person of their medication, to contact the guardian, if necessary, to alert the guardian when a fall is detected, and to provide company to the person, a robot is developed and implemented. The main objective of the project is to identify the primary and secondary activities of daily living that require assistance for the elderly and the differently abled, to implement human detection, tracking, and fall detection in the robot. Secondly, to design a robot that will assist the elderly and the differently abled in fulfilling a subset of activities of daily living, to optimize the robot for domestic purposes through software validation and verification, and finally to fabricate the designed robot. Human detection, following, and fall detection algorithms are implemented using Python with a Raspberry Pi 4 for processing. Pose estimation will be used to detect the human, build the logic for human following, and fall detection as well. The robot follows the elderly person from behind and detects any falls with an accuracy of beyond 85%.

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