Autonomous Human Following Shopping Trolley Integrated with Smart Shopping Android Application for Sri Lankan Supermarkets

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Robotics applications have made tremendous advancements in the previous decade and it has evolved to perform certain day-to-day tasks, despite it was generally used for industrial tasks. In developed countries, autonomous robot assistants who interact with people are currently employed in grocery industry scenarios with the intention of aiding consumers to make the shopping process more efficient. This research paper attempts to propose a smart shopping system that can be implemented in Sri Lankan supermarkets. The proposed system consists of three major components. a) a mobile device that is carried by the consumer b) a human following shopping trolley c) an Android application with auto billing generation capability. Previous researches have been carried out to implement a human tracking robot utilizing high end, costly technologies such as Laser Range Finders, Kinect cameras and low-end sensors such as ultrasonic sensors. The proposed human tracking unit utilizes Wi-Fi technology to reduce the cost for sensory devices and follow the trajectory of a consumer with higher accuracy. The trolley navigates inside the supermarket following a target consumer while maintaining a safe distance using ultrasonic sensors. The relative position and orientation of the target consumer are determined by utilizing Received Signal Strength Indicator values of Wi-Fi signals. Ultrasonic sensors are deployed to follow the customer while maintaining a safe distance and avoid collisions with obstacles in the supermarket. The designed Android application enables the consumer to scan the bar code printed on goods, prepare a list consisting of items that he wishes to purchase and calculate the total values of items purchased. This approach drastically reduces the time spent at the billing counter. The mobile platforms were developed using Arduino and Node MCU micro controllers and the Android application was developed using MIT app inventor.

Keywords: Human following shopping cart, Android application, Wi-Fi technology, RSSI values