

Project Requirements & Planning

Version 0 - Bare minimum:
Customer activates robot by holding customer card with QR code in front of the Kinect. Robot then follows him as long as there are no other obstacles or other people around. Items held in front of Kinect are scanned. Checkout possible by holding card in front of Kinect again (withdrawn from account). Acoustic warning if balance low.

Version 1 - Target:
Robot can handle other people (follows correct person). User interface on laptop (shows scanned items, items can be removed). Robot knows where it is, customer can search for items and is shown a map with current location and item position highlighted (use lines on floor for orientation).

Version 2 - Stretch:
Customer may walk out of field of view of the robot (robot recognizes customer when he returns). Robot can guide customer to item. Smartphone shopping app (shopping list, robot leads customer to all items). Robot knows what customer is allergic to and warns him about dangerous products. Recommendations based on past purchases. Voice control ("where is item X", "checkout"), acoustic response of robot. Can issue orders if low in stock.

	V0	V1	V2	Notes
PERCEPTION				
Fiducial or QR code detection	x	x	x	Item identification, orientation (QR on aisles)
Object segmentation/localization				
Object recognition				
Human detection/localization	x	x	x	Ability to follow a human
Person recognition			x	Ability to recognize specific customer
Surface segmentation/localization				
Mapping and localization		x	x	Location in store (lines on floor and QR codes)
Speech recognition			x	Voice control
Mobile device input			x	Mobile shopping app
Browser input				
ACTUATION				
Navigation to map locations			x	Lead to item
Relative motion (odometry)				Lines on floor, odometry hopefully not necessary
Motion patterns/animations				
Random search				
Speech synthesis	x	x	x	Account balance, obstacle, interaction (stretch)
Sound synthesis			x	Maybe welcoming sound, warning sounds
LEDs				
Visualizations		x	x	Items list on laptop
Asking for human help	x	x	x	Complains if there are obstacles
Project specific actuators:				

Items needed for modification of the Turtlebot, props/furniture needed for demonstration

Basket (for items). Supermarket props (aisles and products; can use cardboard boxes), Color tape or similar for lines on floor. Probably need a lot of space, in particular if we want to model an entrance / checkout area too (optional).

SHOPPING LIST: Color tape (~\$5), Basket (~\$15)