| Req. ID | Description | Story Points | Priority | Sprint No. | | |
|---|---|---|---|---|---|---|
| 1 | Talk to Golf Course | 2 | 1 | | | |
| 2 | Acquire Golf Cart | 5 | 1 | | | |
| 3 | Acquire Workspace | 3 | 1 | | | |
| 4 | CV Model: People/Vehicle Detection | 8 | 2 | | | |
| 5 | Data Collection (Person vs. Vehicle) | 5 | 3 | | | |
| 6 | Identify Objects in path vs not in path | 13 | 5 | | | |
| 7 | General Research | 2 | 1 | | | |
| 8 | Determine Online Map Representation (metric vs topological) | 2 | 1 | | | |
| 9 | Implement a Map Type | 3 | 2 | | | |
| 10 | Read in Data from Camera, Radar to Map | 5 | 5 | | | |
| 11 | Research OSM Format | 2 | 1 | | | |
| 12 | Map Golf Course | 2 | 3 | | | |
| 13 | Mark Waypoints at Significant Locations | 2 | 4 | | | |
| 14 | Read in GPS to MCU | 2 | 1 | | | |
| 15 | Combine GPS with Offline Map | 5 | 6 | | | |
| 16 | Process Camera Feed (Current Path) | 3 | 2 | | | |
| 17 | CV Model: Path Segmentation | 8 | 7 | | | |
| 18 | Data Collection (Golf Course Path) | 8 | 3 | | | |
| 19 | ID/Buy Camera | 2 | 1 | | | |
| 20 | ID/Buy Radar Sensor | 2 | 1 | | | |
| 21 | ID/Buy GPS | 1 | 1 | | | |
| 22 | Setup ROS on Rasp. Pi, Laptops | 3 | 2 | | | |
| 23 | Interface ROS with Sensors | 2 | 3 | | | |
| 24 | Interface ROS with Actuators | 2 | 3 | | | |
| 25 | Identify Route in Offline Map using Algorithm like A* | 3 | 1 | | | |
| 26 | Behavior Flow Chart | 1 | 1 | | | |
| 27 | Implement Flow Chart as FSM | 2 | 2 | | | |
| 28 | Determine Planning Algorithm Type (Combinatorial/Variational) | 3 | 1 | | | |
| 29 | Decide planning algorithm details (e.g. motion primitives, cost function) | 3 | 2 | | | |
| 30 | Implement forced braking after detection objects (from cameras, radar) | 8 | 4 | | | |
| 31 | Manual Override Cart Control | 13 | 8 | | | |

| 32 | Identify Model Predictive Control Type (e.g. State, Transfer Function) | 1 | 1 | | | |
|----|---------------------------------------------------------------|----|---|--|--|--|
| 33 | Create MPC Model, Identify Parameters | 13 | 2 | | | |
| 34 | Program MPC Controller on Arduino | 8 | 3 | | | |
| 35 | Map MPC Output to Actuator Input (System Identification)/Program | 8 | 4 | | | |
| 36 | Modify golf cart brake system | 13 | 2 | | | |
| 37 | Modify golf cart steering | 13 | 2 | | | |
| 38 | Modify golf cart motor Control | 13 | 2 | | | |
| 39 | ID/Buy on-board Arduinos/RaspPi | 2 | 1 | | | |
| 40 | Calculate distance to object | 2 | 5 | | | |
| 41 | Image processing to detect the edges of the path | 5 | 4 | | | |
| 42 | Process detections from Person/Vehicle detector in obstacle avoider | 8 | 6 | | | |
| 43 | Investigate YOLO implementations for embedded systems (YOLOv6-tiny) | 5 | 2 | | | |
| 44 | Interface controller with ROS | 3 | 5 | | | |
| 45 | Interface obstacle avoider with controller | 3 | 6 | | | |
| 46 | Interface motion planner with controller | 5 | 6 | | | |
| 47 | Interface behavior selector with controller | 3 | 6 | | | |
| 48 | Map UI (display golf course and cart location/heading) | 8 | 7 | | | |
| 49 | Control UI (bring cart to a stop, go to manual mode, etc.) | 8 | 7 | | | |
| 50 | Program planning algorithm/interfaces | 13 | 5 | | | |