
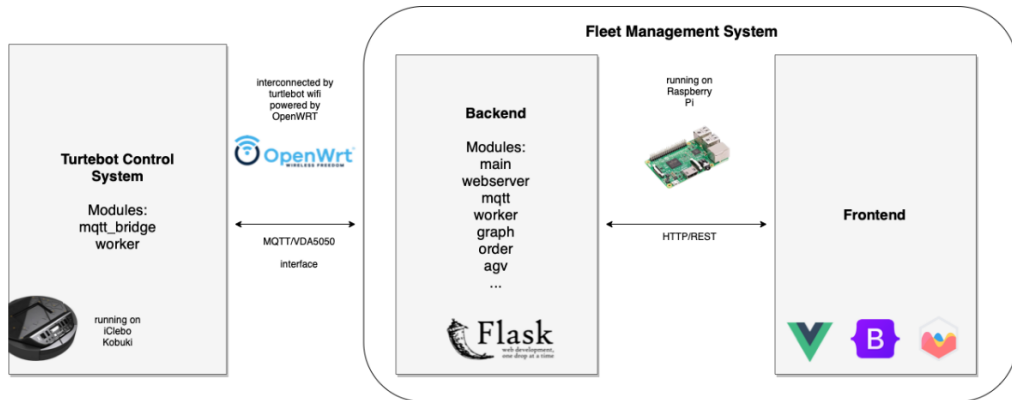
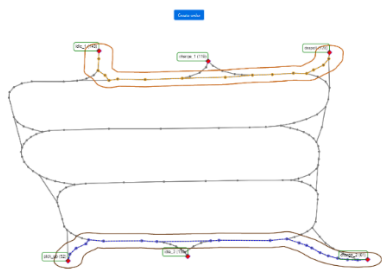



AMOS SS22 Project #3 TurtleBot Fleet Management

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|----------------------|--|
| Project name | TurtleBot Fleet Management |
| Project mission | The mission was to develop three key components namely, a fleet management system, an on-robot navigation system and a user interface along with interfaces to have an intra-component communication. The fleet management system has to manage TurtleBots (AGVs) on a defined circular course. The TurtleBots need to communicate with the fleet management using MQTT & VDA5050 and should navigate in the available physical space to deliver small goods from a home station to a particular station on a pre-planned route and reorient themselves when going off-course. An interactive user interface should provide status information for every robot. |
| Industry partner | Sick AG |
| Team logo |  |
| Project summary | <p>Our fleet management can control a fleet of robots and deliver goods from point A to B without human interference. We have created a good looking and easy to use web-based user interface for submitting driving orders and monitoring of the TurtleBots. We implemented the navigation along virtual lines based on information from the Sick Lidar sensor on the TurtleBots.</p> <p>But a picture speaks more than a thousand words, especially in a hardware project, so have a look at our AMOS demo day video.</p> |
| Project illustration | <p>Our architecture and tech stack</p>  <pre> graph LR subgraph TCS [Turtlebot Control System] TCS_modules[mqtt_bridge, worker] TCS_note[running on iCleo Kobuki] end subgraph FMS [Fleet Management System] subgraph Backend Backend_modules[main, webserver, mqtt, worker, graph, order, agv, ...] Backend_note[running on Raspberry Pi] end subgraph Frontend Frontend_note[using Vue.js, Bootstrap, Firebase] end Backend_note -- HTTP/REST --> Frontend_note end TCS -- "MQTT/VDA5050 Interface" --> Backend_modules Backend_modules -- "interconnected by turtlebot will powered by OpenWRT" --> TCS </pre> |

| | <div><div><h2>Our user interface</h2><p>Turtlebot Fleet Management - Global UI</p></div><div><h3>Orders</h3><table><tr><th>ID (Update)</th><th>AGV</th><th>Type</th><th>Status</th><th>Start -> End</th><th>Route</th><th>Resend</th><th>Cancel</th></tr><tr><td>0 (6)</td><td>2</td><td>NORMAL</td><td>ACTIVE</td><td>137 -> 61</td><td>Completed: [] Base: [137, 138, 142, 141, 140, 2] Horizon: [3, 43, 53, 54, 55, 56, 57, 58, 59, 60, 61]</td><td>Resend</td><td>Cancel</td></tr></table></div><div><h3>AGVs</h3><table><tr><th>AGV ID</th><th>Driving Status</th><th>Connection Status</th><th>Battery Status (%)</th><th>Charging Status</th><th>Velocity (m/s)</th></tr><tr><td>1</td><td></td><td>Offline</td><td></td><td></td><td></td></tr><tr><td>2</td><td>No Status</td><td>Connected</td><td>37%</td><td>Discharging</td><td>0</td></tr></table></div></div> | ID (Update) | AGV | Type | Status | Start -> End | Route | Resend | Cancel | 0 (6) | 2 | NORMAL | ACTIVE | 137 -> 61 | Completed: [] Base: [137, 138, 142, 141, 140, 2] Horizon: [3, 43, 53, 54, 55, 56, 57, 58, 59, 60, 61] | Resend | Cancel | AGV ID | Driving Status | Connection Status | Battery Status (%) | Charging Status | Velocity (m/s) | 1 | | Offline | | | | 2 | No Status | Connected | 37% | Discharging | 0 |
|------------------------|---|-------------------|--------------------|-----------------|---|--------------|--------|--------|--------|-------|---|--------|--------|-----------|---|--------|--------|--------|----------------|-------------------|--------------------|-----------------|----------------|---|--|---------|--|--|--|---|-----------|-----------|-----|-------------|---|
| ID (Update) | AGV | Type | Status | Start -> End | Route | Resend | Cancel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 (6) | 2 | NORMAL | ACTIVE | 137 -> 61 | Completed: [] Base: [137, 138, 142, 141, 140, 2] Horizon: [3, 43, 53, 54, 55, 56, 57, 58, 59, 60, 61] | Resend | Cancel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGV ID | Driving Status | Connection Status | Battery Status (%) | Charging Status | Velocity (m/s) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | Offline | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | No Status | Connected | 37% | Discharging | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Team photo |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project repository | https://github.com/amosproj/amos2022ss03-turtlebot-fleet-management | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional Information | Demo day video: https://github.com/amosproj/amos2022ss03-turtlebot-fleet-management/blob/main/Deliverables/sprint-12/demo-day-video.mkv | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |