

Embedded Systems 07/08. Assignment 2: Provisional Task Statement

Any revision or clarification to the task or rules will be posted on the module Blackboard site.

In your team, design and build a Derbot-based Autonomous Guided Vehicle (AGV) which undertakes all (or some) of the following actions:

- Follows a white track on a black background as fast as possible,
- At a specified distance drops a glass marble (or similar small object),
- Detects an obstacle which at some point is placed across the track, stops and indicates an alert (the block is then removed),
- Stops within a finish zone,
- Within finish zone, rotates to face a bright light, placed nearby.

Further details:

Track, and Track Following

Track width is 35 mm approx, white insulating tape laid on flat plywood painted matt black. AGV must be tolerant of some scuffing/imperfection of surfaces, and variability in track width. The AGV is deemed to be following the line as long as the line lies fully between the AGV wheels.

Block

Block will be flat vertical surface of solid wood, perpendicular to line of track, of height not less than 10cm. Colour is not specified. Alert may be audible or visible.

Finish Zone

The zone is marked out with white tape, of same material and width as track. All AGV points of contact with the floor must be completely within the finish zone. Approx. internal dimensions are 20cm square. Completion time is measured up to when AGV comes to a halt within the zone. AGV should pause at least 2 seconds before attempting to locate the light.

Light Seeking

Light will be diffuse source, equivalent to 60W domestic light bulb. On completion of light seeking, AGV should come to a halt, with at least one point of floor contact within finish zone.

Competition Conduct

At the start of the competition, all competing AGVs must be placed in a “holding bay”. Teams take their AGV from the holding bay when it is their turn to compete. One team member should give a brief presentation (not more than 3 minutes) introducing team members and strategy. The AGV with power switched off should then be placed with wheels on the start line. On the command GO, power should be switched on, and the AGV released, with no further manual contact with the vehicle. Once the AGV has started moving, it may exceptionally be redirected by hand, with contact of less than 3 seconds, and a penalty deducted for each such intervention. In the event of major AGV failure, a team may request a 10-minute delay and restart, during which time they can attempt a repair. A fixed penalty applies. Only one such restart will be allowed. Gross manual intervention, e.g. lifting and relocation of AGV, pushing or guiding, will lead to a forced restart (with penalty) or disqualification. A maximum duration of 5 minutes will be allowed for each AGV to complete all specified tasks (including the light seeking element). No further points may be scored once the 5 minutes is up.

