Definition of scope for a UKMARSBOT enhancement

1. Concept

Extend the hardware and software of the UKMARSBOT platform to enable builders to control the UKMARSBOT and have programmatic access to the interface connector using a Raspberry Pi processor board.

2. Purpose

The preferred computer learning platform for many schools, colleges and hobbyists is the Raspberry Pi. Competitions such as Pi Wars are popular with robot builders.

Extending the capability of the UKMARSBOR platform to include control by a Raspberry Pi will significantly widen the potential audience for UKMARSBOT and provide Pi based builders with a capable platform as a basis for their projects for Raspberry Pi based competitions.

Implementing this enhancement will also allow builders using the Raspberry Pi to build robots capable of completing UKMARS sponsored challenges of Maze Solving, Wall Following, Line Following and Drag Racing.

3. Outline of capabilities

The idea is to provide:

- a programmable running chassis with the capability to mount small wheels inboard and large wheels outboard to meet the requirements of many robotics challenges
- programmable access to the sensor board interface on the UKMARSBOT to support the use of existing sensor boards or the control of new boards with different sensor/actuator configurations
- the necessary mounting hardware to fix a Raspberry Pi Zero or ZeroW to the UKMARSBOT
- consider including mounting for a Pi camera
- instructions and guidance on connecting the Pi to the on-board Arduino through a serial connection
- instructions and guidance on supplying power to the Pi
- definition of the protocol and commands that are supported on the serial connection
- software for the on-board Arduino to implement the commands and protocol over the serial connection. This Arduino software to be viewed as firmware with builder software confined to the Pi using the subsystem through the serial interface
- UKMARSBOT is an open source project, advanced builders may, if they wish, modify the Arduino firmware and undertake distributed development, though this should not be necessary to build working robots

4. Challenges the platform could support

The platform could provide the basis for multiple challenges so long as builders add specific hardware to perform the bespoke challenges.

All the 2021 Pi Wars contests:

- Feed the fish
- Tidy up the toys
- Up the garden path

- DIY obstacle course – may be trickier with just 2 wheels

Pi Wars 2020 challenges:

- Lava Palava
- Eco Disaster
- Escape Route
- Minesweeper

UKMARS contests:

- Line following
- Wall following
- Maze solving
- Drag racing

IET Competitions:

- Line following
- Time trial
- Drag racing

Other contests:

- Sumo (with 2 wheels?)