Drag race student tasks.

## Starter pack program operating instructions.

1) switch on, with robot on the line

2) slide the sensor left and right to calibrate the sensor.   
 - it will show the position over the line on the 3 LEDs.   
 This shows that the sensor is working.

2a) Keep the download lead attached, and test the distance sensor   
 by rotating the right wheel whilst watching the "Debug" screen on the computer.   
 W9 shows the value of "timer", which should increase as you turn the right wheel.

3) to start the robot line following, short press the front button.   
 This will use the currently stored EEPROM values.

3a) to start entering the EEPROM values, using the TV remote,   
 use a long press instead, on the front button.

3c) to finish the TV remote operation use the Power button on the TV remote.

4) the robot will follow the line, but will stop after the tuned distance setting.

5) to restart the program after it has stopped press the back button.

## TV remote instructions

To enter one of the 5 EEPROM values, key in its digits, followed by its "special key".

e.g. "1" "4" "9" "ch+" to set the ch+ value to 149

The 5 possible special keys are   
Ch+ , Ch- , Vol+ , Vol- and Mute.

Be careful pressing the digits, that you don't get repeat values.

The TV remote sender repeats if you hold your finger on the button, so use a very short press for each digit.

The starter pack uses the EEPROM data in the following ways:

* Ch+ speed`
* Ch- Kp - Proportion (amount of steering)
* Vol+ Kd - Derivative (Stability)
* Vol- Distance
* Mute - Unused- (so far)

## Drag racing TASKS

1. Learn what the starter pack does in the first stage, before the start button is pressed.   
   (it displays sensor value, and shows the timer (distance) reading via debug)
2. Learn how to set up Speed, Kp (proportion), Kd (Derivative), Distance using the TV remote.  
   Learn how to read the settings from the robot.
3. Make sure your program sets Speed, Kp, Kd and distance from the values set up in EEPROM by subroutine "Ronan" .
4. Find out correct setting for distance to make it stop at end of drag race track.
5. Find out the fastest speed that works to keep the robot on the track with stability.
6. Ditto Kp,
7. Ditto Kd.
8. Try out adding a tail skid.
9. Try out starting out full speed, then reducing speed part of the way down the track.
10. Use a starting sensor, with white paper instead of the front button, to start the race.   
     (use Right sensor connector.) make it start when paper is removed.   
     The program will need to be changed for this.  
     Make sure the loop waiting for start paper removal doesn't have a debug in it.
11. Easter Egg:  
    Make it reverse down the track slowly afterwards with just 2 steering zones:  
    - start sensor on, and   
    - start sensor off.   
    This will have just 2 programmed speed settings.

## Advanced:

Ccompare the speeds of all the available robots, using the same value of "speed".   
The robots have different speed motors!   
Use the track, and timing gate.

## Advanced II

Reverse the motor connections (plus to minus. )  
This will make the motors go forwards with numbers less than 490.  
Use "leftspeed = 980 - leftspeed" to modify the output from "MotorMaths" subroutine.   
This should increase the available speed.   
(See graph of speed vs pwm setting).

## Advanced III

Instead of reversing the motors, it is possible to modify the motor circuitry.   
This gives about an extra 0.5 volts, but shifts the stop speed to about 450 as opposed to 490.   
The stopspeed symbol would need to be changed on the include file.

*Mr Fisher 29/1/2020*