Rotary Racer Display

Project	GpSpeedDisplay
Reference	Version 1.0
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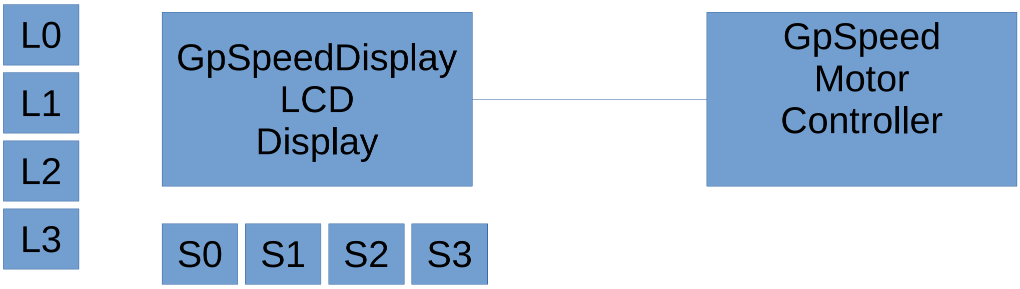
Introduction

This describes the GpSpeed to GpSpeedDisplay Interface. The GpSpeed is the motor speed controller designed and built by the RR team. The GpSpeedDisplay is a display and control module designed and built by the RR team

Design

The GpSpeedDisplay module provides a simple 2 line 16 character LCD display along with 4 user push buttons and 4 coloured LED's. It is powered and connected to a GpSpeed motor speed controller using a 6 way cable that provides 5V and has an I2C communications bus.



The GpSpeed controller is the master device. It is responsible for:

1. Controlling the motor speed/power.
2. Writing to the LCD display and LED's the necessary driver information.
3. Reading the switch state from the driver and changing operation as needed.

The GpSpeedDisplay is a slave device and responds to commands from the GpSpeed controller. It is responsible for:

1. Displaying characters on the display as requested by the GpSpeed controller.
2. Setting the LED's on/of state as requested by the GpSpeed controller.
3. Reading the switches continually and returning their on/off state when requested by the GpSpeed controller.
4. Future: Setting an interrupt line whenever the switches state has changed

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Display Software Interface

The GpSpeedDisplay is controlled over an I2C bus. It implements two slave devices on this I2C bus with two separate I2C addresses.

Device	Address	Description
LCD Display	$7C	The two line LCD display
Led’s and Switches	$20	The Picaxe 20X2 implementing LED and switch control

The LCD display operation is covered in the LCD modules data sheet. The LED and Switch operation is covered below.

Register Address	Item	Description
$00	LED’s	The bits 0,1,2,3 of this 8 bit register enables the LED’s 0,1,2,3
$01	Switches	The bits 0,1,2,3 of this 8 bit register indicate the state of the switches 0,1,2,3

So to set LED 2 on you would need to send the following I2C message:

<address = $20><register = $00><data = $04>

In Picaxe basic this would be:

```
hi2cout $20,$00,($04)
```

To read the switches you can use the following Picaxe command:

```
hi2cin $20,$01,(b0)
```

The variable b0 will now contain the switches state in its bits 0 – 3.

```
if b0 bit 2 then
        …
endif
```

In the future the GpSpeedDisplay could set an interrupt line(wire) high whenever a switches state is changed. The GpSpeed controller could then respond to this as an interrupt to its operation and read the switches state. This can speed up switch operation.

Notes