SMART MUSCLE DEVELOPMENT KIT

Preliminary June 2015

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Hardware Contents

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Smart Muscle

The Smart Muscle contains the valves used to regulate the air flow as well as the pressure sensor and control electronics to run the valves. It runs its own control loop and requires just a pressure demand from an external controller to operate.

There are two connections on the Smart Muscle, a 6 Bar compressed air inlet and a 4 pin male M8 connector used for can communications.

For more information on the Smart Muscle see the Smart Muscle User Manual, available from Engineered Arts.

CAN Server

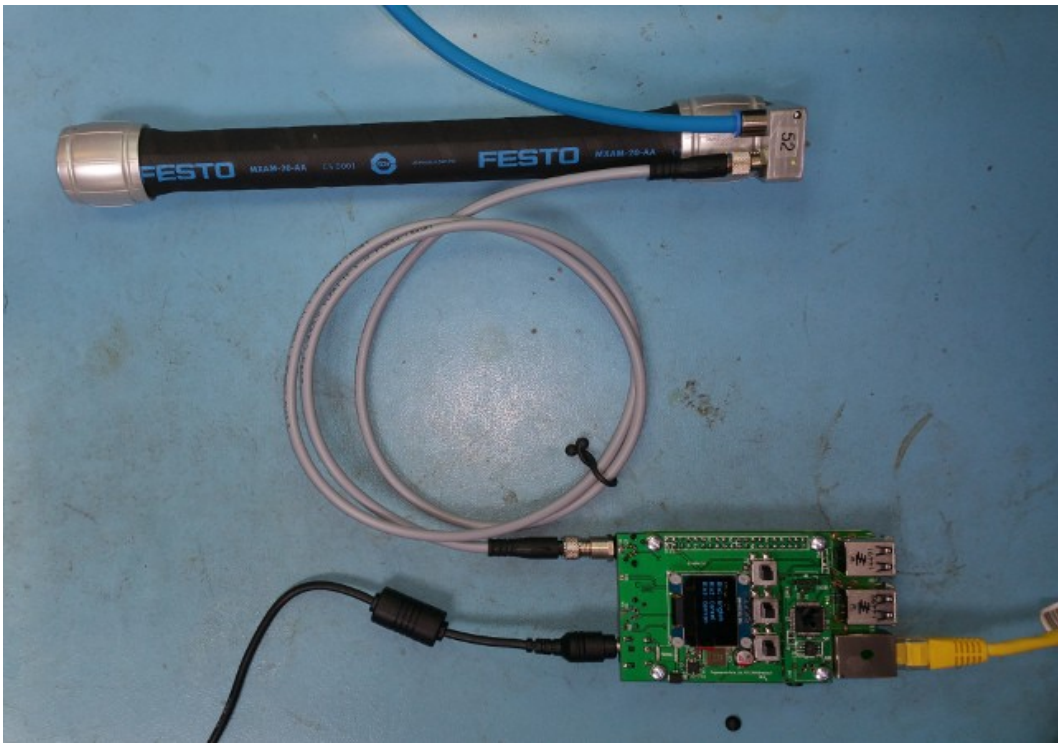

Figure 2: Smart Muscle Development Kit Assembly

CAN Server Unit

The CAN server unit is a PC based on a Raspberry Pi 2 computer. It runs a modified version of Ubuntu. The breakout board on top of the Raspberry Pi has a 4 pin female M8 connector for CAN communications, an OLED display and 3 interface buttons.

Power Input

There is a 2.5mm barrel power connector on the CAN Server unit. The input is 24V (dc) and requires no more than 500mA.

On-board Control

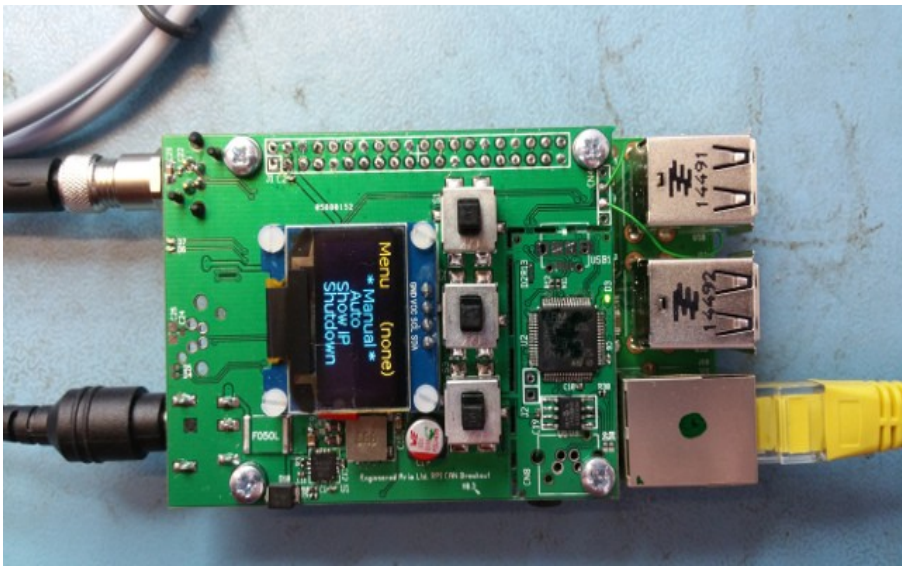

Figure 3: Raspberry Pi CAN Server Unit

Using the OLED and buttons the smart muscle can be controlled without the need for a network connection. Follow the on-screen menus. There are 2 modes, a manual mode where the user can inflate or deflate the muscle byt pushing the buttons and an auto mode where the muscle will follow a sinusoidal curve inflating and deflating, the user can speed up or slow down the wave with the buttons.

The menu language can be changed between English and German.

Network Control

To get the most out of the Development Kit it can be controlled using a computer via a network connection. Connect the CAN Server Unit into your local area network, using the 'Show IP' option on the menu you can obtain the IP address your DHCP has assigned the CAN Server.

Using a computer connected to the same LAN, open up a Chrome web browser (other browsers are not fully tested and are unlikely to function correctly). Chrome is available on Windows, Linux and Mac. Type the CAN Server Unit's IP address into the address bar, the CAN Server will serve a web user interface with a Login prompt. Use the following credentials:-

- Username: root
- Password: Sm4rt_muscle

Web User Interface

Muscle Control

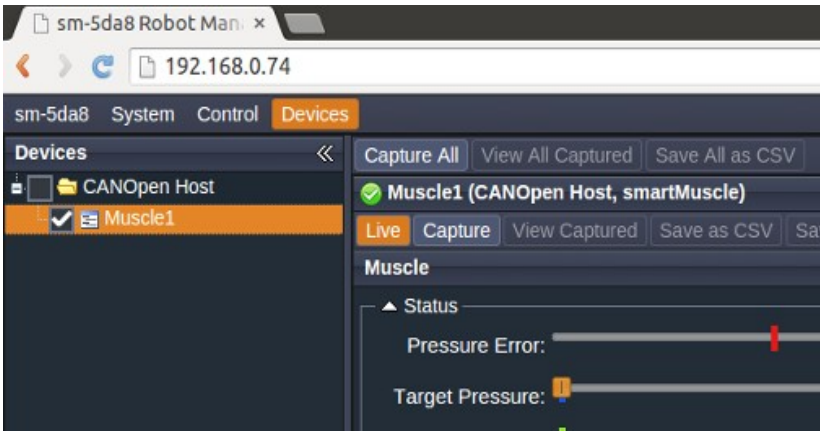

Figure 4: Web User Interface Devices

Navigate to the 'Devices' tab at the top of the UI. Select 'Muscle1' in the tree on the left. You will see all the parameters listed under 'Muscle 1' in the middle of the interface. Consult the Smart Muscle User Manual for details on each of the parameters listed.

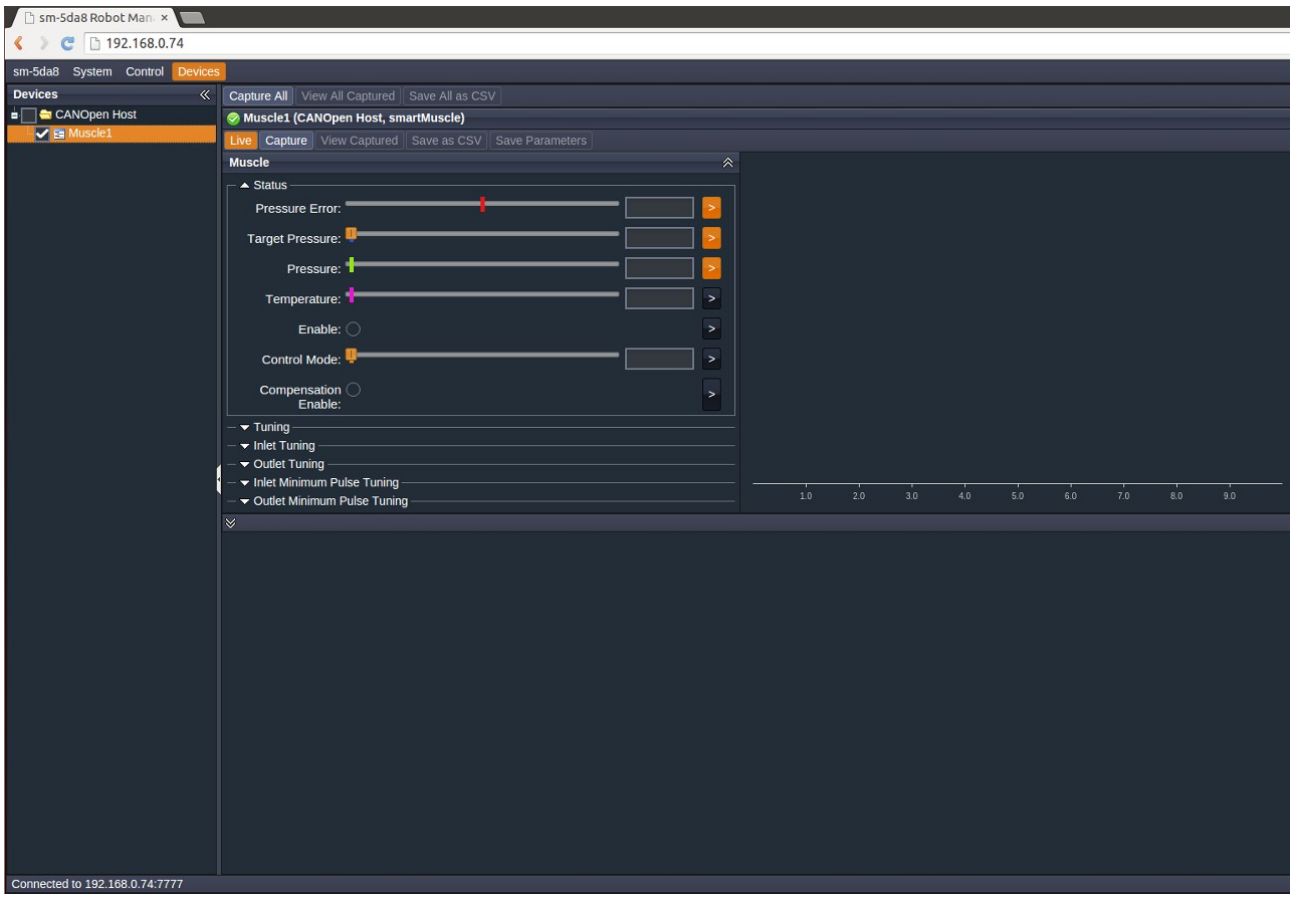

Figure 5: Web User Interface

Parameter Storage

The Smart Muscle can store the parameters internally, according to the CAN Open specification. Consult the Smart Muscle User Manual on how this can be achieved. The CAN Server is also able to store parameters, this is a much neater solution. When a parameter is changed in the Web User Interface, the 'Save Parameters' button lights up red, when this is clicked the new parameters are saved in the CAN Server. When the CAN Server is turned on and detects the Smart Muscle connection it will send all the saved parameters to the muscle. This way all the parameters for any number of muscles are stored centrally and a replacement muscle will not require re-tuning.