*Firmware and software instructions*

*Computing unit preparation*

1. Install windows drivers for TTL-USB device by following the instructions in the Readme file. “PL2303\_64bit\_Installer.exe” executable file with the drivers is provided. Alternatively, it can be found online1.
2. If you are using Windows version older than 10, follow the instructions2 to install Smoothieboard drivers.
3. Download3 and install the latest Arduino IDE.
4. Download4 and install Python 3.
5. Download5 and install Pylon 6 Camera Software Suite. For operating systems other than Windows use Basler software search engine6.
6. Download Arduino libraries7 and save in the Arduino library folder.
7. Suggested Python editor: Spyder – The Scientific Python Development Environment. Follow online installation guide8 to install Spyder on the computing PC.

*Arduino firmware initialisation*

1. Open Arduino firmware sketch called “MEW digital platform 1.0”.
2. Make sure Arduino Due board and correct port are selected.
3. Upload the sketch.

*Smoothieboard firmware initialisation*

Smoothie is configured simply by editing a configuration file on its SD card. Essential temperature and linear actuators settings need to be configured in order to ensure correct Smoothieboard operation.

1. In configuration file, specify both temperature sensor to AD8495 amplifier by setting ‘temperature\_control.hotend.sensor’ and ‘temperature\_control.bed.sensor’ to ‘ad8495’.
2. Define the pin for each sensor. Set ‘temperature\_control.hotend.ad8495\_pin’ to ‘0.23’ and ‘temperature\_control.bed.ad8495\_pin’ to ‘0.24’.
3. If needed, adjust the temperature reading by adjusting the offset value of ‘temperature\_control.hotend.ad8495\_offset’ and ‘temperature\_control.bed.ad8495\_offset’.
4. Define correct steps per millimetre conversion by setting ‘alpha\_steps\_per\_mm’, ‘beta\_steps\_per\_mm’ and ‘gamma\_steps\_per\_mm’ to 800.

Refer to online resources for more details on temperature9 and linear actuation10 configuration. Once the configuration is ready:

1. Upload “config” file to the SD card used with a Smoothieboard.
2. Reset Smoothieboard to implement the changes.

For more detailed information on how to configure Smoothieboard refer to the “Configuration file” section11 of the online documentation.

*Python user interface initialisation*

Python UI was developed by modifying an existing code12. Before running the main function “MEW digital platform UI.py”, open the function in Sypder (or another text editor) and make sure that the selected “COM” port corresponds to the port Arduino Due is connected to.

1 <http://www.prolific.com.tw/US/ShowProduct.aspx?p_id=225&pcid=41>

2 <http://smoothieware.org/windows-drivers>

3 <https://www.arduino.cc/en/software>

4 <https://www.python.org/downloads/>

5 <https://www.baslerweb.com/en/sales-support/downloads/software-downloads/pylon-6-1-1-windows/>

6 <https://www.baslerweb.com/en/sales-support/downloads/software-downloads/>

7<https://github.com/Lasonic/automated_mew_platform/tree/master/Firmware_and_software/Arduino_libraries>

8 <https://docs.spyder-ide.org/current/installation.html>

9 <http://smoothieware.org/temperaturecontrol>

10 <http://smoothieware.org/stepper-motors>

11 <http://smoothieware.org/configuring-smoothie>

12 <https://gist.github.com/andySigler/80c60d3f7e4ba4a950200cccc6400ca1>