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Robots that don't suck

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iRobot Create

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- We went to a lot of trouble to get the iRobot Create; they don't ship it to the UK.
- It turned out that we didn't need the special DB25 connector in the Create, nor the special green Create control module.
- We do all our interfacing via the mini DIN connector which is supplied on all 400 and 500 series Roomba machines. On the 500 series, you have to lever the top faceplate off to find it; on the older ones, the connector is under a little sliude-off cover on the top edge of the machine.

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RoboRealm

- Builds an image processing pipe.
- Allows you to write a control algorithm in VBScript.
- Will directly drive the iRobot.

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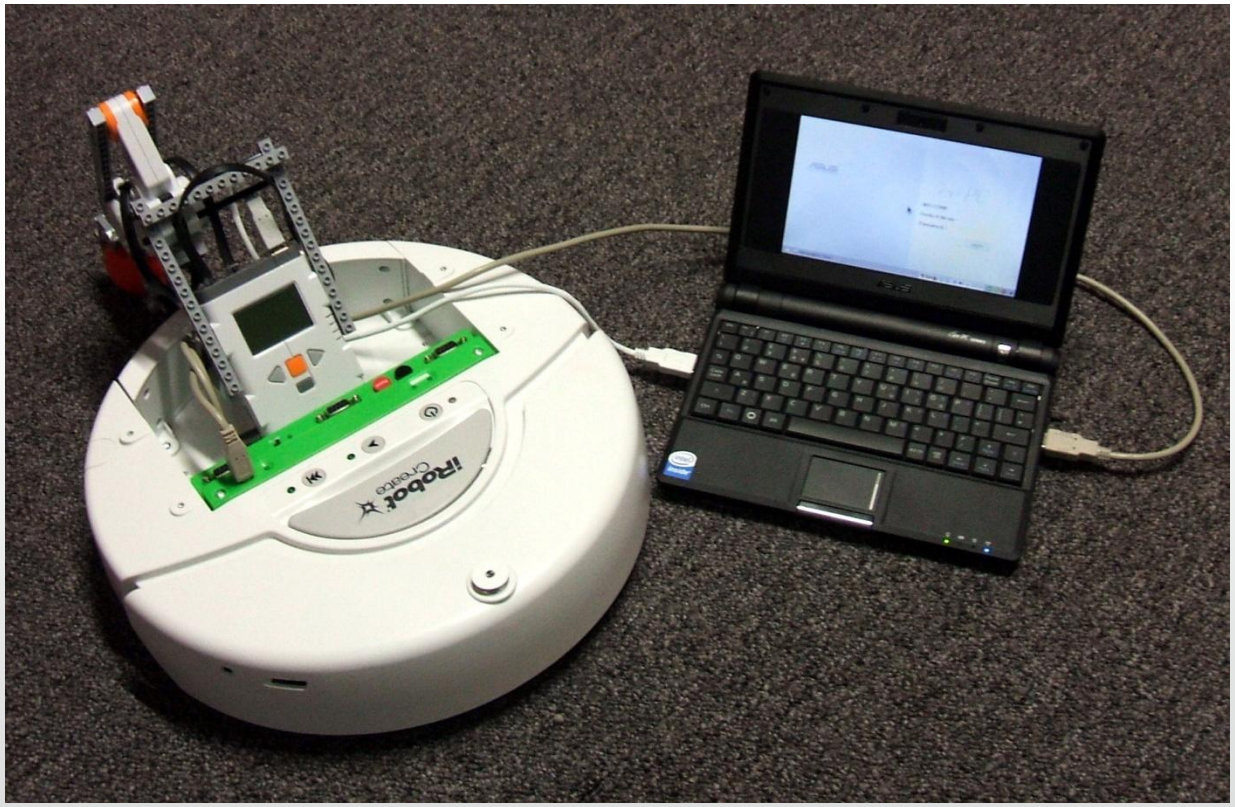
Autonomous robots



We used the iRrobot Create, Asus EEE PC and RoboRealm for quick robot prototyping.

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Raw Image with ball

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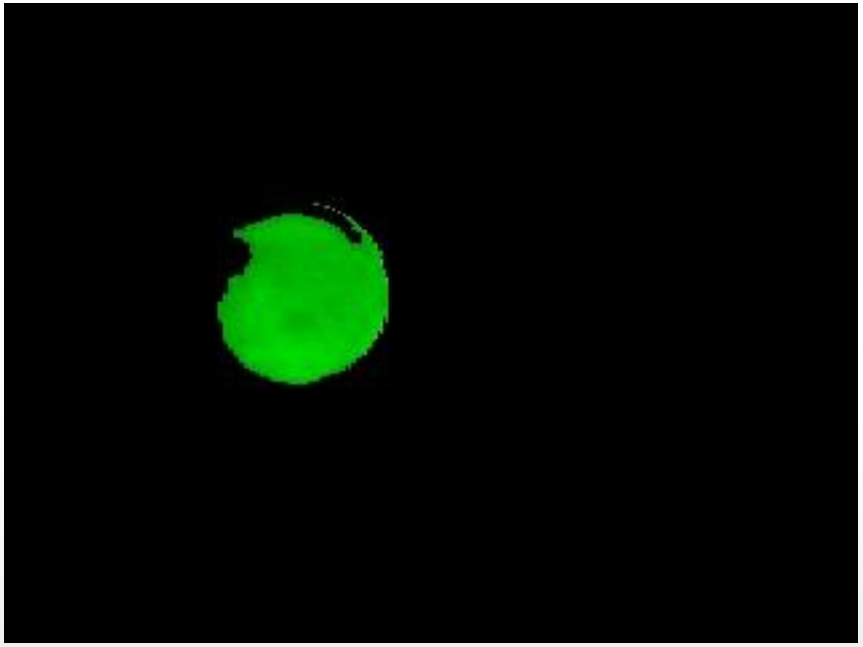
RGB Filter



CG and size

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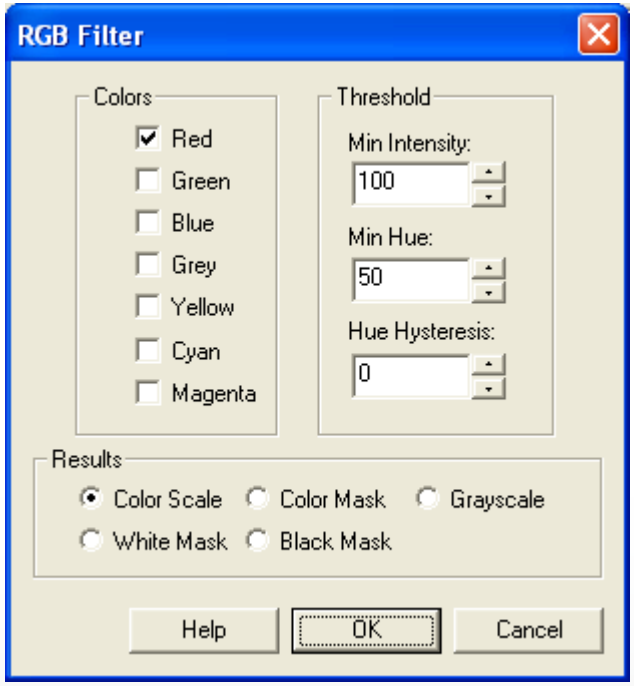

Each RoboRealm module has a GUI; in many cases these give a real-time analysis of the images being processed.

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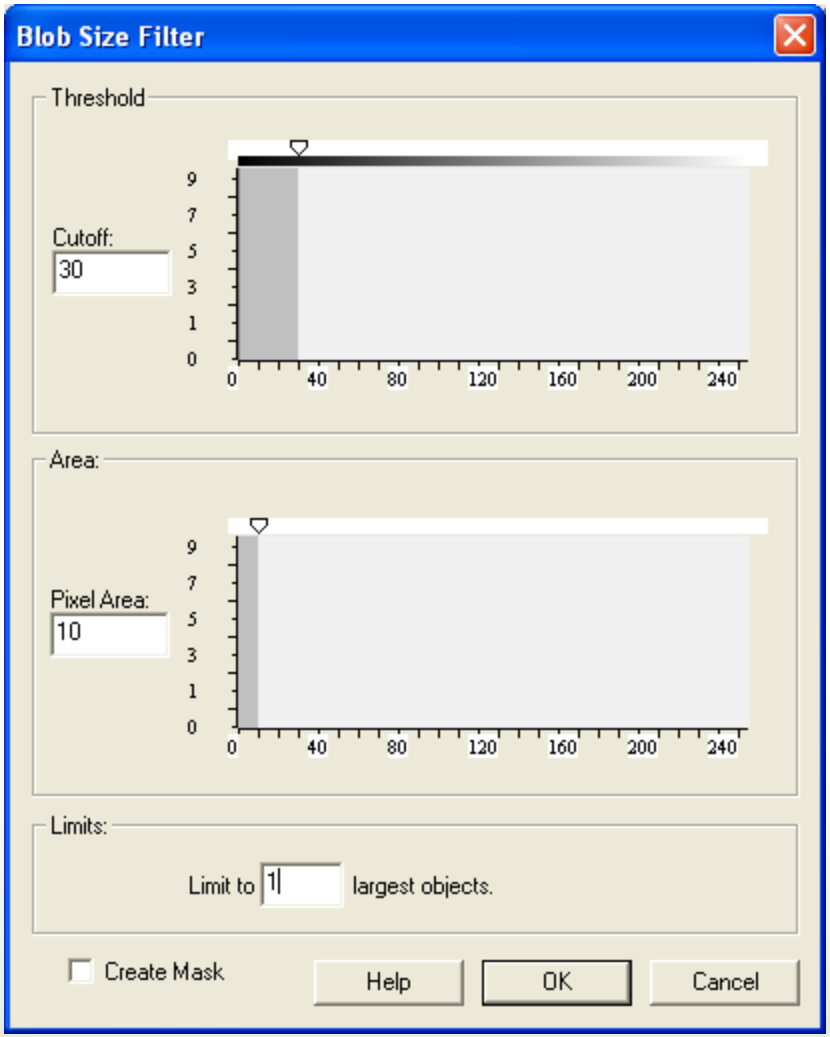

These settings on the blob size filter ensures we only track one object.

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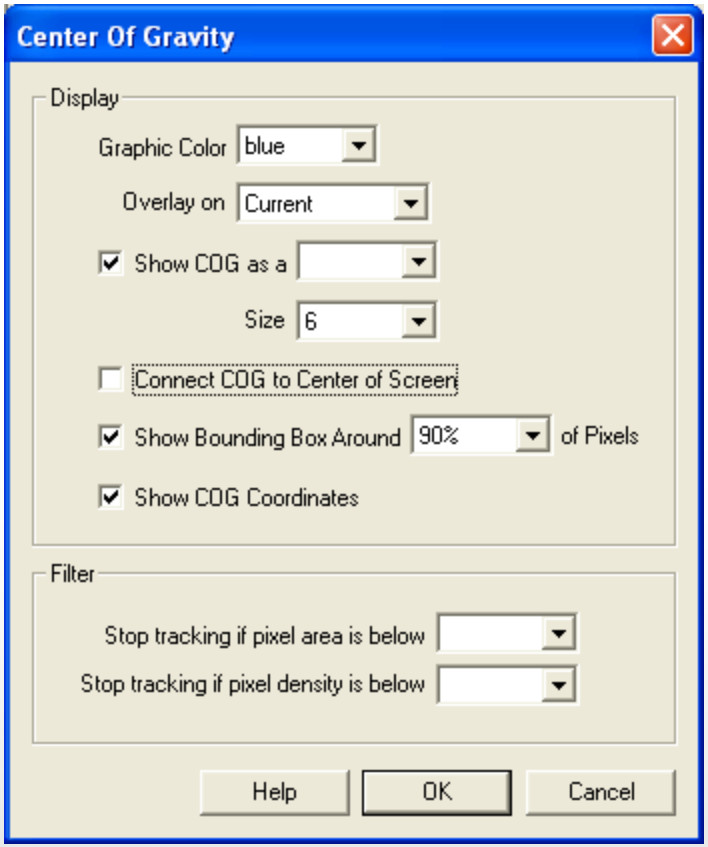

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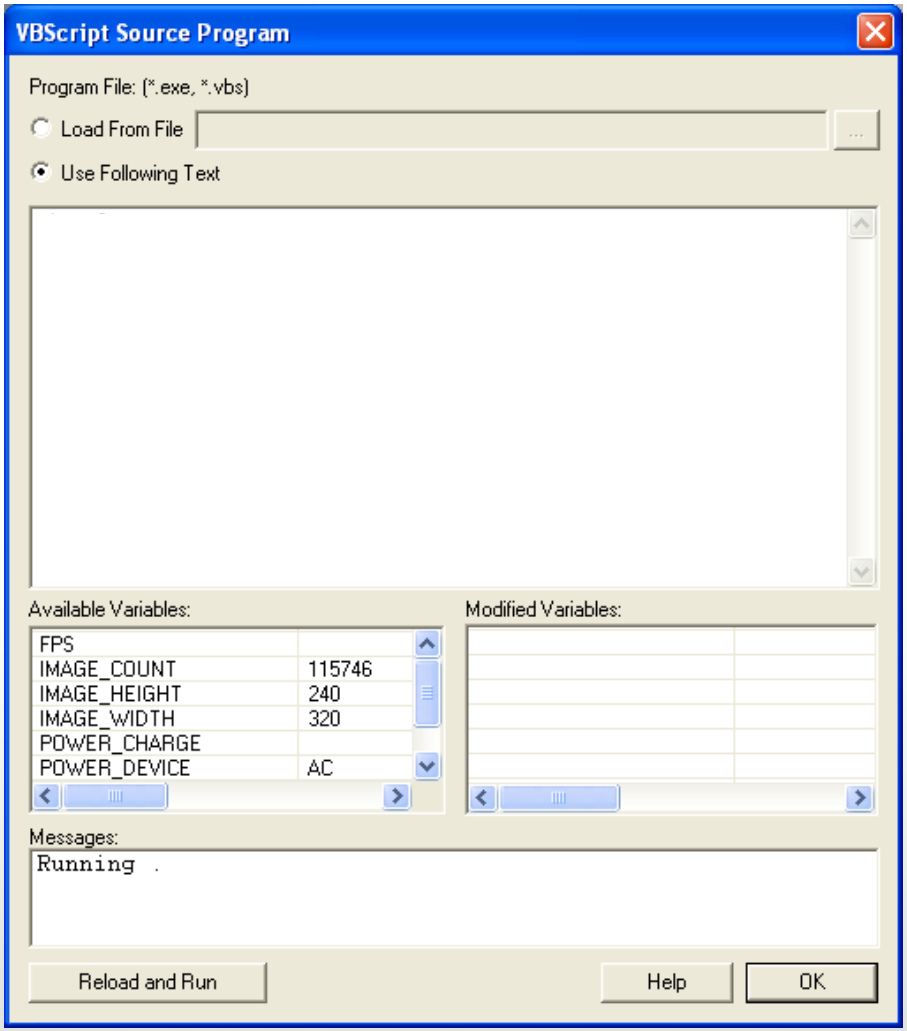

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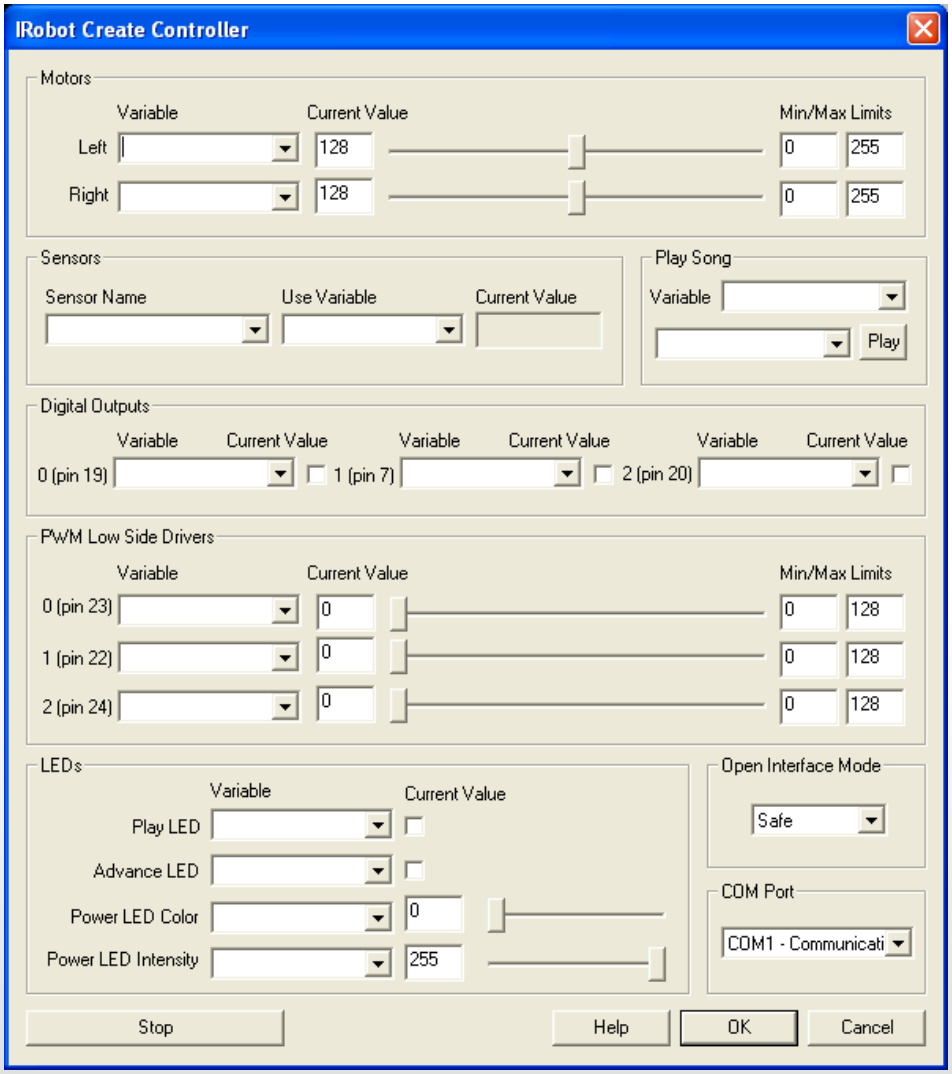

More recent versions of RoboRealm have a (smaller) tabbed interface.

The RoboRealm program

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Is just XML:

```
<head><version>1.8.18.4</version></head>
<RGB_Filter>
  <max_value>120</max_value>
  <min_value>120</min_value>
  <channel>2</channel>
</RGB_Filter>
<Blob_Size>
  <cutoff>30</cutoff>
  <limit>1</limit>
  <mask>FALSE</mask>
  <object_size>10</object_size>
</Blob_Size>
<Center_of_Gravity>
  <show_coord>TRUE</show_coord>
  <color_index>3</color_index>
  <connect_line>FALSE</connect_line>
  <density>-1</density>
  <overlay_source>FALSE</overlay_source>
  <show_box>TRUE</show_box>
  <box_size>9</box_size>
  <overlay_image>Source</overlay_image>
  <show_cog>TRUE</show_cog>
  <threshold>-1</threshold>
</Center_of_Gravity>
<VBScript_Program>
  <script>SetVariable "SERVO_VALUE", Cint((GetVariable("COG_X") *
255)/GetVariable("IMAGE_WIDTH"))</script>
  <source_mode>gui</source_mode>
</VBScript_Program>
```

…

- RoboRealm web site: http://www.roborealm.com
- RoboRealm Help http://www.roborealm.com/help/
- iRobot Create information: http://www.irobot.com/sp.cfm?pageid=294

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Setting up the EEE Screen

- For old versions of RoboRealm, you need to run the screen in at least 1280x960 mode, so as to see all of the `iRobot Create Controller` window.

1. Download AsTray+1.3.7.zip and put the extracted files `AsTray.exe` and `DrvPatch.dll` in the same folder.
2. Execute `AsTray.exe`. If it works you'll see a tray icon in the windows tray pad.
3. Disable the Intel driver services `igfxpers.exe` and `igfxtray.exe` using start menu → run → msconfig→ start up.
4. Reboot the EeePC to make the tweaks take effect.
5. To make AsTray Plus run during windows start-up, copy `AsTray.exe` and `DrvPatch.dll` into the `c:\program files\asus\eeepc acpi\` folder of Asus's original `AsTray`, replacing the original version.

- There is information on VBScript programming at http://msdn.microsoft.com/en-us/library/0ad0dkea(VS.80).aspx
  You can use VBScript in RoboRealm through Extensions->VBScript_Program
- You can control the iRobot Create through Control->Robots->Irobot_Create

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Hardware hacking the iRobot

- We do not use the Cargo Bay DB25 connector at all.
- We modify the supplied serial port (mini DIN) lead to provide a USB connection. We could use a separate USB/RS232 converter, but our solution is cheaper, neater, and consumes less power from the EEE battery.
- We modify the battery box to bring out power leads which we route round the iRobot to the cargo bay. Here we use a series pair of 9.6V and 8.4V NiMH rechargeable battery packs.
  Please be careful. The iRobot seems very sensitive to overvoltage; we have burnt out motors, complete with a puff of smoke!

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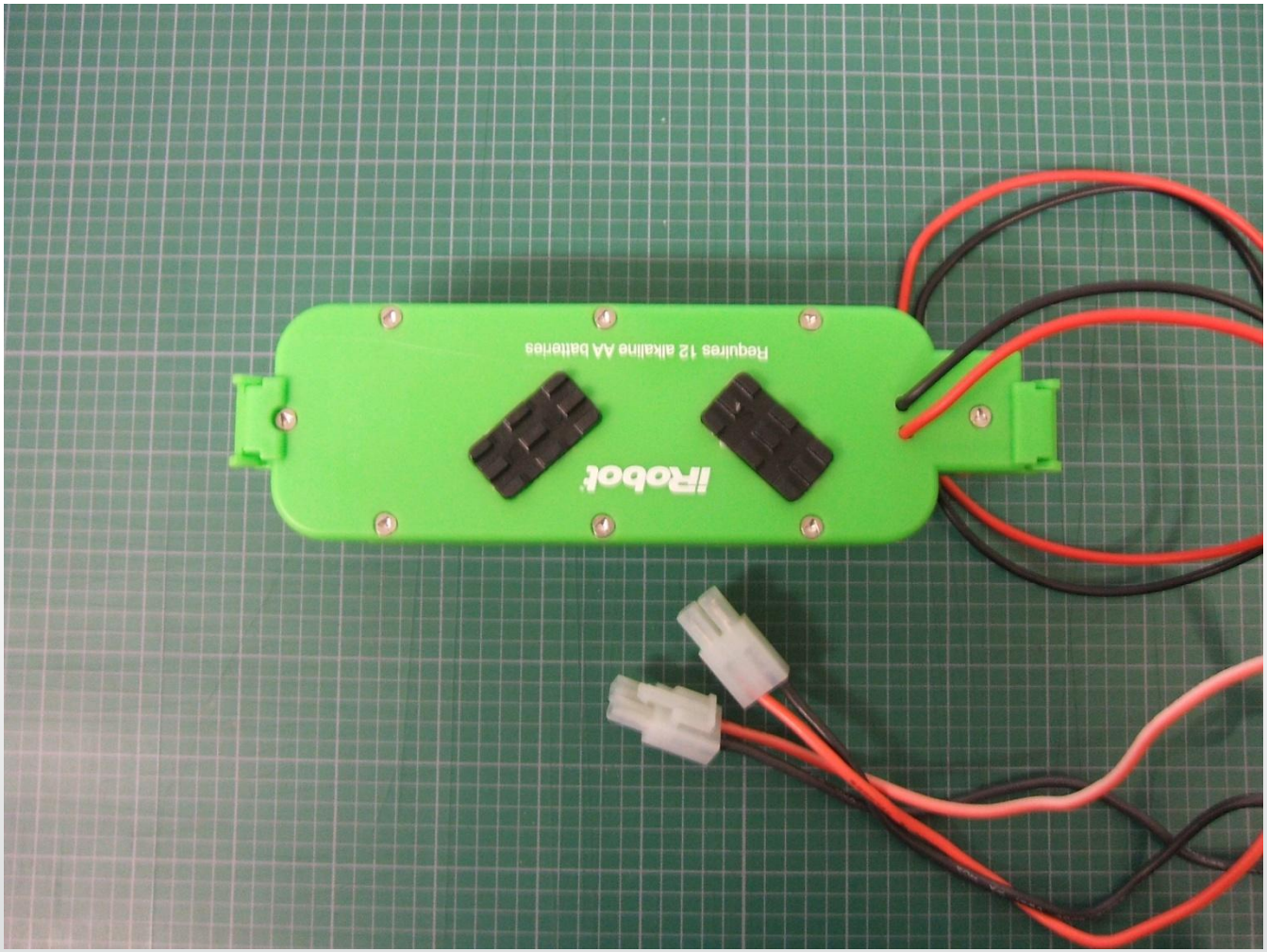
Battery Case



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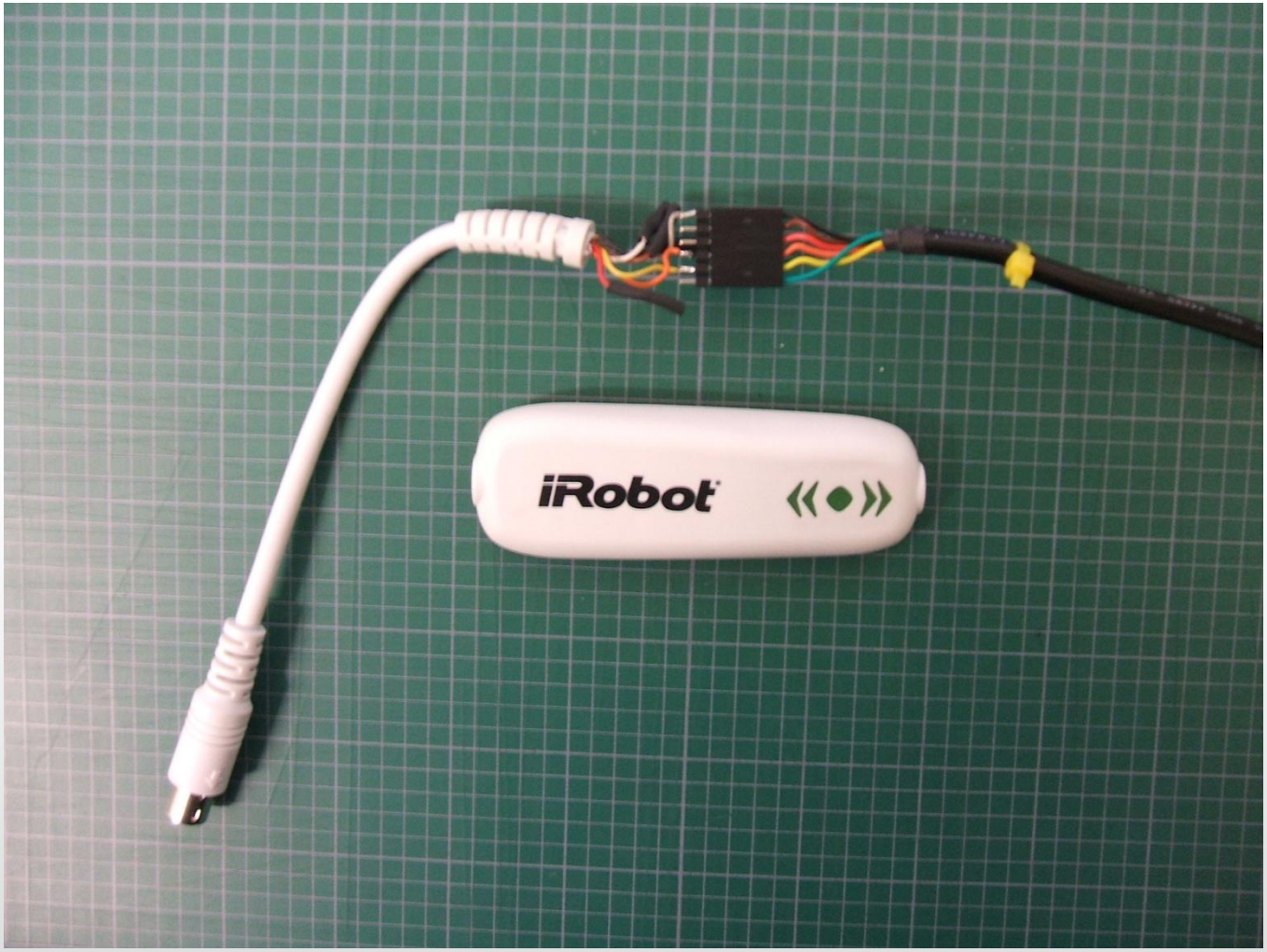
USB lead



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Hardware parts

- USB to low voltage serial converter—parts from Farnell (onecall)
  - 1329311: FTDI - TTL-232R-3V3 - CABLE, USB TO TTL LEVEL, SERI
  - CN09987 : HARWIN - M20-9990646 - 0.1" PIN HEADER - 6 WAY

- NiMH batteries—parts from ModelPower
  - 8.4 Volt 3300mAh NiMh Sub C Power Pack
  - 9.6 Volt 3300mAh NiMh Sub C Power Pack
  - Tamiya Large Connector - Plug & Socket (2 off)

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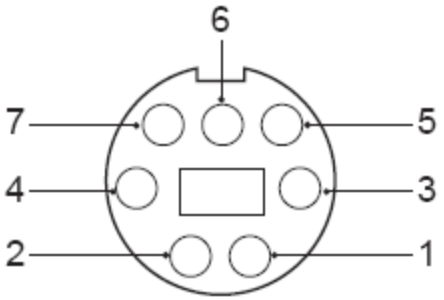
Connections for the USB port

Mini DIN	#4814 cable		USB adaptor
6	grey	----	black
	n/c	----	brown
	n/c	----	red
3	orange	----	orange
4	yellow	----	yellow
	n/c	----	green
	red		n/c
	brown		n/c
	white		n/c
	black		n/c



Top view of female DIN connector in iRobot

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Setting up the USB Serial port

- Download and unpack the driver CDM 2.04.06 WHQL Certified.zip.

- Plug in the USB connector and point the *New Hardware* wizard (twice) at the unpacked driver.