

Prototyping and Soldering Q + A

3 Stages of Prototyping - Plug and Play Boards, Vero Boards and Printed Circuit Boards

Prototyping boards - white plug and play boards. Plug components in directly. Make connections using single core wire.

Vero Board - copper boards with tracks - solder components - cut tracks with spot face cutter

Wire wrap board - copper contacts - use sockets and headers with long pins - connections made by using wire wrap gun with the very fine thin single core wire. Point to point connections. Unwrap tool available for removing connections.

PCB's - Design in Target preferably - Eagle Project files will be accepted

Soldering - Any Experience? - Anyone wanting to learn to solder?

Read and Sign Health and Safety Sheets on Soldering and Solder Fumes

Use Fume Extractor

Neatness is key - the neater and tidier the connection or join the more likely it is to work.

Clamp the workpiece - Use the bench vice or the plug and play boards to hold the job steady and in position. If needs be use tweezers or long nose pliers to hold things in place - ask for help

From a teammate to do so if needs be.

Let the soldering iron heat up first.

Clean the soldering iron tip frequently using the brass wool - the tip should be clean and shiny with solder not black or with blobs on it.

Hold soldering iron and solder like you would a pen.

Once the job is clamped and in place apply heat first then slowly touch on with solder.

Don't hold soldering iron and solder on job.

Cables & Connections - use multicore wire and matching header pins and connectors. Will need crimp tool, crimp pins and header sockets.

Solder and heat-shrink cable connections - extender leads or for connections made with heavier duty wire.

Soldering extender wires -

Place a suitable diameter and length of heat shrink over the individual wires and outer sleaving if needed and move well out of the way of where you will be soldering.

Strip back 1.5cm of exposed wire on both ends.

Place the ends so that they face each other and are overlapping each other then twist them.

Solder along the length of the wire for a low profile join with maximum coverage and tensile strength.

Once cooled down move heat shrink into place and use the heat gun to shrink to size.

Experience and Practice:-

Anyone want to do some soldering or make some cables just now?
Practice boards and test cables are available.

F.A.Q's

Wi-Fi

SDP Robots is an internal network only.

Computing Regulations Key Points:- No homemade WAP's allowed and everyone and everything that connects to the Universities network should be accountable and traceable ie UUN's and passwords are needed to see the outside world.

Suggested method:- Download to DiCE - SCP to PI - Unpack and Install

Note that you have a PI, an EV3, an arduino which are platforms with built in Wi-Fi, Bluetooth and RF and matching USB sticks. You have access to DiCE PC's and many of you will be designing apps for mobile devices.

The PI's Wi-Fi configuration file can be edited to include more than one Wi-Fi spot, with priority numbering and UUN and password information.

Budget -

Your budget should be a living document - update it as you go along - be aware of what's left on your budget at any given point in time.

We are restricted to ordering parts from University approved suppliers - however for the purposes of your budgets if you have found the part that I have ordered for you at a cheaper price on Amazon or Ebay then email me the link and I will agree to it going on your budget at that price. Please note that you cannot order these parts and claim your money back as we have proved that they can be bought from a University approved supplier. Expense claims can only be submitted for parts that we cannot source through official University Suppliers.

Sensible rule of thumb - If one individual part of your system is going to cost over a quarter of your budget you should consider lower cost alternatives. It is a prototype after all and as much as we want everything to work well and look professional, everyone (Industrial Guests included) will know that you are working under time and monetary restraints. This point also goes for anything that we can't allow due to Health and Safety or Computing Regulations. For the trade fair, final demos and reports you should include some information on the next stages of development of your system, answers to questions such as what additional/hidden costs your system might involve, subscriptions to outside services, lead times for custom built parts to be manufactured, what the real life material, sensors, motors, batteries and the likes will be along with what impact they would have on how the real life mass produced system would function.

Raw material costs -

6mm Pegboard, Plywood, MDF = £10 a sheet (8ft by 4ft)
RSPRO Metal strut = £41 for 3 metres - this will be factored down
PCBs = £12 for double sided and £11 for single sided A3

Misc Parts - Allow for £10 approximately of your budget to go on miscellaneous parts, fittings and fixings, nuts and bolts etc.

Printing - Allow space on your budget for 2 x A0 prints (or multiples off) at £18 for matt finish from Printing Services for floor mat prints for the final two weeks and final day demo.

3D Printing -

email .stl files -

Printer default settings are fast (0.2mm layer), transparent/white/black PLA (whichever is currently on the machine), no support material and a brim for the first/base layer adhesion

RPI - I2C - GPIO- Rotational Encoder Boards

It is possible to connect devices directly to the I2C ports or the GPIO and get them up and running, please check with me about methods, wiring layouts, voltages and for pre-made headers and cables before doing so. Currently no supplied test code for the above, but if you

look at how Sandbox implements the I2C bus for the motor board and the GPIO for the reset switch then it should point you in the right direction.

General Stuff Amnesty and Supplies Ordering -

Please return communal stuff that you have borrowed, tapes, measures, tools etc

Can you take a couple of minutes after this to have a quick check of your lockers and do so just now please.

If you notice that we are short of supplies or you happen to have used the last of something let me know so that I can order more stuff in.

Questions

Suggestions

Next Time - Environment and Peripherals