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 or jumper wires.

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? Old PCBs are available for practicing soldering with.

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 joint 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 groupmate 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 the soldering iron and solder like you would a pen.

Once the work-piece is clamped and in place apply heat first then slowly touch on with solder. Don't hold the soldering iron and solder on the work-piece.

Cables & Connections - use multicore (stranded) wire and matching header pins and connectors. Will need to borrow the crimp tool, crimp pins and header sockets. Note:- that there are a variety of manufacturers who make crimps and headers, make sure that you are using the correct crimps for the header that you are making.

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 sleeving 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 the heat shrink into place and use the heat gun to shrink it 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 - no direct access to the internet

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.

The PI's hostname and fixed IP address are only valid when you are on SDProbots wi-fi - The moment you change to any other form of network connection you lose them and get a randomly allocated IP address instead.

Budget -

Your budget should be a living document - update it as you go along - Items can be returned and come off the budget. The £200 cash part of the budget is primarily for items that we do not have in stock and for services that we cannot provide inhouse. Prior approval required.

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 afterall 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 a 3 metre long piece
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.

3D Printing, Milling and Engraving

Design in Tinkercad or Autocad Inventor (2019 version preferably)

Lego dimensions are easily found online. Note that for 3D printing holes (and axle hole sizes should be increased by 0.8mm and the notches at the top of a piece of lego should be reduced by 0.4mm.

email .stl files

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

If in doubt send us a small test file first.

Kit Amnesty, Supplies, Ordering and General Stuff -

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

Please feel free to return any of the kit that we issued you with in week 1 if you are not using it and it is just taking up space in your locker. Don't worry you can ask for it back at a later date.

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 us know so that I can order more stuff in.

Both of my authorises for ordering goods are on annual leave this week, so all this weeks orders are on the system/in process but on hold awaiting approval till Monday.

Yes, staff are working normal hours during Learning Week

Power to the CCTV unit in 3.11 and all areas in 3.01 has been restored

Demo room changes are being discussed and we will get back to you ASAP to confirm any changes.

Workshop queue is building so submit your design and consultation appointment requests sooner rather than later.

We are aware of some wi-fi issues in AT3.01 Arena area and are investigating. Let us know if and when you are experiencing this and we will power-cycle the router.

The 3.01 and 3.11 camera set ups only feed directly to the 4 DiCE machines that are next to them. Now that things are getting busier please only use 1 machine per group.

The big clear boxes of Lego are communal spares.

Last years robots are available for parts now.

Turtlebot plates have been ordered but are likely to be another 2 weeks before being in stock

Questions?

Suggestions?

Next Time - Environment and Peripherals