

Welcome to Code Club!



CODE CLUB



Code Club Week 4!



Lets take a break from programming, and do some 3D Printing instead!!!!



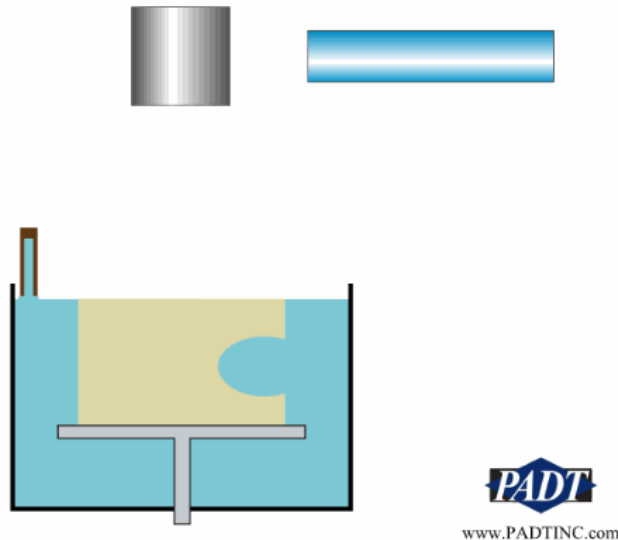
3D Printing



3D printing is the process of making a physical object from a three dimensional digital (electronic) model

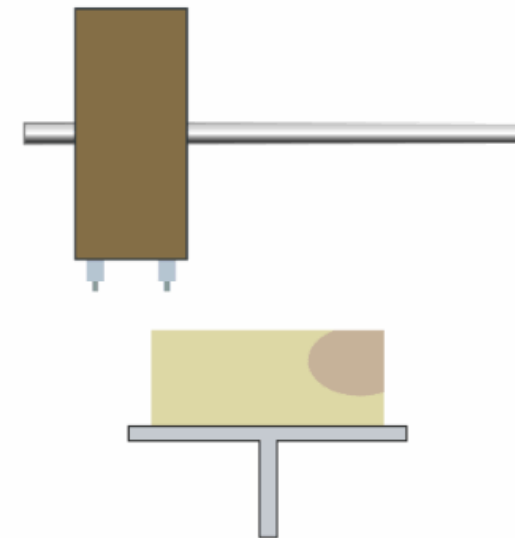
There are many different types of 3D printers – the two most popular are “Fused Deposition Modelling”, and “Stereolithography” – we’re going to be using an FDM printer today

Stereolithography (SLA)



Expensive, far better quality, large,
companies only

Fused Deposition Modeling (FDM)



Cheap, reasonable quality, small,
anyone can buy

3D printing history



1984 – Charles Hull invented stereolithography

1989 – FDM (Fused Deposition Modelling) – “invented” and Patented by S. Scott Crump

1992 – Charles Hull releases his first commercial SLA machine

2005 – RepRap Project launches – a freely available project to make a printer which can make itself! (i.e. you can make all the bits for another one using it)

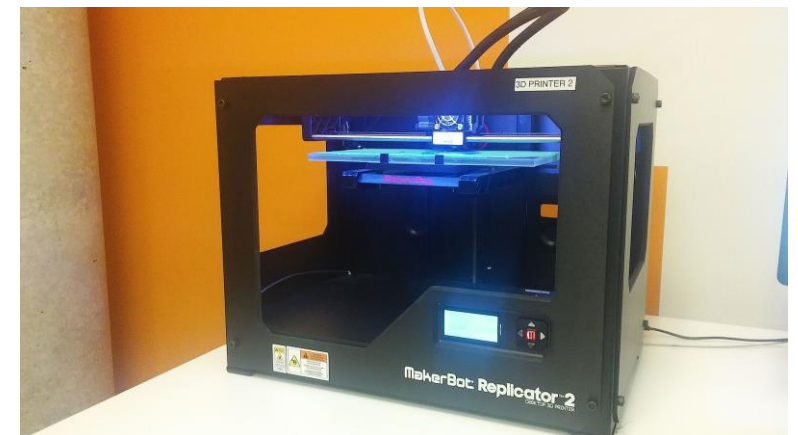
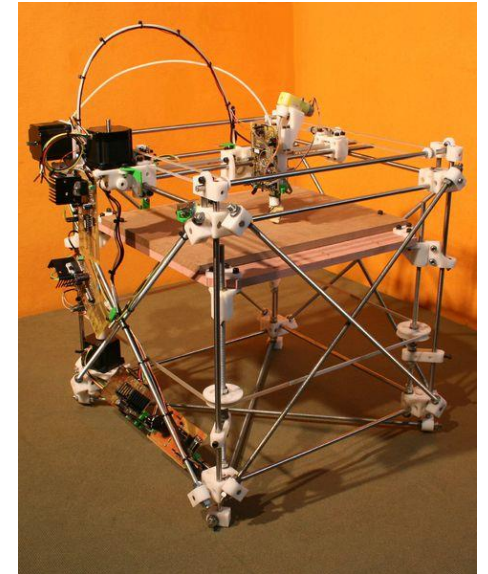
2008 – RepRap releases “Darwin”, a build it yourself, print it yourself, printer

2007-8 – Shapeways formed – allows printing of designs by email

2009 – FDM patent expires, new printers cost \$1,000 rather than \$10,000

2009 – Makerbot formed based on RepRap designs

2011 – 2018 – Loads of new printers appear commercially – cheap, easily accessible, pre-built – works out of the box!



What can you use 3d printing for?

Making models and toys

Prototypes of new products to see what they look like, or feel like

Cheap production for lower numbers of items – no factories needed, no set-up, custom equipment etc

Easy to change something, and re-print it – no re-tooling necessary

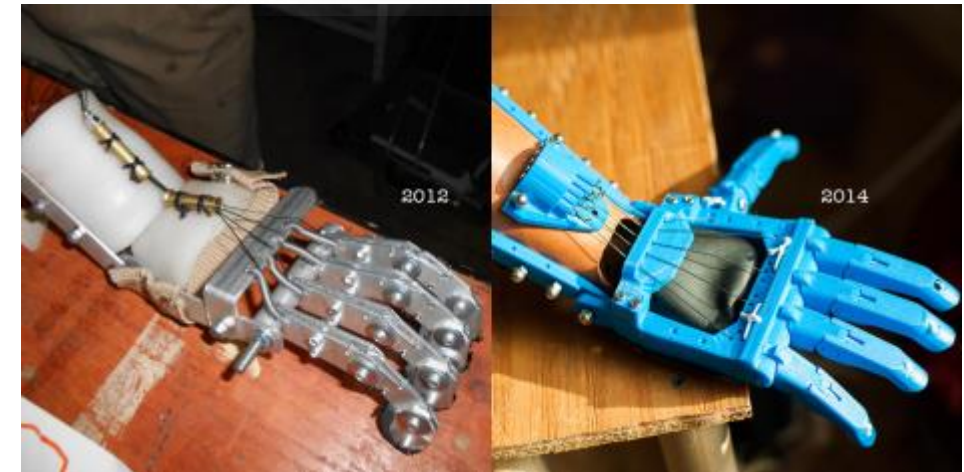
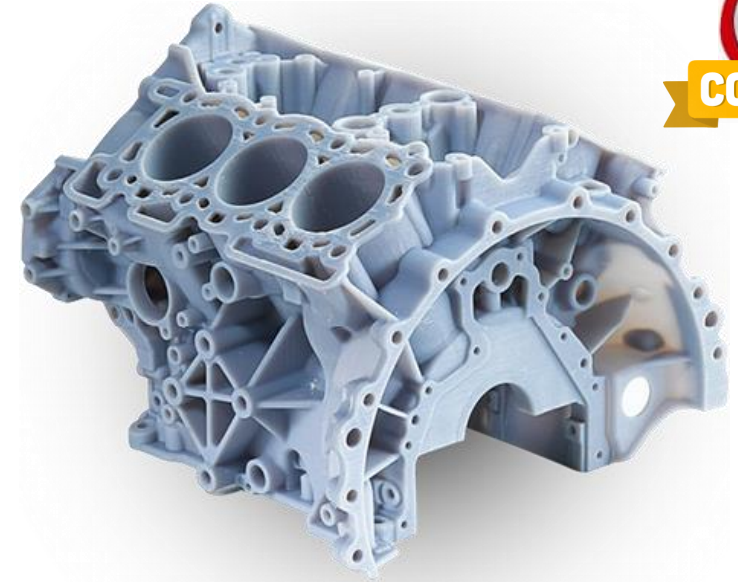
Spare parts – if something breaks, print a new part!

Medicine – print veins, scaffolds, and maybe organs one day!

Space Exploration – getting parts into orbit is expensive.

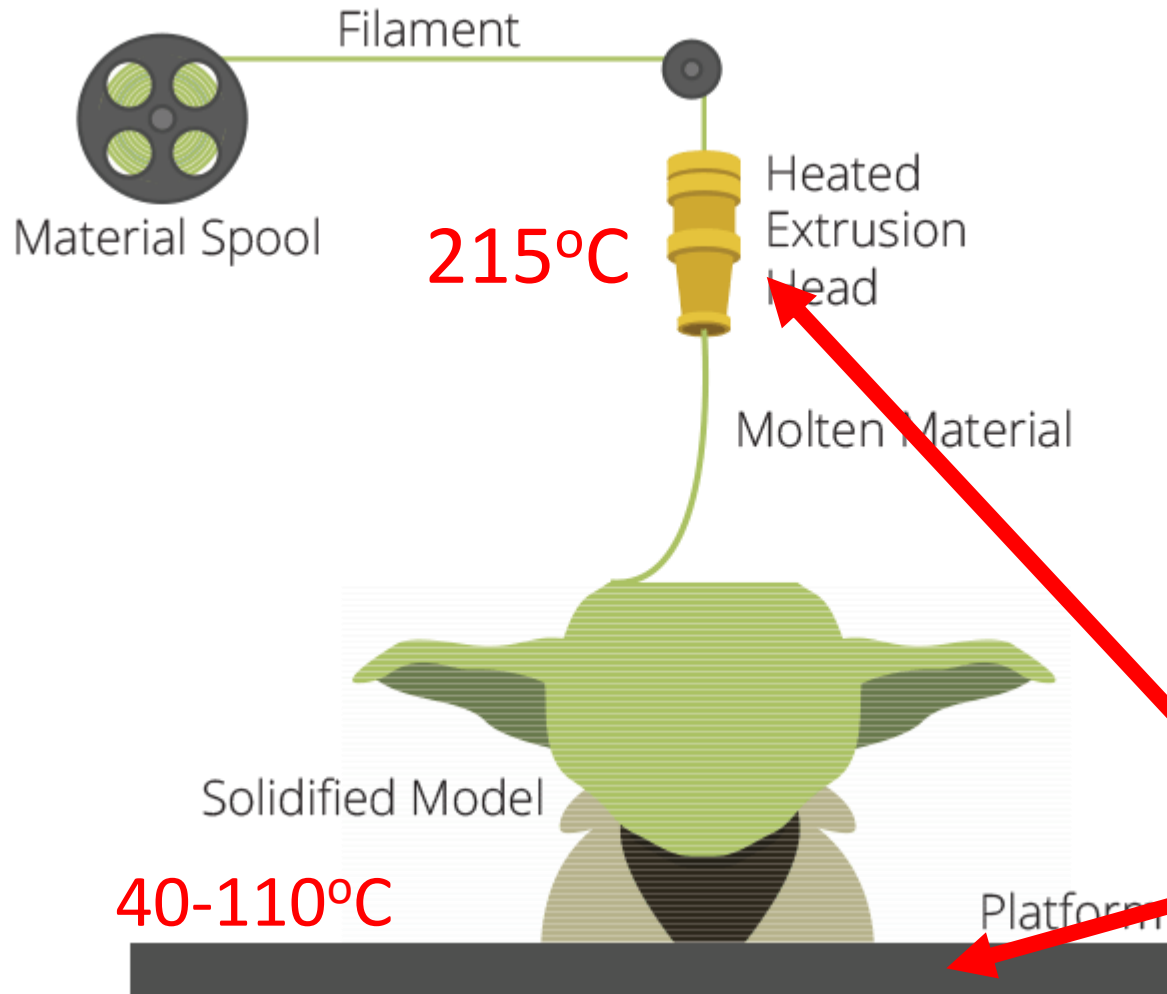
Getting to the Moon/Mars is expensive, and difficult why take loads of spare parts with you, when you can 3d print them if you need them when you're there?

Medicine – make something that'll fit someone personally such as prosthetic limbs/hands etc



How does it work?

How does a 3D printer work?



The printer takes in plastic “cable” called filament.

It then melts it as it passes through the extrusion head

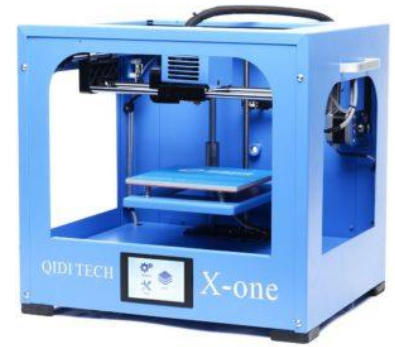
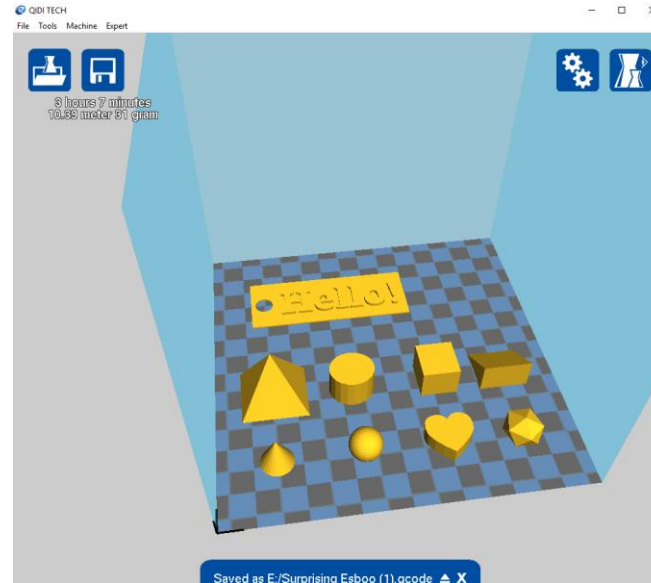
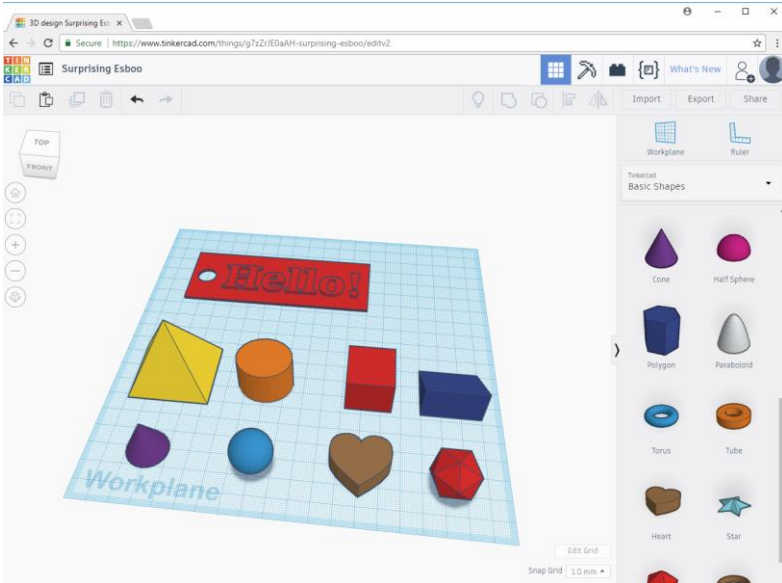
The nozzle moves forward and back to squirt the melted plastic onto the the platform – building up the model in layers

Once that layer is done, the platform moves down slightly, and the process repeats until the whole model has been made

HOT HOT HOT HOT HOT

3d Modelling

How do we get our model we want to print?



Design

3D modelling package. TinkercAD.
Sketchup, Blender, Autodesk, Solidworks

Slice

Slicing software – orientation, scale,
“slices” into layers, and fills cavities
Slic3r, Cura

Print

FDM Printers - Thermoplastics

Thermoplastics are materials which are soft and moldable when heated, but go solid when cooled.



ABS

Acrylonitrile Butadiene Styrene

A Plastic, oil/chemical based – LEGO blocks, recorders, car parts, plastic goods, radios etc

Strong

Better for items with no fine detail

Not bio-degradable

Higher “Melting Point” (220C)

Need to be heated while printing – Heated Bed @ 110C

Bad smell. Ventilation required, possibly toxic



PLA

Polylactic Acid



Organic – made from Corn starch and sugar beet

Weaker than ABS

Better finish on fine detail

Bio-degradable (3-6 months), renewable

Lower Melting Point (180-200C)

Does not need to be heated while printing

Slightly sweet smell

Let's make a keyring!

I'll make one, and then you can have a go.



Today's Activity



Open up a new browser **TAB**, and go to:

<http://airyhallcode.club>

TinkerCAD link – then “sign in”

Email address:	userX@airyhallcode.club
Password:	cod3club

Next Session – 19th February!

Make something cool in Scratch, Python, or something
in TinkerCAD we can print!



Tomorrow – 6th February Falcon Heavy Launch

6.30pm – 8.30pm

SPACEX

www.spacex.com

