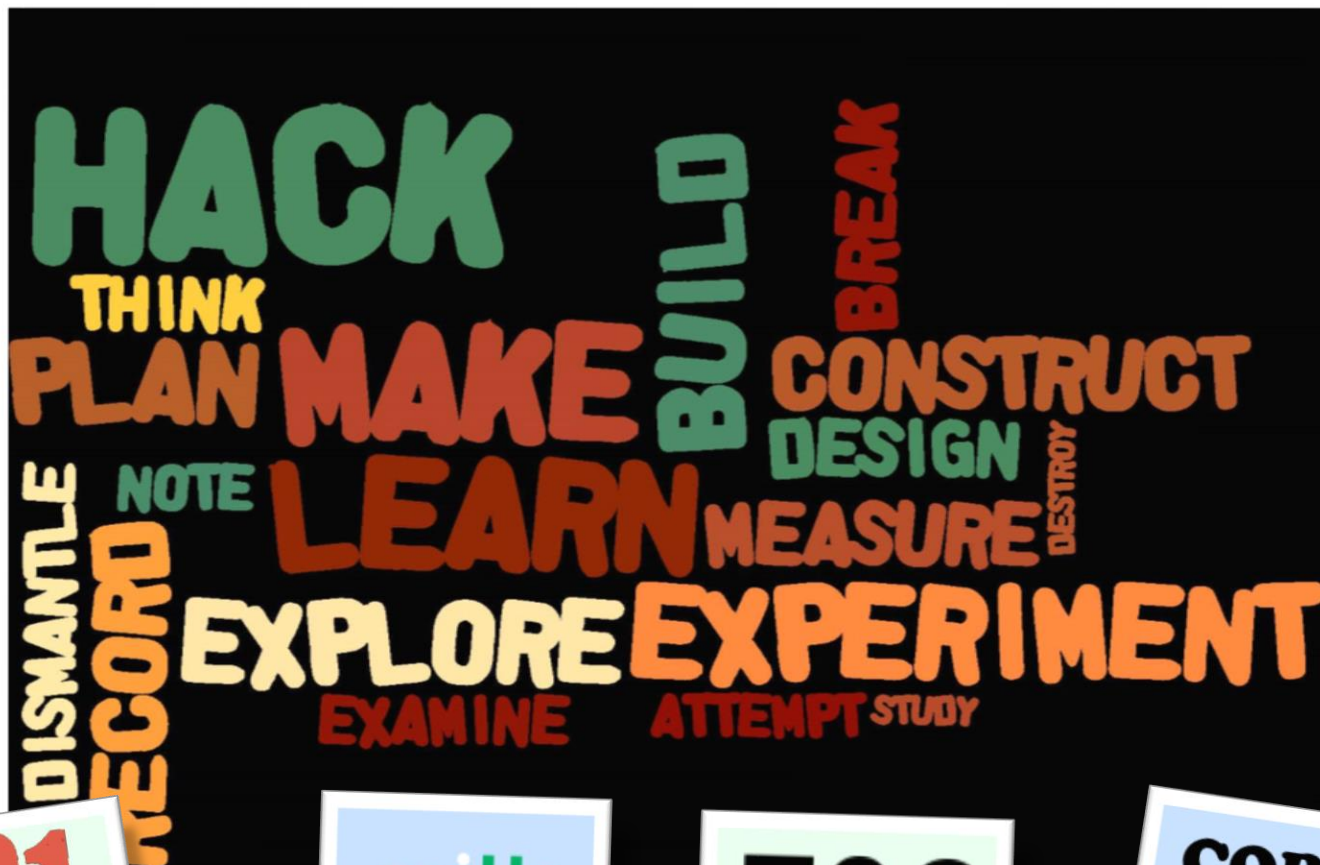




HaCkeRS

A HackerSpace in CoderDojo!



What the Hackers Do



Not About Law-Breaking!

- Hack things together
- Take apart to understand & improve



Work on Projects

- Bring your ideas; we'll try to help
- NOT based on weekly tutorials



For Advanced Members

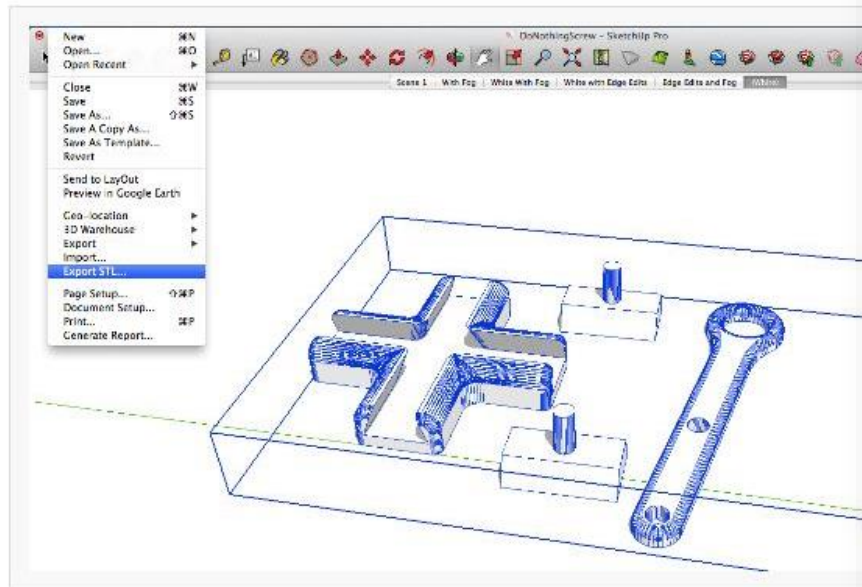
- Have completed most/all other groups
- Build on ideas from other groups

3D Modelling!

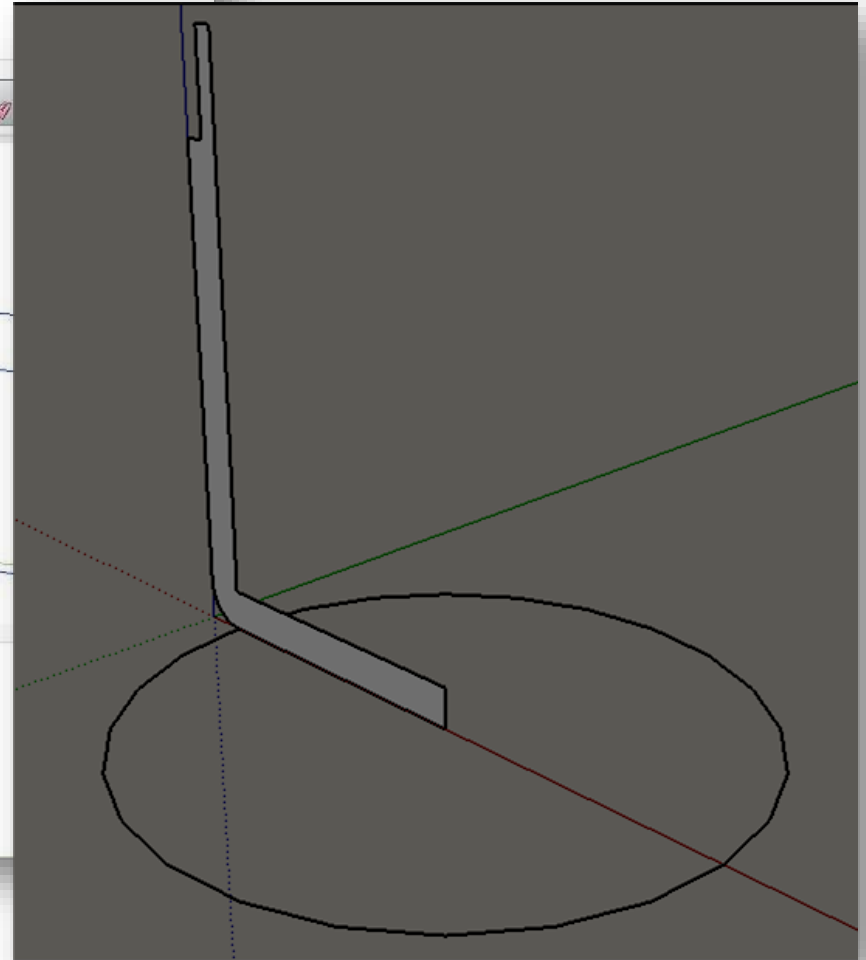


SketchUp STL

Import and Export STL files for 3D printing



SketchUp STL



Advanced Coding & Algorithms!

PROGRAMMING LANGUAGE:

PYTHON (probably)

① ROBOT MECHANISM TO MOVE TO 7 DESIGN

Find

$$\begin{aligned} X+y &= -8 & M1 \\ x-y &= 1 & M2 \end{aligned}$$

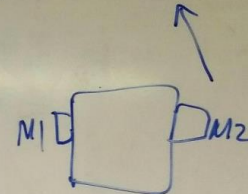
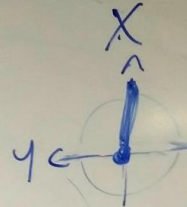
$$\begin{aligned} x &= .9 \\ y &= -.1 \end{aligned}$$



$$\begin{aligned} X+y &: 1 \\ x-y &: 1 \end{aligned}$$

$$X = 1$$

$$y = 0$$



$$M1 : +1$$

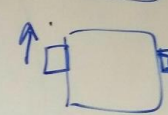
$$M2 : +1$$

$$x-y : 1 \times 4$$

$$x-y : 0$$

$$X = .7$$

$$y = .7$$



$$M1 : +1$$

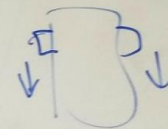
$$M2 : .05$$

$$X+y = -1$$

$$x-y = -1$$

$$X = -1$$

$$y = 0$$



$$M1 : -1$$

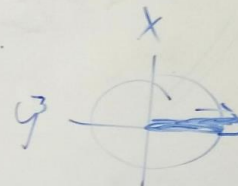
$$M2 : -1$$

$$X+y : 1$$

$$x-y = -1$$

$$X = 0$$

$$y = 1$$



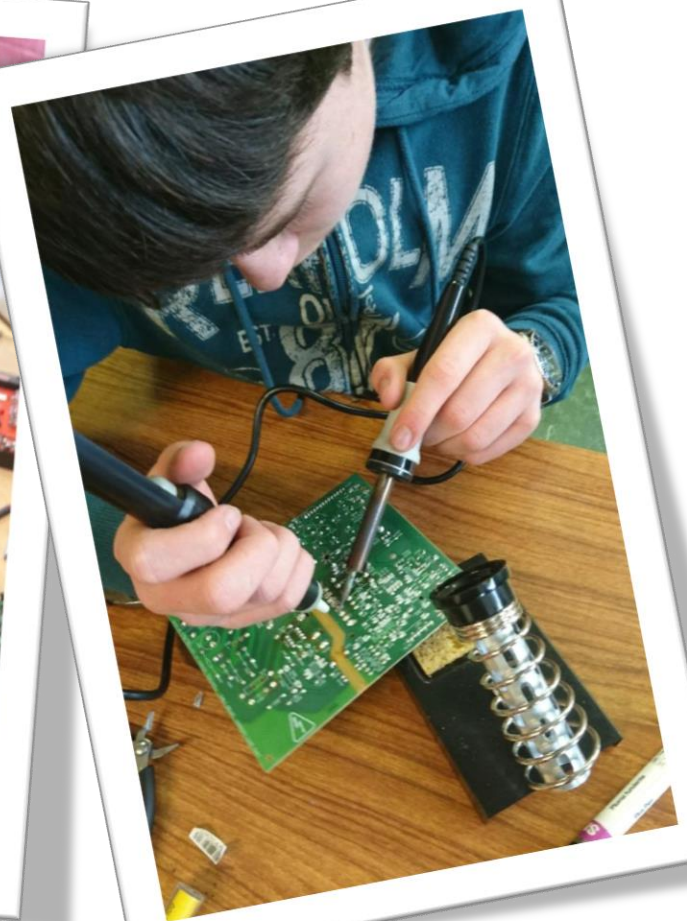
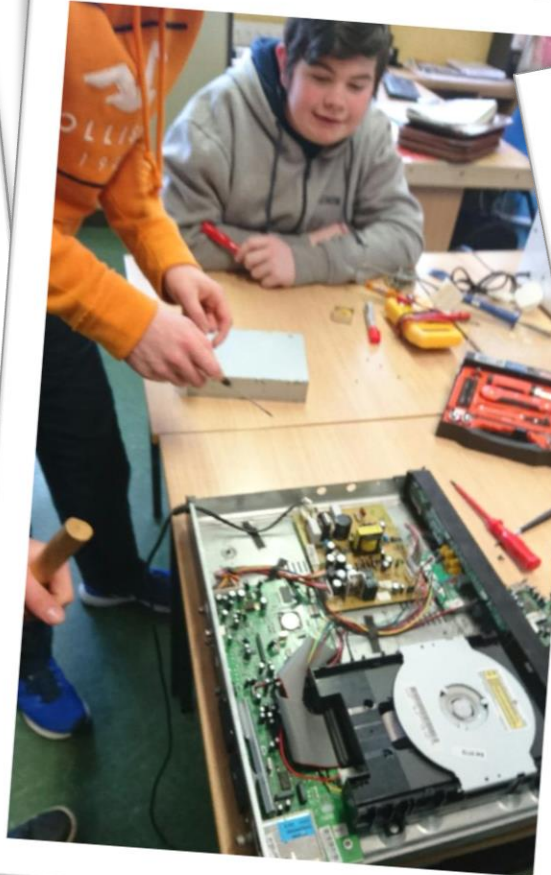
$$M1 : +1$$

$$M2 : -1$$

or my colour

Making and Breaking!

- Not this Year



Making and Breaking!

- Not this Year



2019-20: AI Robot for Connect4!

SENSING: Computer vision to examine current state of board



PLANNING: AI Minimax algorithm to decide what move is best



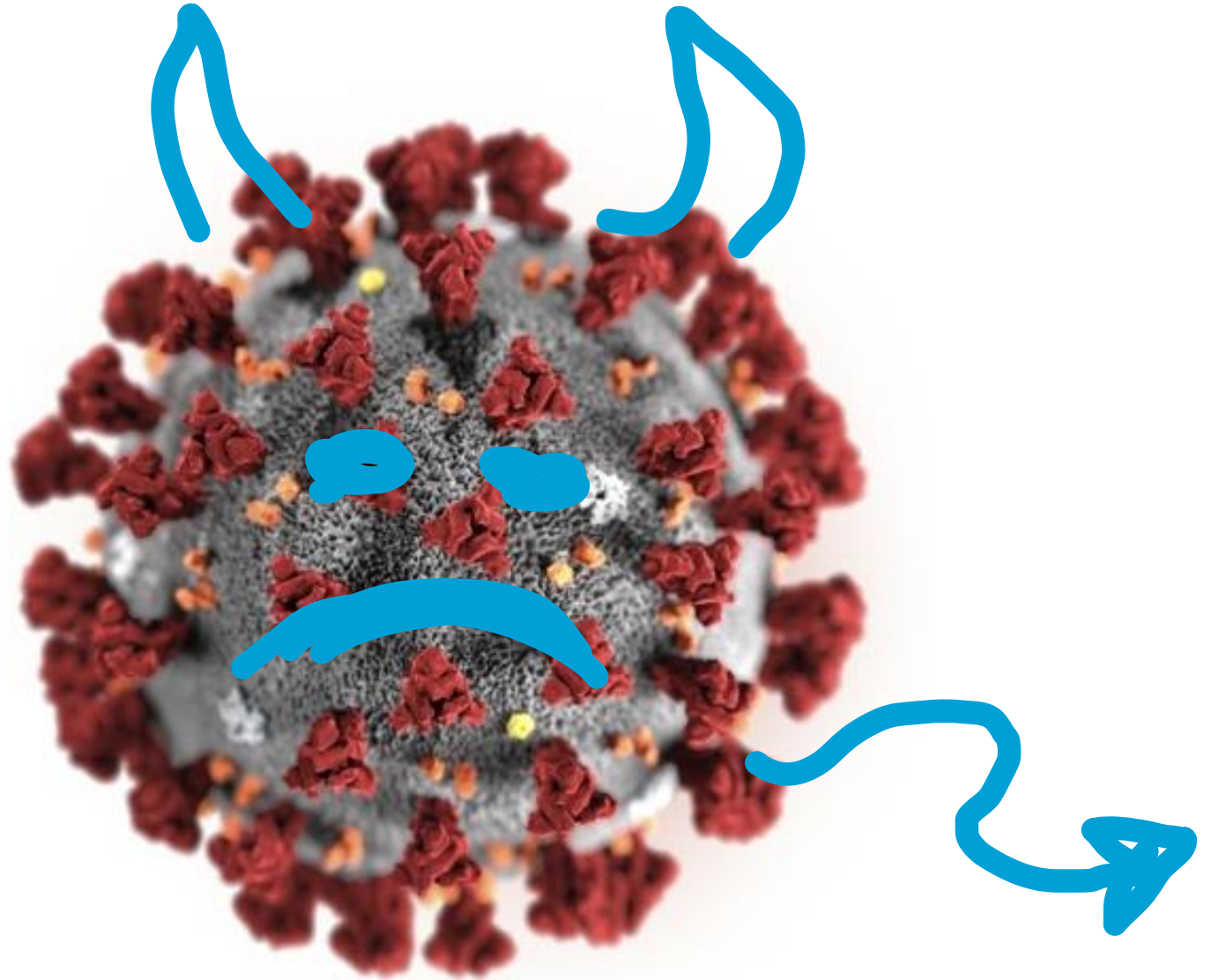
ACTUATION: Robot mechanism to move to correct slot and drop in token



We Even Had a Gantt Chart!

Task	22-Feb 1	29-Feb Storm	07-Mar 2	14-Mar St Patrick	21-Mar 3	28-Mar 4	04-Apr Easter	11-Apr Easter	18-Apr 5	25-Apr 6	02-May Bank Hol	09-May 7	16-May 8	23-May Demo Day
<i>Initial Planning</i>														
Brainstorming ideas	Plan to do													
Python programming basics	Plan to do													
<i>Robotic Arm with Token Dispenser</i>														
Design mechanism to release & reload			Done											
Design structure for horizontal movement			Done											
Design wooden frame			Done											
3D print dispenser and integrate motor					Overdue									
Make wooden frame					Overdue									
Build horizontal movement structure					Overdue									
<i>Sensing - Computer Vision</i>														
Basics of webcam use in Python	Plan to do				Overdue									
Code to take webcam picture of board					Overdue									
Image alignment and analysis					Overdue									
Create matrix with 0/1/2 for Empty/Red/Yellow					Overdue									
<i>Actuation - Making Moves</i>														
Basics of motor control in Python			Done											
Code for horizontal motor control					Overdue									
Code for token release/reload					Overdue									
Button for turn-taking (if needed)					Overdue									
Code to communicate with human player					Overdue									
<i>Control - Artificial Intelligence</i>														
Basics of AI for 2-player games	Plan to do					Overdue								
Implement Minimax algorithm						Overdue								
Code to evaluate a board position						Overdue								
Code to generate future board positions						Overdue			Overdue					
Test the AI									Overdue					
<i>Integration and Testing</i>														
Put it all together									Overdue					
Test and identify any problems									Overdue			Overdue		
Update and improve												Overdue		
<i>PUBLIC DEMO</i>														Overdue
Colour meanings:	Plan to do		Done		Overdue		Closed							

Unfortunately We Didn't Plan For ...



2020-21: Starting in January We'll Design and Build a Project

This will be purely software as we'll be online

We will brainstorm an ambitious project:

- Artificial intelligence?
- Games?
- Website?

We will tackle it together:

- Teamwork and planning
- Specialise in different aspects
- Build something we can be proud of



You can also work on your own project ideas in Hackers



**BT YOUNG SCIENTIST
& TECHNOLOGY Exhibition**



Driven by innovation, delivered by BT

From Now to January: Join Bodgers or Modellers

Would-be Hackers:

Please join either Bodgers or Modellers group

Develop your skills that we will use later

Bodgers:

Best for developing your Python coding skills

Modellers:

Best to develop 3D modelling skills,
if you have a lot of Python experience already