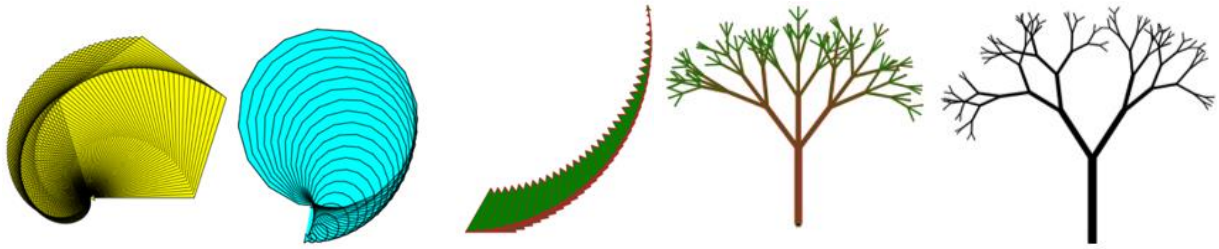
Starter Workshops (2 x 90 Minutes)

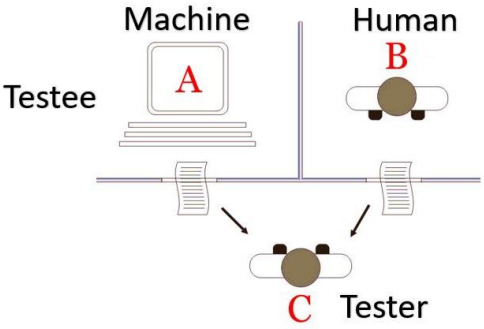
Fractals and the art of code

Every day video games and animated movies move closer to resembling reality, this is made possible in great part through our understanding of fractals which are self similar patterns that occur everywhere in nature: shells, clouds, plant life, river systems etc . . . Fortunately for us we can create a great variety of spectacular fractal shapes using only turtle and a process called recursion where functions that draw shapes call on themselves



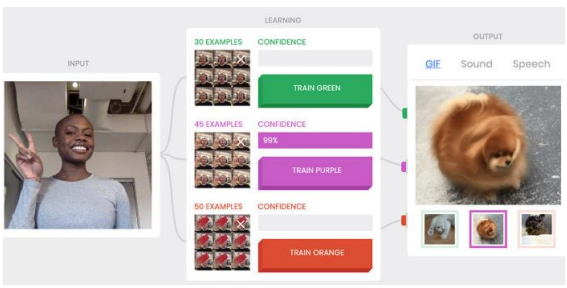
Python chatbots

In 1950 Alan set the benchmark for Artificial Intelligence as a computer that can carry on an in depth text conversation with a human. . . In 2020 we interact with useful chatbots like Siri, Alexa and Google Assistant all of which do chores and help us organize our lives. Yet despite becoming super useful and superior to us in many games we play (Chesss, Jeopardy, Go etc . . .) computers still don't seem all that human. . . In this workshop we will try to change that by learning how to use Python to program chatbots to recognise emotion and be more spontaneous (random) in their interaction with us.



Hands on Introduction to Artificial Intelligence

One of the most fundamental aspects of human intelligence is the fact that we are creatures that learn and communicate what we know. We have all learned how to read, how to walk, how to talk and in this workshop we will be learning how to program a computer. We will also be finding out whether the machines we are programming are capable of learning in ways similar to us. We will learn the importance of data, and find out how computers use data to learn how to perform tasks. We will also get to engage with artificially intelligent systems that recognise images, find meaning in texts and even play music that matches the sounds that you make



Python Small Games and Applications

There is magic in creating a computer program that does something useful or interesting. With the amazing simplicity of Python this magic eminently reachable. In this workshop we will be building three simple yet awesome applications with Python in just 3 hours. The first application is a number guessing game where the user repeatedly guesses a number 1 to 100 and gets told if they have guessed too high or too low, the second is a memory game where you have to memorise ever harder sequences of numbers or words and compete against your friends. The last is a bot that randomly generates poetry . . . which might just save you some time on your Christmas cards.

```
enter the number you memorised:
5616
Well done
you have 4  seconds to remember this:
38980
```

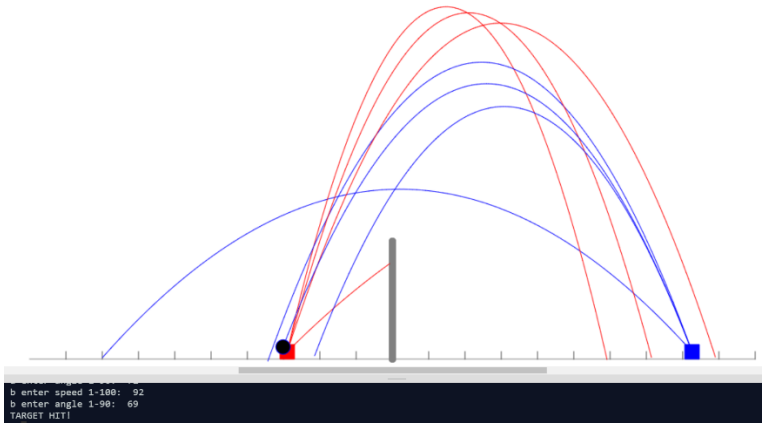
```
How many items do you want to guess: 5
type 1 for guessing numbers and 2 for guessing words
2
['kept', 'expect', 'flower', 'character', 'went']
```

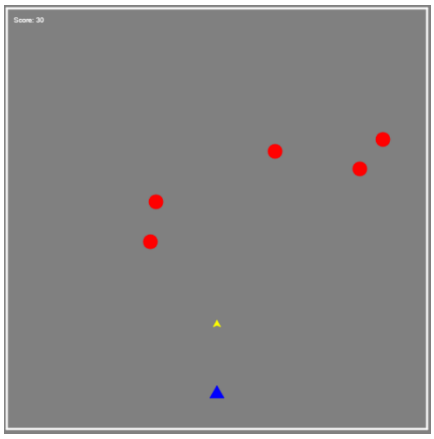
```
your time was 1.1060407161712646 seconds
when I say __GO__ you hit ENTER!. got it?
ready
steady
#####__GO__######
```

```
your time was 0.7283987998962402 seconds
fastest time was 0.7283987998962402
slowest time was 1.1060407161712646
the average time was 0.9273434480031332
```

Making Games with Python Turtle

Python Turtle, also known as Logo has been a programming smash hit with beginners since the 70's In this workshop we will be using it a little differently. We will program two little games using Turtle: the first is a simplified version of space invaders where the players dodges a rain of bricks and the second is a classic rendition of Angry Birds where we will have two players targeting each other with projectiles whose motion is programmed in by the classic Newtonian Equations

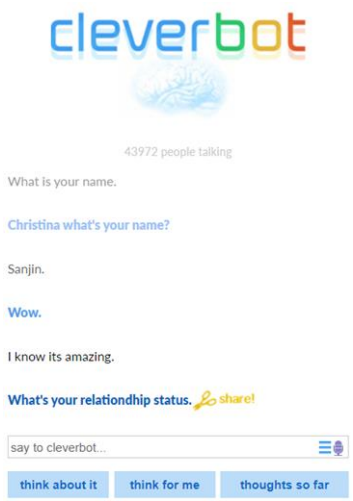


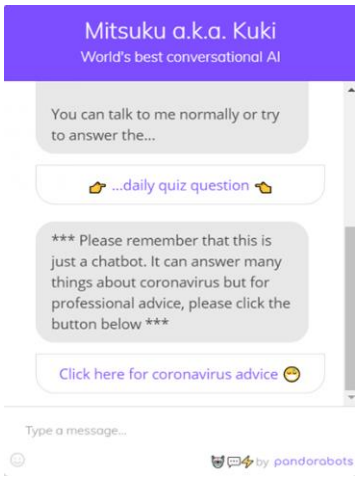


Masterclasses (4 x 90 minute Sessions)

Advanced Chatbots and Book Analysis Masterclass

It's interesting to ponder what makes humans unique among all the known living creatures. For the most part it is our developed intelligence and ability to work together to solve complex problems, both of which are made possible by human language. One has to wonder what would be possible if we were truly understood by our phones and computers that possess millions of times more memory and processing power than we do! In this masterclass we are going to be taking our first steps in Natural Language Processing, a computer science field that deals with programs that analyse and understand human language. We are going to be creating algorithms that read books and derive meaning from them as well as creating ever more elaborate chatbots that use natural language processing to communicate with people in more meaningful ways.



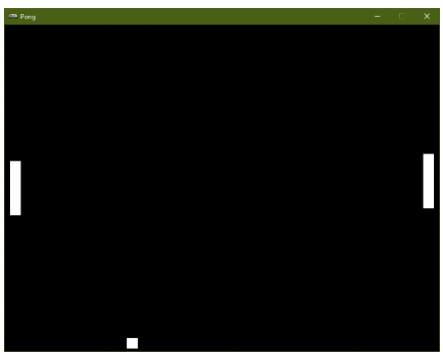


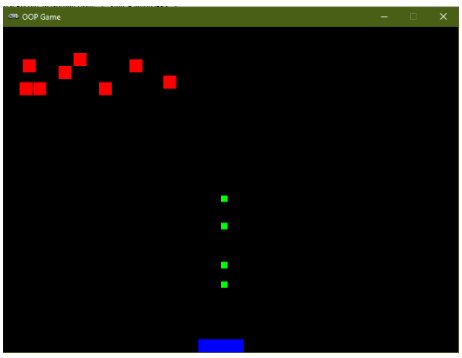

```
import random
from textblob import TextBlob
from greeting import *

import json
d = {"one":1, "two":2}
json.dump(d, open("text.txt",'w'))

topics = {
  'football':0.1,
  'Melbourne':0.2,
  'AFL':-0.5,
  'Endgame':-0.1,
  'Python':0.5,
  'Computers':0.7,
  'Computer games':0.5
}
```

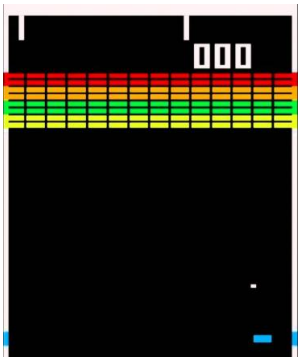
```
Hello human I am a happy chatbot
what is your name?
Bob
Do you have nickname?
no
I will call you Bobby
What's up Bobby?
Its all good mate
Glad you are doing well
I would like your opinion on Python?
It is a great language
OMG you really love Python
I disagree  Python is worse than that
What is your take on AFL?
I think it is great
OMG you really love AFL
I disagree  AFL is worse than that
What do you think about Computers?
I have always loved them
OMG you really love Computers
and I tend to agree with you
What do you reckon about Endgame?
did not watch it
That is a very neutral view on Endgame
and I tend to agree with you
```

Pygame Masterclass

The 1970's brought video games to the world with an all time classic called Pong. The game basically consisted of two rectangular paddles moving up and down and trying to bounce a square ball past each other. . . This simple game was strangely compelling and gave rise to a gaming revolution that is still with us today. In this masterclass we will be programming a full version of Pong with both human and computer players, a score keeping system and escalating difficulty. We will also be re-creating a modern classic game called Agar.io, which is a game centred around a dot that grows as it eats other dots that are smaller than it and in turn runs away from larger dots that can eat it.

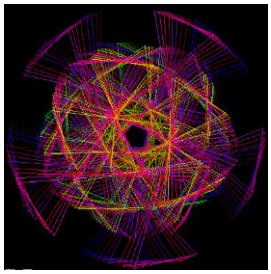


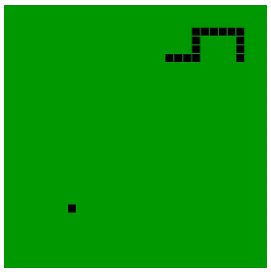


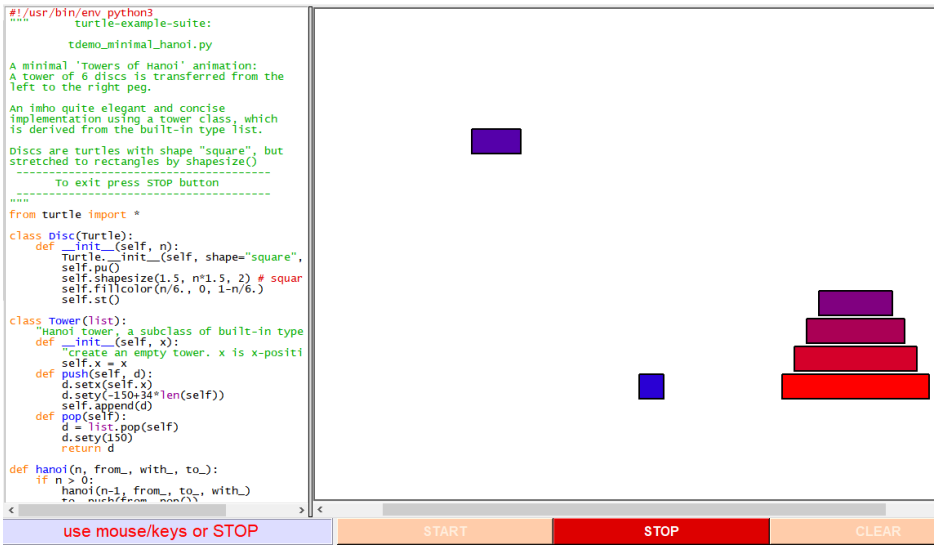


Python Turtle Masterclass

Python Turtle is known for being the simplest text based program for making 2D games and drawings, but in this masterclass we are going to be pushing Turtle to its limits by creating advanced games that use the sensing of the arrow keys to move characters around a map (much like Super Mario) and use the R,G,B colour systems to draw mind bending fractals that change colour and shape in a way that is responsive to user inputs. If you sign up for this one you should be planning on using a colour printer to print out some of the mazey Fractal Art that we are going to be creating.

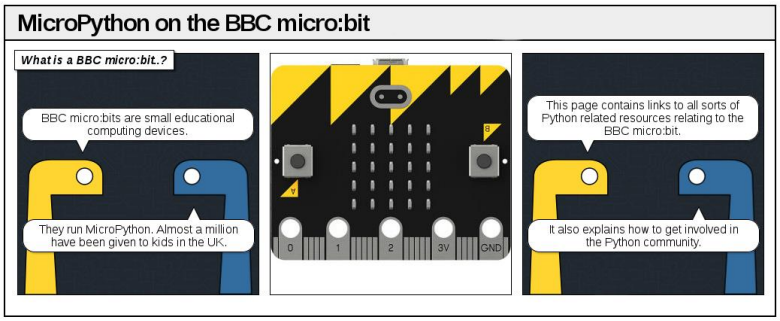






Micro:bit Python Masterclass

In 2018 for the first time in history, there were more devices connected to the Internet of Things than there are people on earth . . . In 2020 there will be 31 Billion of them, but what kind of devices are these and why are they significant? Well the vast majority of IoT devices are microcontrollers, small computers that live on one microchip and have less than 1% of computing power and memory of a smartphone. They are however very significant because they interface with the real world by sensing the environment and making automatic decisions. They operate traffic lights, automatic doors and elevators as well as all of your home appliances. In this masterclass you will be learning to program one such microcontroller, called BBC micro:bit using Python. The micro:bit can sense acceleration, magnetic field, temperature, light intensity and human touch. We program: games that measure reaction time and memory, distributed alarm systems and smart fitness gadgets that track your steps and help your co-ordination and balance.



Mega Projects (6 x 90 minute Sessions with homework)

Object Oriented Games in Pygame Space Invaders

Building a complete video game with cool graphics, multiple levels, multiple sprites and a well tailored escalating level of difficultly is no simple feat. However it is made a lot easier by a programming methodology called: Object Oriented Programming which models all the game elements as objects with attributes like colour, location, visibility etc. . Using this methodology we will be recreating Space Invaders, a wonderful game where a space defender does battle with ever larger hordes of space invaders eventually dealing with bosses. Our journey will begin with programming the movement of the space defender, then one by one we will create different varieties of enemies and optimise the gameplay so that the difficulty is just right.