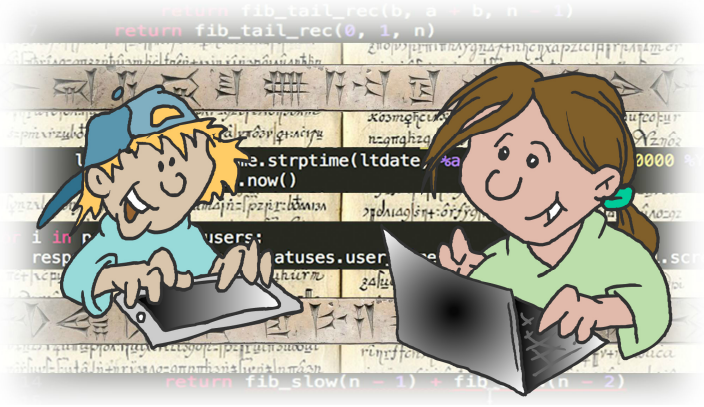

A G.A.T.E.WAYS JOURNEY PROGRAM

for gifted Year 5 and 6 children with a

love of technology and coding

'SSSSS, HERE COMES PYTHON ….. FRIEND OR FOE?'

G.A.T.E.WAYS is an independent organization offering challenging and enriching activities and experiences to develop and extend highly able children This *JOURNEY* for both girls and boys will run over four sessions.
Code is everywhere - it helps you look up interesting facts for your homework when you log in to Google; it enables you to watch YouTube clips and play games; it even helps your teacher or parents book your next G.A.T.E.WAYS adventure on the G.A.T.EWAYS online portal. In this Journey we will learn to write our own code using Python, which is a text-based general purpose programming language as opposed to a drag and drop coding program - which makes it surprisingly easy to use!

Requirements: Bring writing materials, a notebook, a blank USB to save your work, a snack (no nuts please) and a small labelled photograph of yourself. Also bring a stamped, self-addressed DL envelope for your report. If you are attending this program in Term 1 or 4, you must bring a hat for the break

Session 1: How Smart Is Your Interviewer?

A program essentially provides computers with a set of instructions to be obeyed. Computers follow instructions *exactly*, even if they produce a crazy result. A small error in a code can cause a lot of problems. Imagine the consequences of an error in the coding for a space shuttle launch, a nuclear power plant, or a driverless car. Intelligent machines require intelligent code! In our first session, we will create an artificial intelligence program that pretends to be a human on the other side of a text box. You could create a super hero, a meme machine or a journalist interested in your latest endeavours. This all happens with the use of 'strings' or blocks of text, which we can modify in various ways and a series of if – then logic statements. Just a couple of these statements endow the program with some basic decision making, while many of them working in an organized manner give rise to real intelligence!

Session 2: Primed to code!

What was studied by number theorists around 300BCE that is so important for cyber security today? Prime numbers of course! Prime numbers are cool. As Carl Sagan points out so eloquently in the novel *Contact*, there's a certain importance to their status as the most fundamental building block of all numbers, which are themselves the building blocks of our understanding of the universe. Python is awesome at solving basic mathematical problems so it is very handy to have in class! In this session, we'll start by using just a few lines of code to perform simple mathematical tasks such as addition, subtraction, multiplication, and division. Then we'll use Python to complete more complex operations involving factorization and algebra. This will then enable you to create a code that tests for prime numbers. Finally, we'll tackle an all-time classic computing problem which involves coming up with an algorithm that generates prime numbers.

Session 3: Can We Keep (It) Secret??

In this session, we will look at cryptography and the technologies that allowed the Roman Empire to transmit secret messages that only Roman commanders could read. The most famous of these is the Caesar Cypher which works by shifting each letter by a certain number of positions within its alphabetical sequence. These sorts of codes and ciphers, though effective for thousands of years, can easily be cracked by our own devious schemes and computer power. Today we'll look at several strategies for doing this, as well as something called brute force cracking which involves finding all possible solutions. Towards the end of the session we will find out how to write code for encryption ourselves and thus get a bit of an insight into how emails and text messages are kept safe from prying eyes.

Session 4: Can you out-guess a trickster?

In this session, everyone should be well and truly ready to embark on a truly ambitious task. We'll come up with a 'trickster' program to create a 'number guessing game' which will give hints to the player such as: 'the number you seek is greater than 50'; 'the number you seek is divisible by 7'; 'the number you seek is even'. Of course, we could make the program nice and encouraging or we can instruct it to tease the users' performance. What FUN!! We will also enable this game to be played on the internet so that you can wow your family and friends, and explore the possibilities of changing the game dynamics to go head to head against other human players!.

About the Presenter:

Sanjin Dedić is a robotics engineer with a background in product development and a teacher. His main passion in life is presenting programming and robotics with minimal academic jargon and abstract maths, in a way that can be embraced and understood by everyone, especially primary school students. In doing so he hopes that many younger more creative minds can join in the creation of the hi-tech world that is growing up around us.