A G.A.T.E.WAYS JOURNEYS PROGRAM

for gifted Year 3 and 4 children with a love of

science, technology and construction

…and Star Wars

‘Star Force Explorers Rule!’

G.A.T.E.WAYS is an independent organisation 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. “*Star Wars*” is an epic space fantasy depicting the adventures of various characters "a long time ago in a galaxy far, far away." This journey will help inspire you to give engineering and robotics a go, even if you have little or no experience. We will use some familiar characters like the droids, R2-D2 and his ever-complaining companion, C-3PO as springboards for our robot designs and mission challenges. We will explore how engineers and designers decide how to create robots to perform certain functions in outer space. Using laptops and the construction set called Lego WeDo™, you will follow design briefs to construct models of machines, program actions and behaviors, measure distance in centimeters, speed in rotations and create and tell stories. This hands-on journey involves creativity, problem solving and teamwork as you work to solve the mission brief presented in each session. Discussions and presentations will allow you to share your ideas and to reflect on whether you’ve achieved your aims.

Mission 1 Star Wars Walker

In this session you will be introduced to the **All-Terrain Scout Transport** (AT-ST), also known as a Scout Walker, made famous by the movie. It is used by the Old Republic and the Galactic Empire for ground assault or transport and has played a pivotal role in the fate of characters and the outcome of battles. The walker is a light machine, equipped with laser cannons. Its greatest assets however, are its speed and maneuverability. Its Achilles heel is its legs. In the event of one leg getting damaged, the whole machine loses stability and it is liable to fall and be destroyed. Your mission for this session is to design and build a stable robot that is inspired by the Scout Walker. The robot’s motion is to be powered by a special camshaft that enables it to slowly put one leg in front of the other. You will need to program your walker robot to detect obstacles in its path using a sensor and to stop moving upon detecting such danger. Programming and testing this robot is a great way to explore the way in which science fiction has influenced design.

Mission 2: Cybernetic Hand – Robotic Arms

In the ‘Star Wars’ films, the science of cybernetics was used in the making of technological replacements for body parts, including eyes, limbs and, in extreme cases, most of an individual’s body. Darth Vader was rebuilt with cybernetic parts by medical droids after his limbs were severely injured. Luke Skywalker had a cybernetic hand installed to replace the one he lost after his duel with Darth Vader. In the real world a robotic arm is very useful for scientists, doctors, astronauts and engineers working in high-tech laboratories doing difficult operations, or for remotely handling unknown objects on another planet. Modern day robotic hands can pick up very small objects and move them with great precision, even more precisely than humans can. In this session you will gain an understanding of how manipulators are being used in different fields of science, and industry and even zero-gravity conditions. Your mission will be to design and construct a robotic arm that will be controlled by a keyboard and a manual crank. Once you’ve made your arm, you will test the strength and manoeuvrability of your new cybernetic limb by picking up a Rebel fighter and docking it with a space freighter.

Mission 3: Star Wars: X-Wing Alliance

For this mission you will build and program a model of the famous X-wing fighter used by Luke Skywalker to destroy the death star. This versatile spacecraft can change the arrangement of its wings midflight in order to adjust the propeller speed as it climbs up and dives down. The angle of the wings is controlled by the tilt sensor, which reports how much the spacecraft is tilted. Through programming and testing you will learn how to set the tilt sensor to each of the possible six positions. Once you've perfected your flight program, you will have the opportunity to demonstrate it to your colleagues. During this session we will also explore some science fiction classics and reflect on how this genre has changed as technology has evolved

Mission 4: Droid Scouts - Spying for the Empire

When the Empire wanted to find Luke and his friends, they sent robotic 'droid' scouts, who are able to go where living beings can't. Droids don't need food, water or oxygen and can withstand extreme heat and cold. In this mission you will design and build an unmanned remote controlled vehicle to spy for the Empire. Your vehicle will have a rotating camera and sensor mounted on an adjustable arm. You will manipulate the movable joints to place the sensor at the ideal height for detecting those Rebel troublemakers in their planetary hideouts. Once you have perfected your vehicle, you will test it by seeking out Rebels on a simulated planetary surface. During this session will also investigate how automated vehicles have been used in real world space exploration.

Preparation:

Before the first session watch at least one of the Star Wars movies to familiarize yourself with the machines that appear in the film.

Requirements:

Bring a plastic pocket book to hold handouts, a pencil case with a ruler or measuring tape; a snack (no nuts please); a small-labeled photograph of yourself and a stamped, self-addressed DL envelope for the return of your report.

About the presenter:

Carla Maxwell is an Art, Design Technology and Robotics teacher who has completed a Masters of Information Technology in Education (by Research) at the University of Melbourne. Her Bachelor of Fine Art also gives her a unique perspective on teaching in a creative and integrated manner. Carla continues to plan activities for students that are fun, hands-on and experience based, taking into account aspects of mathematical and scientific principles.