**2018 Term 4 – Project**

# Objective

The objective of the term project is to consolidate all the learning that the child has gained over the term. It’s an opportunity for the child to bring together all that learning, showcasing their creativity, innovation through a working software, hardware prototype. As part of the term project the child is encouraged to challenge themselves, push the boundaries, explore new concepts while building upon the foundation they’ve built over the entire term.

The term project is not about winning or losing but rather about the journey. The focus is the journey the child takes, working with their parents and volunteers to stretch themselves, overcome challenges they face along the way and in the end build something they are proud of. The size of the software, hardware prototype does not matter, it’s the learning gained and the opportunity to showcase that learning to their peers through the final presentation at the end of the term.

# Project options

1. Scratch project
2. Scratch + BBC micro:bit project
3. BBC micro:bit project
4. Robotics project
5. Electronic project – Based on the micro:bit, Arduino or the Raspberry Pi (chat to the volunteers)

# Project Guidelines – Scratch

This project type is only available to kids who have been with the CodeClub for 2 terms of less. The project can be designed using either Scratch 2 or Scratch 3 (Beta) using the online or offline version of Scratch.

## Content pre-requisites – Scratch

Here’s guidelines that your project will need to follow –

1. Should make use of Scratch 2 or Scratch 3
2. The project should include an “original” game or a project based on a story line / theme designed for mum/dad/someone you love
3. Should be interactive i.e. allow for user interaction using the keyboard (for Scratch)
4. Design should take into consideration interests of the person you are building the project for.
5. Consider using scenarios/themes/characters/situations that the person you are building the project for can relate to.
6. Should run for at-least 30 seconds (or more)
7. Should include music and some form of animation
8. Should include at-least 1 character designed by you
9. Should include user input through the activity, make decisions based on input and then perform an action
10. Should include the use of at-least one decision element i.e. if-then, if-then-else, if-then-elif-else, while-do, etc.

# Project Guidelines – Scratch + BBC micro:bit

The project can be designed using either Scratch 2 or Scratch 3 (Beta) using the online or offline version of Scratch. We recommend using Scratch 3 (Beta) because it comes with native integration for the BBC micro:bit. All the council laptops should have the Scratch and BBC micro:bit connector installed allowing development of Scratch projects that integrate with the BBC micro:bit.

If for some reason you are keen to use Scratch 2, please speak to the volunteers who can assist in working with you through the (convoluted) setup process.

## Content pre-requisites – Scratch + BBC micro:bit

Here’s guidelines that your project will need to follow –

1. Should make use of Scratch 2 or Scratch 3 and interact with the BBC micro:bit
2. The project should include an “original” game or a project based on a story line / theme designed for mum/dad/someone you love
3. Should be interactive i.e. allow for user interaction using the keyboard (for Scratch if required) and the BBC micro:bit
4. Design should take into consideration interests of the person you are building the project for.
5. Consider using scenarios/themes/characters/situations that the person you are building the project for can relate to.
6. Should run for at-least 30 seconds (or more)
7. Should include music and some form of animation
8. Should include at-least 1 character designed by you
9. Should include user input through the activity, make decisions based on input and then perform an action
10. Should include the use of at-least one decision element i.e. if-then, if-then-else, if-then-elif-else, while-do, etc.

# Project Guidelines – BBC micro:bit

The project would need to be designed using the BBC micro:bit makecode editor. Kids have the option to program the BBC:microbit using either block based programming, javascript or using Python. The BBC micro:bit can be used to create interactive projects, themed games or be used to measure data from the real world using its sensors and integrate that into a themed project.

## Content pre-requisites – BBC micro:bit

Here’s guidelines that your project will need to follow –

1. Should be a built using the BBC micro:bit and programmed using block coding, Javascript or Python.
2. The project should include an “original” game or a project based on a story line / theme designed for mum/dad/someone you love
3. Should be interactive i.e. allow for user interaction using the BBC micro:bit
4. Design should take into consideration interests of the person you are building the project for.
5. Consider using scenarios/themes/characters/situations that the person you are building the project for can relate to.
6. Should run for at-least 30 seconds (or more)
7. Could include music or some form of animation
8. Should include user input through the activity, make decisions based on input and then perform an action
9. Should include the use of at-least one decision element i.e. if-then, if-then-else, if-then-elif-else, while-do, etc.

# Project Guidelines – Robotics

At CoderDojo Altona North we have access to four different types of robots i.e. Makeblock mBot, Makeblock mBot Ranger, Makeblock Codey Rocky and the GoPiGo 3. Kids will need to build a project that meets criteria set out in the section below. Given the limited number of robots kids are expected to work in groups of two, sharing design, build, test and presentation responsibilities between the individuals in the team. A point worth noting is that kids who choose to work on these challenges will only have access to these robots in class. You are also free to bring your own custom robot to class and work on the challenge.

## Content pre-requisites – Introduction to Robotics

Here’s guidelines that your project will need to follow –

1. Will need to be based around one of the following robots - Makeblock mBot, Makeblock mBot Ranger, Makeblock Codey Rocky, GoPiGo 3 or your own custom robot.
2. The robot should be able to move around the designated track or circuit. The plan for the circuit will be made available in advance.
3. The robot should come to a stop, play music and flash lights if an obstacle is encountered.
4. The robot should be able to navigate around obstacles placed along the track of the designated circuit and come back to the track
5. The objective is to successfully navigate the track driving around the obstacles and completing one full lap at minimum
6. See following examples –
   * <https://www.youtube.com/watch?v=Le57JXARfSQ>
   * <https://www.youtube.com/watch?v=k6Kn0bBxzdk>
   * <https://www.youtube.com/watch?v=bwMmDUPhPLE>

Note – The robotics projects are challenging in nature. Kids are encouraged to work through the challenge and design their code to meet each of the pre-requisites laid out above. If they do not meet each of the pre-requisites about they can carry forward the project to next term and showcase whatever they have built.

## Content pre-requisites – Advanced Robotics

As part of Advanced Robotics challenge kids are encouraged to think broadly, do their own research and identify potential challenges they might want to invest in. We recommend that kids work with their parents or form teams and work with other kids to come up with ideas. Here are some guidelines to get you thinking about potential projects –

1. Will need to be based around one of the following robots - Makeblock mBot, Makeblock mBot Ranger, Makeblock Codey Rocky, GoPiGo 3 or your own custom robot.
2. A complex line following project which includes different types and sizes of obstacles. The robot would use its line following sensors to navigate through the track.
3. A maze with or without tracks that the mbot needs to navigate through using it’s line detection sensors and ultrasonic sensors.
4. A project which involved use of both the micro:bit and the mbot. This could be a simple or complex line following project with a twist. The twist could involve moving obstacles that were managed/manipulated by the micro:bit e.g. a gate on the track only open when the mbot’s presence has been detected by the micro:bit, a bridge whose floors only close up when an mbot nears the ramp, etc.
5. A set of sumo wrestling robots who play against each other. The robots are programmed to look for each other and push the other out of the ring. The winner is the one who stays within and pushes the other out.
6. Soccer playing robots which are programmed to find a large ball and push the ball into a goal.
7. See following examples –
   * <https://www.youtube.com/watch?v=WWlw78e70QU>
   * <https://www.youtube.com/watch?v=2c1VdUS48lc>
   * <https://www.youtube.com/watch?v=DmQLJ2_7e_M>
   * <https://www.youtube.com/watch?v=Vr-VC8Su1UY>
   * <https://www.youtube.com/watch?v=yx6JtQVpcUw>
   * <https://www.youtube.com/watch?v=Le57JXARfSQ>
   * <https://www.youtube.com/watch?v=bhkjOldya5E>
   * <https://www.youtube.com/watch?v=QFwnQ--HpBU>
   * <https://www.youtube.com/watch?v=Nyl7fuqpAkQ>

Note – The robotics projects are meant to be challenging in nature. Kids are encouraged to work through the challenge and design their code to meet each of the pre-requisites laid out above. If they do not meet each of the pre-requisites about they can carry forward the project to next term and showcase whatever they have built.

# Project Guidelines – Electronics

Kids have the opportunity to build an electronic project based around the BBC micro:bit, Arduino or the Raspberry Pi. The project can incorporate sensors from the Kitronik Inventors kit, Sunfounder electronics kit or the Littlebird Arduino Advent kit. The code for this project can be written using block code (BBC micro:bit), C/C++ for the Arduino or Python if using the Raspberry Pi.

## Content pre-requisites – Electronics

Here’s guidelines that your project will need to follow –

1. The project will need to interact with the real world using sensors, display data and make decisions.
2. The project will aim to address an identified need
3. The project will implement sensors to measure data from the real world, act upon the data by performing certain actions depending on the measured values of the data
4. Will need to use sensors part of the Kitronik Inventors kit, Sunfounder electronics kit or the Littlebird Arduino Advent kit.
5. The code for this project can be written using block code (BBC micro:bit), C/C++ for the Arduino or Python if using the Raspberry Pi.
6. The project can be based on a story line or a theme or be used a prop used as part of a story.
7. The project will need to be demonstrated as a working prototype

**Approach** –

1. Think through the content pre-requisites and work through your storyline
2. Come to class and share with us your story line for your project / game / activity
3. Document your story line, design and approach on paper.
   * Use simple block based flowcharts to show how the game/story/project will evolve
   * Visualize and write up the different steps involved in your game/story/project and how they are different from each other
   * Visualize and write up the challenges at each of the steps and which ones need specific attention
   * Use additional sheets of paper to work through logic for key aspects of the solution.
   * Discuss with the volunteers and talk through your approach before you start putting together code
4. Present the storyline / theme / concept in class along with the documented flowchart/visualization you’ve put down on paper
5. Work on the project in parallel and fine tune it along the way
6. Present the final project at the last session for the term

**Presentation** –

All kids will be asked to present their project at the end of Term. There are no first/second prizes. The chief guest will have the opportunity to nominate two projects along the following lines –

1. Technical Ninja – A project that stands out for meeting all the technical criteria laid down.
2. Creative Ninja - A project that stands out for its innovate approach and creativity in addressing the challenges encountered.

**Happy Hacking!!!**