

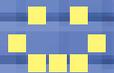
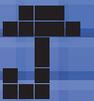
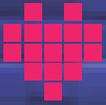
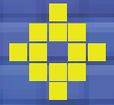


BBC



micro:bit

GAMER HIT



ABRA



MICROBIT-ARCADE

Table of Contents

Parts List.....	3
Required Materials	3
Introduction.....	4
MICRO:BIT	4
Hardware.....	4
Software	5
Arcade 6	
gamer:bit Hardware.....	6
gamer:bit Software	6
gamer:bit Wiring.....	7
Button	7
Joystick.....	7
Build	8
Games 8	
Button Test	8
Coding Basics	9
Game	9
Gamerbit	10
Sample Game	10
#1 – CATCH.hex.....	10
#2 – TAG.hex.....	10
#3 – CHASE.hex	10

Parts List

	Description	ABRA Part #
	micro:bit controller	MICROBIT
	gamer:bit board	DEV-14215
	Arcade joystick	GAMES-05
	Red arcade button	COM-09336
	Blue arcade button	COM-09337
	Yellow arcade button	COM-09338
	Green arcade button	COM-09341
	USB A to Micro B Cable	CAB-600- R
	Spade Connector wire (x16)	CAB-14166
	Battery holder	BAT-H-2AAA
	AAA batteries	30-AAA-4
	Screw & Nut	1965P-3 1068P-3

Required Materials

	Box Cutter (Exacto) Knife
	Phillipshead screwdriver
	Adhesive tape
	Marker or pen/pencil

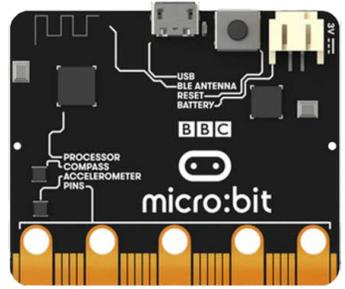
Introduction

The micro:bit is an easy to use yet surprisingly powerful piece of hardware that will allow you to create many impressive gadgets.

The board was designed in the UK by the BBC and measures only 4x5 cm.

The module interacts with many electronic parts and runs customized scripts.

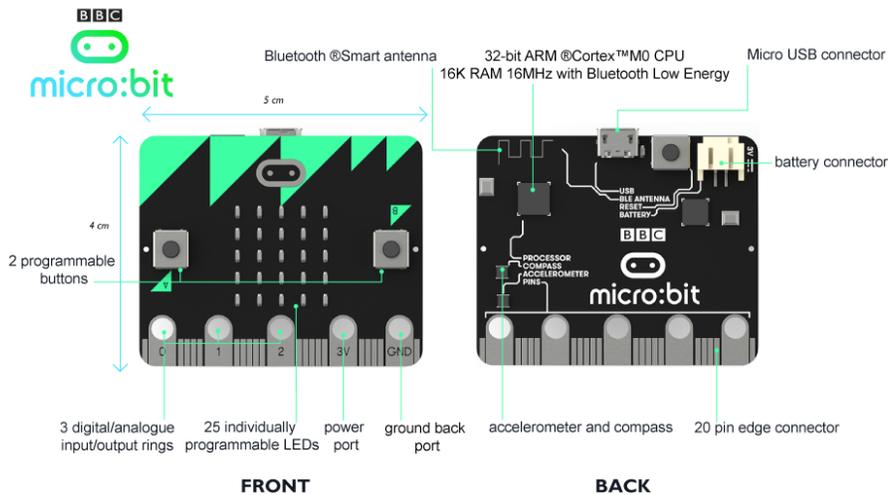
The micro:bit is perfect for beginners who are starting simple projects and for advanced users looking for new challenges.



Level	Intermediate - Advanced
Assembly	~2hr

MICRO:BIT

Hardware



- 16MHz 32 bit ARM Cortex - M0 Nordic nRF51822
- 256 kB Flash
- 16 kB RAM
- 2.4 GHz Bluetooth BLE
- USB 2.0 OTG (On-The-Go)
- 3.3V regulator (for USB only)
- 3 axis accelerometer (I2C) – NXP/Freescale MMA8652
- 3 axis magnetometer (I2C) – NXP/Freescale MAG3110
- 5x5 LED Array
- 2 programmable tactile push buttons
- 1 Reset button
- Ring connectors 3 x I/O, Power, Ground)
- 3 x PWM, 17 x GPIO (Analog, Serial, SPI, I2C)

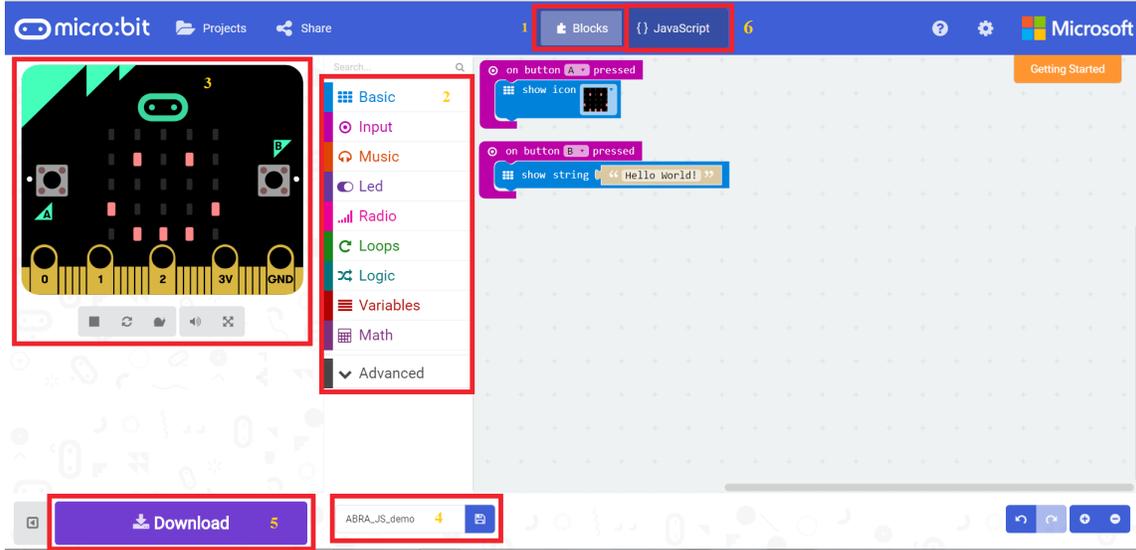
Software

The micro:bit also offers powerful software capability. The code editor is readily available online and scripts can be programmed by simply dragging and dropping block modules. Furthermore, before compiling the code, we test our project on the micro:bit simulator.

This project requires the use of a special Sparkfun package.

MakeCode JavaScript Editor:

Start coding here: <https://makecode.microbit.org/>



1	Block mode
2	Code block selection menu
3	Program simulator
4	Name/Save file .js
5	Download hex file for uploading on board
6	JavaScript mode

Running Programs:

1. Connect the micro:bit into your computer USB. Your computer should recognize the device and create a MICROBIT drive
2. Compile the script (varies with each program editor). This creates a .hex file
3. Save file locally on your computer (ex: My Documents)
4. Locate the downloaded .hex file and folder and copy it (drag and drop) into the MICROBIT drive folder. This will compile the file onto the hardware. (You cannot do multiple files at a time)
5. The micro:bit LED will flash for a few seconds. The software has been incorporated into the flash memory. This means that even after unplugging your device your program will remain. It will execute next time the board is powered.

Windows



MAC



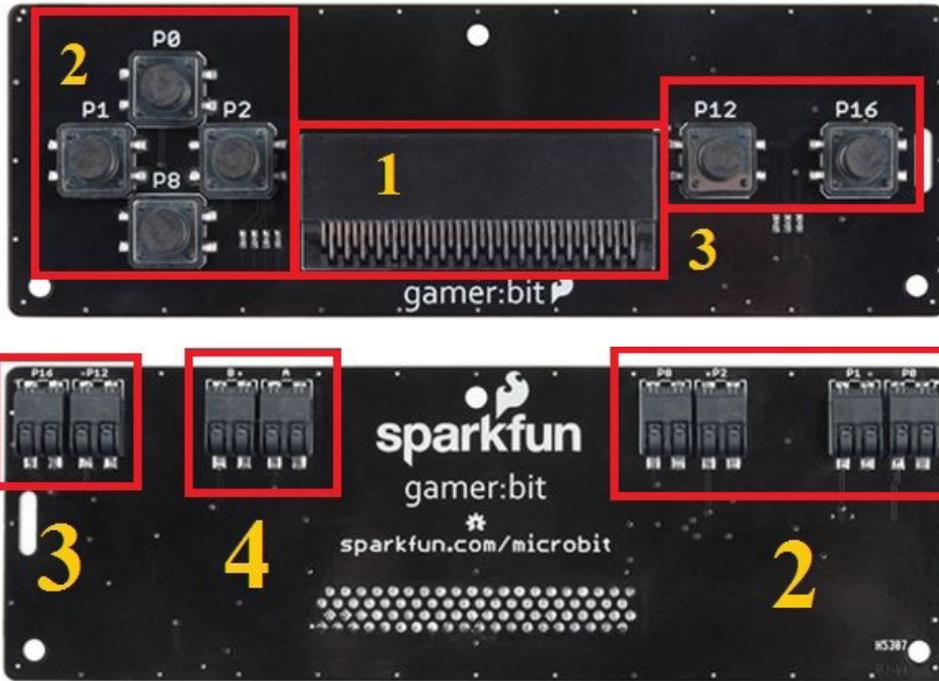
** Download Sample Code Attachments From The Abra Product Page **

Arcade

gamer:bit Hardware

The heart of this project is the gamer:bit break-out board.

Each button has a pin assigned to it. This pin is used for programming. Each button can be used on the micro:bit gamer:bit by itself or can be connected and replaced by another type of button.

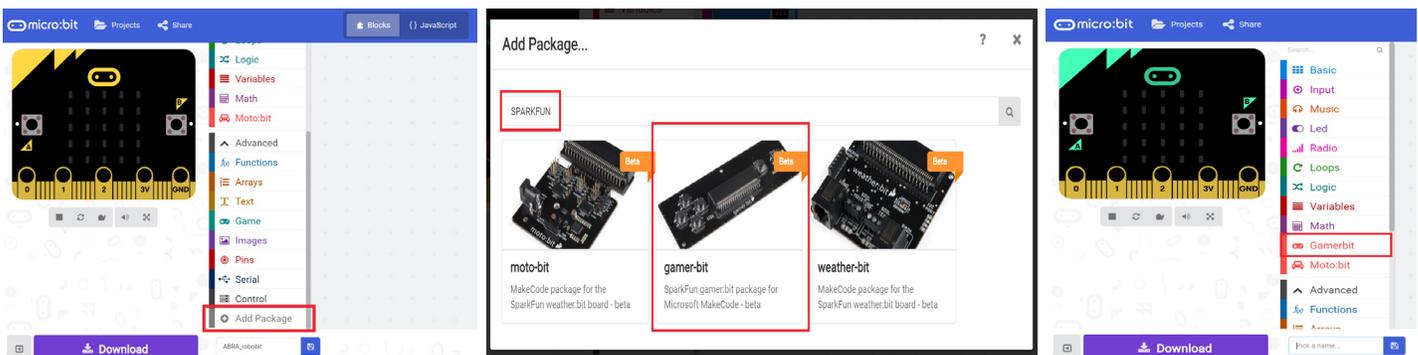


1	micro:bit port
2	Direction pad / Joystick (U,D,L,R)
3	X Y buttons
4	A B buttons

U	P0
D	P8
L	P1
R	P2
X	P16
Y	P12
A	A
B	B

gamer:bit Software

The gamer:bit is powered by a full package of functions which make coding our games much simpler. Let's install the Sparkfun gamer:bit package



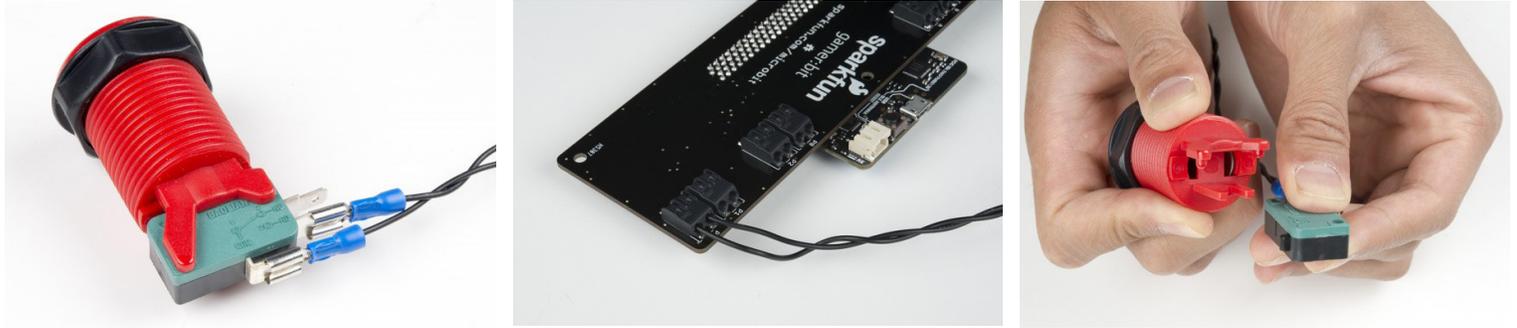
gamer:bit Wiring

The next step is wiring the buttons and joystick and installing them in the arcade box.

****You Prefer Using The Original Micro:bit And Gamer:bit Buttons, Skip Ahead To Start Coding Your Games****

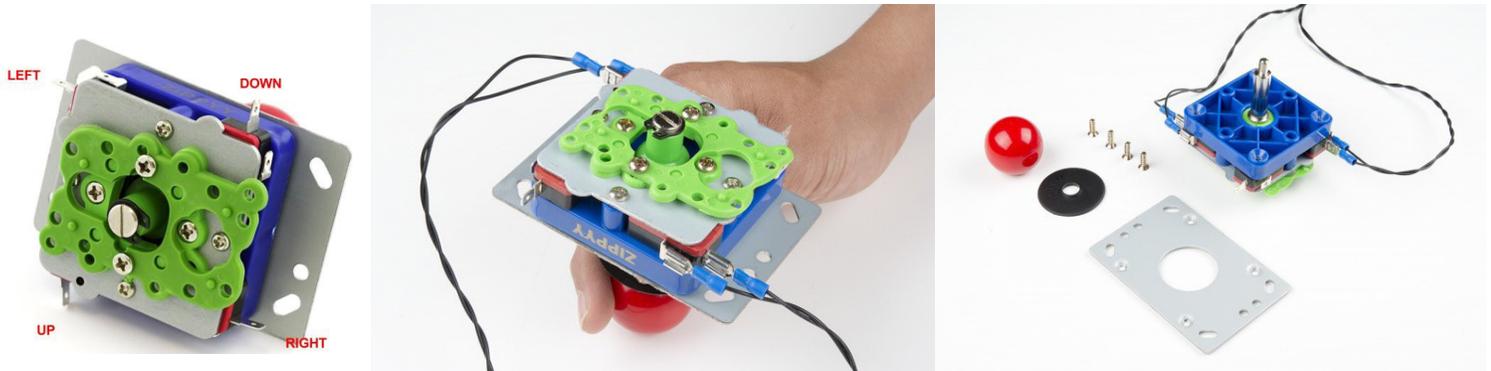
Button

You can add as many or as few buttons as you like. You can place the buttons anywhere you like on the box.



It is a good idea to wrap, label and tape the wires (connection order is not important). The button comes apart for easy installation in the box. Follow the pin guide from gamer:bit Hardware. We will test these buttons in the next section.

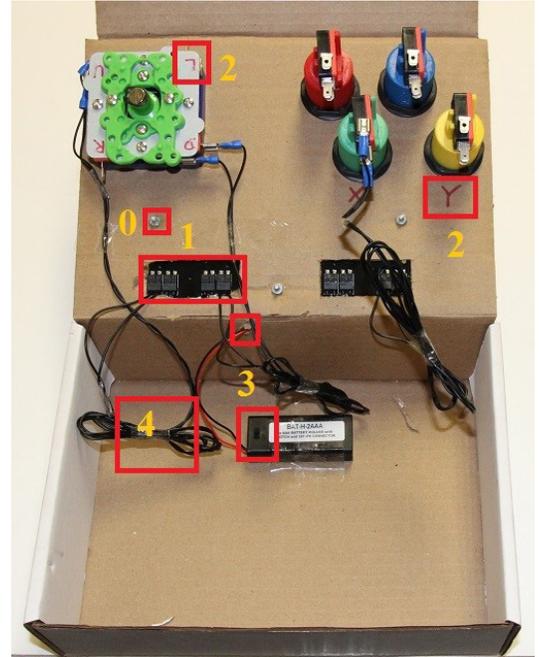
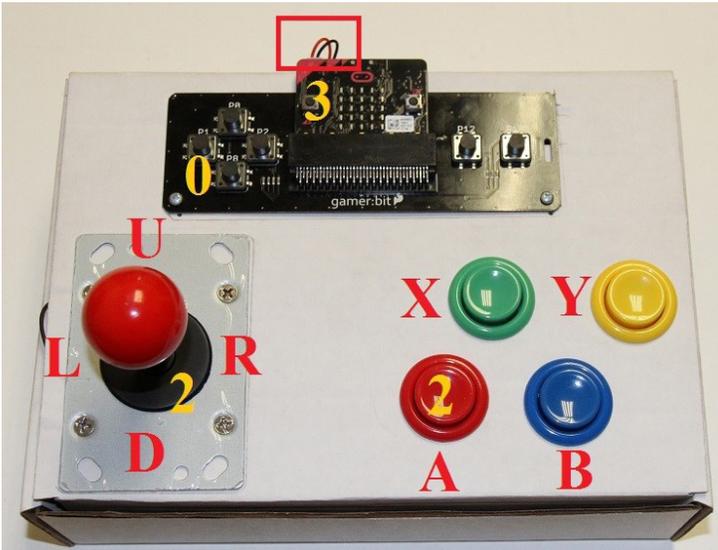
Joystick



It is a good idea to wrap, label and tape the wires (connection order is not important). The joystick comes apart for easy installation in the box. Follow the pin guide from gamer:bit Hardware. We will test the joystick in the next section.

Build

Now that the buttons have been wired, let's assemble the box. It's a good idea to cut out the holes and install everything before testing. We recommend starting with the gamer:bit and battery pack and then connecting each button one at a time.



0	micro:bit + gamer:bit
1	Joystick wiring
2	Button and joystick labeling
3	Battery pack, switch and wiring (poke a hole)
4	Clean wire wrapping and taping

Games

Button Test

Download ButtonTest.hex (available on ABRA's product webpage) into MakeCode editor. (This code will work with the micro:bit and gamer:bit buttons as well as our custom buttons.)

Function:

- A small LED (sprite) will appear at the centre of the screen
- The joystick will move this sprite Left, Right, Down, Up
- Pushing buttons A, B, X, Y will display the letters on screen

**** Do not advance unless all buttons are working ****

Coding Basics

The objective of this DIY micro:bit Gamer Kit is to allow you to build and program your very own games. You can use the Block Editor and Simulator to create your games or dive right into Javascript development.

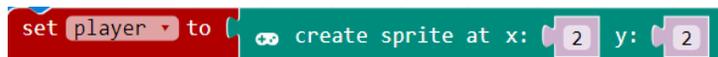
If you are brand new to micro:bit, get familiar with the basics here:

Beginner's Guide: <https://makecode.microbit.org/reference/>

*If you want to start playing, jump ahead to Sample Games

This section provides a basic explanation of the fundamental code blocks needed for making your games.

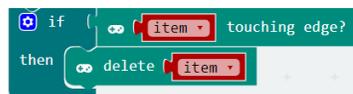
Game



- Create variable "player" at specified sprite position (you can create multiple players or targets)



- Move/Turn/Change/Set your players with the controller



- Influence behaviour based on screen and sprite position



- Set score, change score, get score



- Game timer in milliseconds, game over



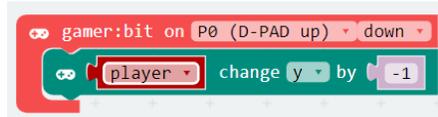
- Game over show, display score



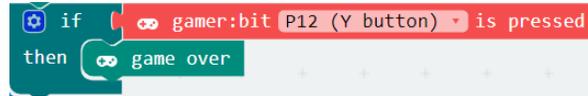
- Pause/Resume player gameplay to allow graphics to render

(Advanced: Try using the micro:bit's built in accelerometer)

Gamerbit



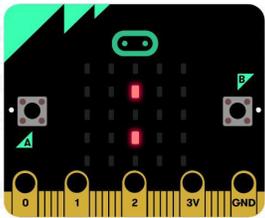
- This controls which input pin (P) we want to use for joystick and buttons
- We can specify the action when the button is held pressed (down), not pressed (up) or clicked (click)



- This reads the value of a control and performs the desired task

Sample Game

** Download Sample Code Off The Abra Product Web Page **



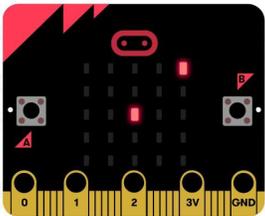
#1 – CATCH.hex

Objective:

Catch the targets as they drop from the top of the screen. Every target you catch is a point for you; every target you miss is a point lost. Catch as many as you can in 20 seconds.

Controls:

- Joystick (Left and Right)



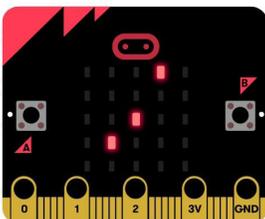
#2 – TAG.hex

Objective:

Your target randomly appears on the screen. It is your job to track it down and tag it before time runs out. Tag as many targets as possible for maximum points. Your player begins at the centre.

Controls:

- Joystick (Left, Right, Up, Down)



#3 – CHASE.hex

Objective:

There are 2 enemies chasing you. Every second they randomly change position. It is your challenge to avoid getting tagged by these enemies. Your player begins at the centre. Each round survived earns you a point. The game is over once you are tagged.

Controls:

- Joystick (Left, Right, Up, Down)
- X button (this randomly changes your position)

ABRA

Congratulations! You have completed the ABRA Electronics – micro:bit Arcade Kit.

You now have a full understanding of the basics of game development. You can combine and expand your knowledge from these exercises to create interactive multiplayer games.

For more exciting micro:bit project ideas, visit :

<https://abra-electronics.com/robotics-embedded-electronics/micro-bit/>



ABRA

www.abra-electronics.com

5465 Cote de Liesse
Montreal, QC
H4P 1A1

Tel: 514-731-0117

Toll Free: 1-800-361-5237