ARCADE for MakeCode Arcade

www.kitronik.co.uk/5311

Kitronik

Introduction: The ARCADE is a programmable gamepad for use with MakeCode Arcade. It features a full colour LCD screen, a piezo buzzer for audio feedback, a vibration motor for haptic feedback, 6 input buttons, a menu button and a reset button. The ARCADE is supplied complete in a transparent protective case, which allows the electronics to be seen.

The ARCADE is powered by either 3xAA batteries or via the micro USB connector. The battery holders are located on the rear of the PCB. Insert the batteries with the negative side onto the spring connection of the battery holder. The ARCADE produces a regulated supply for the on-board processor.

The ARCADE is designed for MakeCode Arcade (https://arcade.makecode.com/)

Programming from MakeCode Arcade:
Connect the ARCADE via the micro USB port to a computer. If the board was already running then press the reset button. The display of the ARCADE will now show the download screen, and a removable drive (labelled KIT-ARCD) will appear. Pressing the Download button in MakeCode Arcade will produce a .UF2 file, which needs to be saved onto the removable drive. For more details see later in this datasheet.

Examples: For some starter games and ideas for what else you could do, go to: www.kitronik.co.uk/arcade

Board Layout:

Rear: 3 x AA Battery Holders
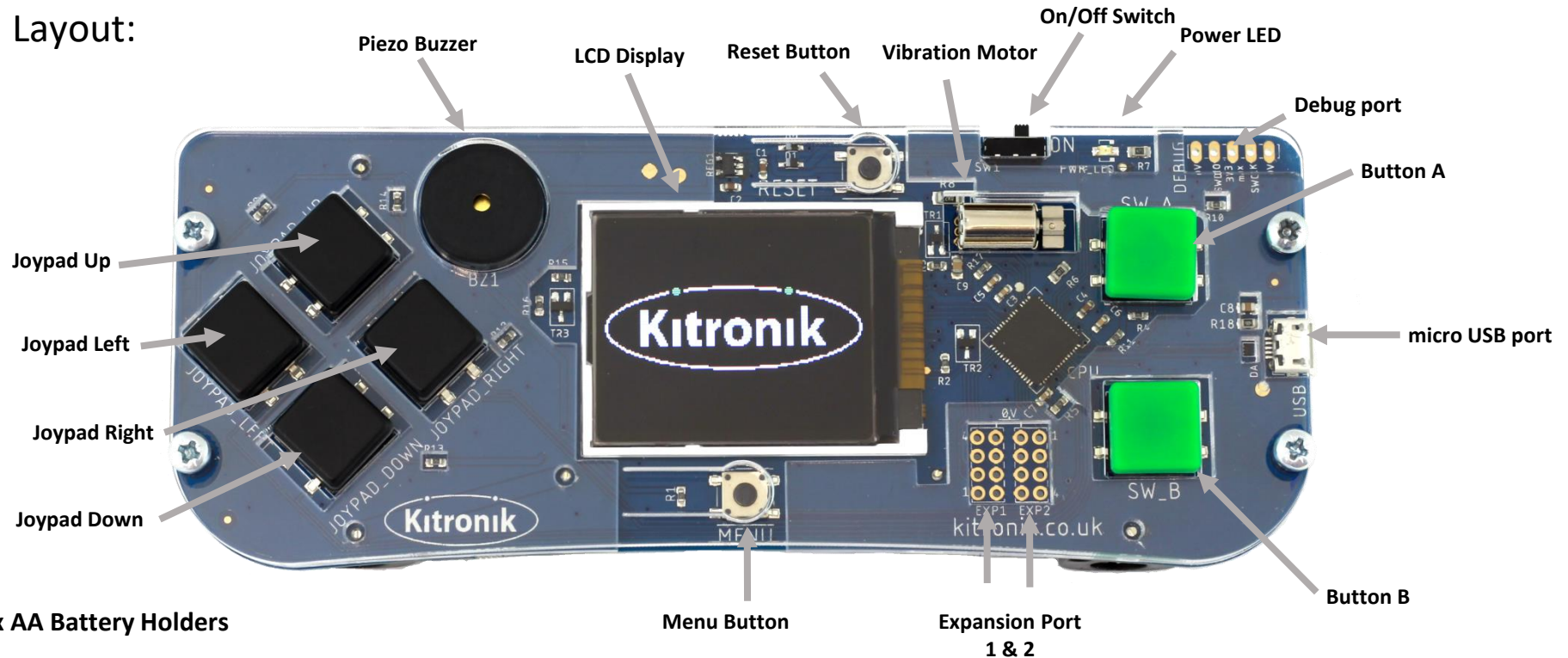
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Programming the ARCADE from Microsoft MakeCode Arcade Blocks Editor

The ARCADE is programmed using the Microsoft MakeCode Arcade Editor.
To use MakeCode Arcade navigate to https://arcade.makecode.com in a web browser (such as Edge, Chrome, or Safari).
There are numerous sample games and tutorials on the MakeCode website. To open them click on the various tiles.

To create your own game from scratch click on the New Project button (other projects previously created are also shown on this home screen). The editor will ask to give the project a name. Type in an appropriate name (such as "My first game")
There is an example game on the next page.

When you have created your code and want to load it on the ARCADE:
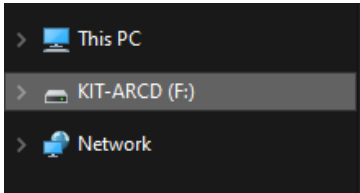
Make sure the ARCADE is switched off and connect a micro-USB lead from the ARCADE to the Computer.
On first connection the Computer may require installation of drivers, this will be done automatically.
Once complete a notification should appear on your Computer.

On the ARCADE a download screen will appear and a drive will appear on the Computer (similar to other devices like USB sticks, phones and BBC micro:bit).
Whenever a micro USB lead is inserted, connecting the ARCADE to a Computer, pressing the reset button on the ARCADE will switch between the currently loaded code and the download mode.

To get the code from the editor to the ARCADE, click on the download button.
The first time this is done the editor will ask you to select which compatible device you have.
Select the Kitronik ARCADE from the list. If the Kitronik ARCADE is not listed then select the D5 option.

Then select where to save the .UF2 file (select KIT-ARCD on the device list), or if the file has already been saved in your downloads folder, simply drag and drop the file into KIT-ARCD.
The ARCADE power LED will flash as the transfer occurs. Once complete, the code will start running.

Should the download fail then the ARCADE may only display a blank screen, and the power LED will pulse. In this case reconnect to the Computer and press the reset button. This will put the ARCADE back into download mode.

Microsoft MakeCode Arcade Blocks Editor Code

This program was created in the Microsoft MakeCode Arcade Blocks Editor (https://arcade.makecode.com).
The game shows Kit – The Kitornik Robot as the player. The aim is to move around the screen collecting batteries, with every battery gaining points.

On Start block: First, the background colour is set. Then a player and a food icon are created to display on screen. The Player is in the shape of Kit, and the food is in the shape of a battery. The move block connects the player icon to the gamepad keys, to allow the player to move the robot around.
Finally a 10 second countdown is started, this limits the length of the game.

On sprite block: This block runs once Kit gets to the battery. It detects that there is an overlap in their positions.
The blocks inside increase the score, for the collection of the battery, and then redraws a new battery to collect at a random place on the screen.

This example can be loaded from https://makecode.com/_7w71T5emyPH0

Note: There are additional tutorials on the MakeCode Arcade home page (link above).

Electrical Information

Processor	Atmel SAMD51J19A
Operating Voltage (Vcc)	3xAA – Alkaline or NiMH/NiCad (3.6-4.5V) or USB (typically 5V)
LCD screen resolution	160 x 128
LCD screen size	1.77 inch (diagonal)
Typical Current Draw	Approx. 80mA (depending on use)
Typical Battery life (based on 3xAA 1500mAh batteries)	Approx. 20 hours (depending on use)

Debugging and Expansion Port Information for Expert users

For more advanced use, the debug port allows the user to customise the processor bootloader code, using a SWD programmer. The port is designed for 2.54mm (0.1") pitch standard pin header.
For more information see: https://arcade.makecode.com/hardware/dbg

Also included on the ARCADE are 2 expansion ports. These are connected directly to the microprocessor pins. Enabling these ports requires reconfiguration and programming of the ARCADE bootloader. The bootloader source can be found at:
https://github.com/KitronikLtd/kitronik-arcade-uf2-bootloader

The expansion port is designed to take 2.54mm (0.1") dual pin headers.
Paired with each IO pin on the expansion port is a 0V connection. The IO pins are rated to 3V max. See the pinout table for connections from the expansion ports to the microprocessor.

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Debugging Port	0V	SWCLK	3V3	SWDIO	0V

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Expansion Port 1	PA08	PA09	PA10	PA11	0V	0V	0V	0V
Expansion Port 2	PA12	PA13	PA14	PA15	0V	0V	0V	0V

Note: Kitronik do not take any responsibility for changes users make to the bootloader code on the processor.

EN 55032:2015,
EN55035:2017,
EN IEC 63000:2018