

STEM Kit for Micro:bit Instruction Manual



Preface





In order to learn and use micro bit more easier, we particularly make OSOYOO STEM kit which is fully compatible with micro bit. It can help you make learning easy and fun to enjoy the programming.

05**ð**700

http://osoyoo.com/?p=25057







Easy to Assemble

All the module interface has been modified with XH2. 54 ports as to make it much easier and convenient to wire for each experiment and reduce the chances for errors.



Coding Editors for Micro:bit

We use MakeCode editor to conduct our tutorial experiments.

MakeCode is a coding editors which combines the magic of making with the power of code across a variety of different products.
MakeCode has MakeCode online editors and MakeCode apps and is compatible with PC, computer, PC tablet, phone





Table of Contents

Lesson 1 Greeting card	
PARTS&DEVICES	9
ABOUT MODULE	9
HOW TO CODE	9
HOW TO USE	13
Lesson 2 What is MakeCode	
Starting Microsoft MakeCode for micro:bit	15
Saving and downloading a project to a file	
Flashing a hex file to micro:bit	
Deleting a project	
Adding blocks onto coding area	
Duplicating a block	22
Deleting a block	23
Lesson 3 Micro: Bit & PnP board	25
BBC Micro:bit	26
Resource	
Lesson 4 Twinkling Star	
PARTS&DEVICE	
ABOUT MODULE	
HOW TO CODE	
PROGRAM RUNNING PROCEDURE	
HOW TO USE	35
Lesson 5 Mini Traffic Light	36
PARTS&DEVICES	
ABOUT MODULE	
HOW TO USE	





HOW TO CODE	
PROGRAM RUNNING PROCEDURE	
HOW TO USE	42
Lesson 6 Colorful Neon Light	43
PARTS&DEVICES	43
ABOUT MODULE	44
HOW TO MAKE	
HOW TO CODE	44
PROGRAM RUNNING PROCEDURE	51
HOW TO USE	51
Lesson 7 Whose actions is faster?	52
PARTS&DEVICES	52
ABOUT MODULE	53
HOW TO MAKE	53
HOW TO CODE	54
PROGRAM RUNNING PROCEDURE	57
HOW TO USE	57
Lesson 8 Play Music	58
PARTS&DEVICES	58
ABOUT MODULE	59
HOW TO MAKE	59
HOW TO CODE	59
PROGRAM RUNNING PROCEDURE	62
HOW TO USE	62
Lesson 9 Eye protection Lamp	63
PARTS&DEVICES	63
ABOUT MODULE	64
HOW TO MAKE	64
HOW TO CODE	



OSÓYOO

PROGRAM RUNNING PROCEDURE	
HOW TO USE	69
Lesson 10 Smart Street Lemn	
Lesson to Smart Street Lamp	
PARTS&DEVICES	
ABOUT MODULE	71
HOW TO MAKE	
HOW TO CODE	71
PROGRAM RUNNING PROCEDURE	77
HOW TO USE	77
Lesson 11 Voice-activated Light	
PARTS&DEVICES	
ABOUT MODULE	
HOW TO MAKE	
HOW TO CODE	
PROGRAM RUNNING PROCEDURE	
HOW TO USE	82
Lesson 12 Home Appliance Control	
	03
PROGRAM RUNNING PROCEDURE	88
Lesson 13 Mini Electronic Door	89
PARTS&DEVICES	
ABOUT MODULE	
HOW TO MAKE	
HOW TO CODE	
PROGRAM RUNNING PROCEDURE	94
HOW TO USE	



OSÓYOO

Lesson 14 Advertising Board	
PARTS&DEVICES	95
ABOUT MODULE	
HOW TO MAKE	
HOW TO CODE	
PROGRAM RUNNING PROCEDURE	
HOW TO USE	104
Lesson 15 Mini Weather Station	105
ABOUT MODULE	
HOW TO CODE	
PROGRAM RUNNING PROCEDURE	
HOW TO USE	115
Lesson 16 Mini Electric Fan	116
PARTS&DEVICES	116
ABOUT MODULE	117
HOW TO MAKE	117
HOW TO CODE	117
PROGRAM RUNNING PROCEDURE	120
HOW TO USE	120
Lesson 17 Smart Fire Alarm	
PARTS&DEVICES	121
ABOUT MODULE	122
HOW TO MAKE	122
HOW TO CODE	123
PROGRAM RUNNING PROCEDURE	127
HOW TO USE	127
Lesson 18 Mini Reverse Radar	128
PARTS&DEVICES	





	ABOUT MODULE	. 129
	HOW TO MAKE	. 129
	HOW TO CODE	. 130
	PROGRAM RUNNING PROCEDURE	. 138
	HOW TO USE	. 138
		400
L	Lesson 19 Smart IR Controller	.139
L	PARTS&DEVICES	.139
	PARTS&DEVICES ABOUT MODULE	.139 .140 .140
	PARTS&DEVICES ABOUT MODULE HOW TO MAKE	.139 .140 . 140 . 140
	PARTS&DEVICES ABOUT MODULE HOW TO MAKE HOW TO CODE	.139 .140 .140 .140 .141
	PARTS&DEVICES ABOUT MODULE HOW TO MAKE HOW TO CODE PROGRAM RUNNING PROCEDURE	. 139 . 140 . 140 . 140 . 141 . 141



Ċ



Lesson 1: Greeting card







PARTS & DEVICES

BBC micro:bit board x 1

- Micro USB Cable x 1
- Computer/Tablet PC/Phone x1

ABOUT MODULE

Micro:bit has 5x5 LED matrix which can show icons, numbers, and words





lt is like playing a kid mushroom nail plug puzzle. lighting a led is like pluging a mushroom nail on board

HOW TO CODE

Step 1. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro: bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>

		2
←→ ⊂ ■ https://mal	kecode.microbit.org/#	
⊡micro:bit	👫 Home	Light up the licon to
	er state -	bookmark uns page
	abore 1865	
•••••		
HEREFERRED N.N.		
My Projects > 3		± Import
New Project		

Step 2. Then the MakeCode editor for micro: bit will start on your browser. In the Toolbox, click on any Category and from the submenu, click on the block you want to place on the







🖸 micro:bit 💣 Home	C Blocks		{}	JavaS	cript			0	¢		•	Aicro	soft
CD	Search Q	or L	star	t			fore	ver					
• D	G Music		÷.	×.	×		1	120	×.				
	C Led												
	C Loops												
Simulator	Variables												
	Math												
	Toolbox					C	odi	ing	A	re	a		
L Download	Untitled Viniload Project	8								6	n n	•	۰

Step 3. In the Toolbox, click on the Basic category and drag and drop "**show leds**" block inside the **forever** block. Otherwise, you can click on "**show leds**" block to placing it on the coding area and then drag it inside **forever** block. Draw a "heart" (as following) by clicking the dots in the 5×5 matrix, then you will see the heart shown on the simulator.



Step 4. In the Toolbox, click on the Basic category and drag and drop a **show icon** block inside the forever block, just below the **show leds** block., and choose *an example icon* (*different from the heart at the last step*) from the drop-down menu.



Step 5. In the Toolbox, click on the **Basic** category and Click more and drag the **clear screen** block over and place it inside **forever** block.







Step 6. Drag and drop a **show string** block from **Basic** category over and place it inside the **forever** block, and change *Hello* to *Papa*.



Step 7. In the Toolbox, click on the **Basic** category, click and drag the **pause (ms)** block over and place it inside of the forever block, and change *time* as you like.



Step 8. Rename this project as "flashing-heart" and click Download to download this





project.



Step 9. For chrome browser users, you can see a little windows at the bottom of browser, you can see a .hex file when click "Show in folder". If you use other browser, please open this file's folder according to the download directory of your browser.

	Open Always open files of this type
📥 Download	Show in folder g-heart Cancel
microbit-Flashing	hex 👻
🖉 💭 📓 + Computer + Local Disk (C) +	• 49 Seach Downloads
File Edit View Tools Help Organize • _ Open E-mail New folder	x • D 0
Favorites E Deviktop	
White Music Constants Wideo	· · · · · ·
eð Homegroup	
Computer Microbit-Flashing-heart.her Software (D)	
🗣 Network	
microbit-Flashing-heart (1).hex Date modified: 7/38/2019 3:50	0 PM Dute created: 7/38/2019 3:50 PM

Step 10. Connect Micro bit to your computer with Micro-USB cable, and you will see a "MICROBIT" disk.

Oreanize - AutoDia	Help	Cutum execution	Uninstall as shares a suspense		- FR - 0	
Organize • AutoPla	y Eject Properties	System properties	Uninstall or change a program	» 🕞= *		
 ☆ Favorites ■ Desktop B Downloads S Recent Places 	Hard Disk Drives (4 Local Disk (C:) 485 MB free of) 50.0 GB	software (D:) 37.8 GB free of 139 GB			
 Libraries Music Pictures Videos 	Devices with Remo	139 GB vable Storage (3)	entertainment (F:)	60	mpular	Micro bit
Normegroup	DVD Drive (G:) MICROBIT (b)		Removable Disk (H:)			
Computer Local Disk (C:) Software (D:)	8.04 MB free o	(8.05 MB				لیت ک
□ 文档(E) □ entertainment (F				Connect	Micro bit ith Micro	to your comput -USB cable

Step 11. Drag the .hex file to "MICROBIT" disk. Otherwise, right click the .hex file and send it to "MICROBIT" disk.





8.04 MB	Or right click the .hex file and send it to MICROBIT		
(1) Drag the .hex file to MICROBIT	Send to MICROBIT Cut		
microbit-Hush	ing-head.hes		
The Copying			
Copying Copying for Downlash Discovering Rem.	E MCCOUT ()		

Below link is the full code we have done for you as reference, you can click the **edit** at the

upper right conner to get the full code :

https://makecode.microbit.org/_VMVF1o2PjdUc

HOW TO USE

We can see many LED advertising screens, flashing lights of outside building in our lifetime like our project



LED Advertising Screen



Flashing light of outside building





Is it cool to make a flashing LED gift card? How easy it is to make code with micro:bit! We can use the micro:bit LED to decorate our toy castle or car.



Are you excited with micro:bit? Let's start learning programing and use this tiny computer to expand our imagination and create hundreds of funny games.





Lesson 2: What is MakeCode



This tutorial and most of OSOYOO's content about BBC micro: bit will use **MakeCode by Microsoft** as programming development environment.





Starting Microsoft MakeCode for micro:bit

Step 1. Using your web browser, go to https://www.microsoft.com/en-us/makecode to open the MakeCode landing page.



Step 2. Click "micro: bit" icon to MakeCode landing page. (You can also skip the step 1/2, and go directly to MakeCode page by typing following link https://makecode.microbit.org in browser.)In the MakeCode home page My **Projects** section, click on "**New Project**" to create new project. And click **previous project** to edit existing project.



Step 3. The MakeCode editor for micro: bit will start on your browser.







Simulator – Provides the output without the real hardware while you are building the code.



Toolbox – Provides blocks in categories. It also allows you to search extensions (ready-made program modules) and add more extensions to the toolbox.



Coding Area – The area you use to design your program logic through **Blocks** (graphic programming) or JavaScript coding.







Home – Takes you to the home screen (https://makecode.microbit.org/), which shows recent projects and other activities.



Share – Displays the Share Project window that lets you publish your project to the public cloud and embed your project into a web page with different options.

	Share		
Share Project	Ŷ		Ø
Name			
You need to publish your project to to publish this project.	share it or embed it in other web pag	ges. You acknowledge having cons	ent
		Publish project	~

Blocks and JavaScript button- Allows you to switch the code view between Blocks and JavaScript. Press one of the view buttons at the top to switch the programming method.



Help – Shows a menu with help options such as support, reference, blocks, JavaScript, hardware, and where to buy









More... (Gear wheel) – Allows you to access project settings, adding extensions, deleting the current project, deleting all the projects, choosing a language, and pairing micro:bit for one-click download.

Undo and Redo – Allows you to undo and redo recent changes you make either in Blocks or JavaScript with the Undo and Redo buttons in the bottom right of the editor window.

	(E Block	s () JavaScript		E Blocks	{} JavaScript
on sta	art ar scri	een i	forever	⁰ Undo	on start clear screen	forever show leds
			shaw leds	Redo		
			ROA			
				j i		

Zoom In and Zoom Out – The zoom buttons change the size of the blocks when you're working in the Blocks view. When you're working with the code in the JavaScript view, the zoom buttons change the size of the text.



Save Project – You can type a name for your project and save it. Type in a name for the project in the text box, and press the disk icon to save.



Download – The Download button will copy your program to a drive on your computer.



Show/Hide the simulator – The Show/Hide the simulator button can be used to show or hide the simulator.







Saving and downloading a project to a file

In the project name box, type in a name for your project and click on the Disk icon. The new name of the project is updated in your browser's local cache. At the same time, a hex file will be downloaded to your computer.



If you click on the Disk icon without providing a new name for the project (with the default file name, Untitled), the Rename your project modal box (window) will pop up, type in a name for the project, and click on the Save button. The project will save under the new file name, and a hex file will be downloaded to your computer

Nete :	3		
	Save 🗸 🤇	Cancel ×	
		_)	

Click on the Download button in the bottom of the page. A hex file will be downloaded to your computer.







• Flashing a hex file to micro:bit

For chrome browser users, you can see a little windows at the bottom of browser, you can see a .hex file when click "Show in folder". If you use other browser, please open this file's folder according to the download directory of your browser.

	Always open files of this type Show in folder	
± D	ownload Cancel	
microbit-Test	hex 🗸	,
	_	
🔾 💭 👔 🖡 Computer 🔸 Local Disk (C.)	COLUMN TO A REAL PROPERTY.	
File Edit View Tools Help	- table	W - 73 - 0
Sector Contraction		
Cesktop		
A Downloads		
25 Recent Places		
Cill Libraries		
Music		
Videos		
eg momegroup		
1 Computer		
Local Disk (C:)		
Ca software (D)	microbit-Test.hex	
and the second s		
Wetwork		

Connect the micro: bit to your computer using a micro USB cable (use the micro USB port on the top of the micro: bit)

File Edit View Tools	Help							
Organize - AutoPlay	Eject	Properties	System properties	Uninstall or change a pro	igram »	8: • D		
★ Favorites ▲ Desktop ▲ Downloads ☑ Recent Places ↓ Libraries ↓ Music	• Hard Di	sk Drives (4) ocal Disk (C:) 85 MB free of 5 285 (E:) 5.3 GB free of 1	0.0 GB	software (D:) 37.8 GB free of 135 entertainment (F:) 15.7 GB free of 137	9 G8			000
Pictures Videos Udeos U Computer		WD Drive (G:) MCROBIT (E) .04 MB free of E	LOS MB	Removable Disk ()	+t)	0	D	J
Local Disk (C:) software (D:) Xtfi (E:) entertainment (F MICROBIT (b)		÷.			Conn	ect Micr with N	o bit licro-	to your compute USB cable

Copying a hex file to the micro: bit drive

MICROBIT (L)	
① Drag the .hex file to MICROBIT	Cr right click the .hex file and send it to MICROBIT Send to Cut Cepy
microbit-Test	
from Downloads to Discovering items ♥ More details	Cancel





Go to MakeCode home page and choose the project you want to delete.



In the Editor controls, click on the **More**... button. In the drop-down menu, click **Delete Project**. In the delete confirmation modal box (window), click on the **Delete** button

	Search	Q on st	tart		forever	2		至 Project Settings
	Basic Input	-					- (2 Print
Q ₄	• Music		4. P.		-			Delete Project
	O Led							Report Abuse
0 1 2 3V	GNDI Radio							
■ 0 ₩ 4) Ж	< C Loops							Canguage
	X Logic							High Contrast On
	Variables							Green Screen On
	Math		1.1		1			Reset
N C Z	ould you like to delete 'T	esť?					1	Ab ut
It will	be deleted for good. No undo							
	e deleted for good. He dilde			3)			2.	

Adding blocks onto coding area

In the Toolbox, click on any **Category** and from the sub-menu, click on the block you want to place on the coding area

	Dirch Q	Basic		-	
	Basic	2	3	on start	
·0 0·	••• more	show number 0	K		
4	 Input 	show number	0		_
0.0.0.0.0.	C Music	show leds	*	-	
	al Radio			forever	
	C Loops				-
	X Logic		+	-	
8 V 11 V	Variables				×
	Math	show icon	8		$\mathbf{x} = \mathbf{x}$
	✔ Advanced				
10111		show string "Hello!"			

You can also drag and drop a block onto the coding area.





	Drch Q	2 ^{Sasic}	on start
·D D·	••• more	show number 0	
	Music	show leds	forever
	C Led		
* 0 F 7 0	C Loops		3
	Variables		show number 0
10111	✔ Advanced	show string "Hello!"	

After placing the block, you can further move it to any place on the coding area by dragging and dropping



Duplicating a block

In the coding area, right-click on the block you want to duplicate. Click **Duplicate** from the shortcut menu. You will get a duplicated block







In the coding area, click on the block you want to delete and from the key board, press the DELETE key.



In the coding area, right-click on the block you want to delete. Then, click Delete Block from the shortcut menu

	Search Q
	Basic on start
	more
	⊙ Input
00000	Music forever
0 1 2 3V GND	C Led show number 0
■ <i>2</i> ₩ 40 %	al Radio
	C Loops
	X Logic
	Variables
	Hath Delete Block
	✓ Advanced Help

Drag and drop the block into the Toolbox













Lesson 3: Micro: Bit & PnP board







BBC Micro:bit



Meet Micro:bit

- L. Micro: bit is a powerful hand-held, fully programmable, computer designed by the BBC.
- 2. The BBC micro:bit can be used for all sorts of cool creations, from robots to musical



Features of Micro:bit

- 25 individually-programmable LEDs
- 2 programmable buttons
- Physical connection pins
- Light and temperature sensors
- Motion sensors (accelerometer and compass)
- Wireless Communication, via Radio and Blueto





Pins on Micro:bit

The BBC micro:bit has 25 external connections on the edge connector of the board, which we refer to as 'pins'. The edge connector is the grey area on the right side of the figure above. There are five large pins, that are also connected to holes in the board labelled: 0, 1, 2, 3V, and GND. And along the same edge, there are 20 small pins that you can use when plugging the BBC micro:bit into an edge connector.

Quick Start Guide

'ou can program the micro:bit on both desktop (Macs, PCs, 'hromebooks, Linux, including Raspberry Pi) and mobile. 'lease discover how to use the micro:bit to click learn more





Ideas with Micro:bit

Micro:bit is widely used in schools around the world. Micro:bit official website has over 200 different activities and resources to try, from easy experiments to creative coding challenges.

Learn More







OSOYOO Plug&Play (PnP) Board for Micro:Bit

In STEM educational market, micro: bit control board is becoming more and more popular. However, a single micro: bit control board is not easy to test with multiple sensor modules. We particularly design this OSOYOO Plug&Play(PnP) Board for Micro: Bit.

This board along with OSOYOO modularized electronic blocks, covering most popular sensors and actuators makes BBC micro: bit board extremely easy to learn and install.



To avoid those potential errors from novice user, OSOYOO PnP extension board for micro: bit makes wiring become very handy and easy and almost impossible to make mistakes when working with sensors and actuators. We also reserve the pins on the board so that DIY lovers can customize it and have more possibilities







Feature

	* 3-Pin fool-proof connector x 19
	* 4-Pin fool-prof conector x 5
	* Reserve the pins on the board
	* integrates edge connector contacts
P1	* External power port and ON/OFF switch
	* OSOYOO electronic module compatible
OSOYOO Expansion Beard V1.0 for Micro Bit	

Specification

- Micro USB Power Port Voltage: 5V
- PH2.0 interface Input Voltage: 3.3V
- Micro: Bit Input/output Voltage: 3.3V
- Maximum Current: 600mA
- I/O Interface: P0 P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16

P19 P20

- Software Serial Interface: P0/P1 port
- I2C interface: P19/P20(SCL/SDA) port
- Ultrasonic interface: P8/P16 port
- RGB interface:P0/P1/P2 port
- Working temperature: 0-85 °C
- Dimension 80 * 72 mm / 3.15 * 2.76 inches
- Weight: 38g











Pay attention



Resource

- BBC micro:bit website
- <u>Micro:bit MakeCode Block Editor</u>
- Meet micro:bit starter programming
- BBC micro:bit Features Guide
- BBC micro:bit Safety Warnings
- BBC micro:bit Quick Start Guide
- BBC micro:bit Pins





Lesson 4: Twinkling Star





Yes, we can. Let's make a lamp like our room firstly. Wow, how fun it is to code with micro:bit. Can we use micro:bit to make a daily necessities?

PARTS & DEVICES

- BBC micro: bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Plan(PnP) extension board for micro:bit x 1
- OSOYOO 3-pin LED module x 1
- OSOYOO 3-pin PnP cable x 1
- Computer/Tablet PC/Phone x1





ABOUT MODULE

LED is the abbreviation of Light Emitting Diode. It is a kind of semi-conductor diode and can convert electricity into light (When the current passes, it will light on). White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

HOW TO MAKE

Connect white LED module to OSOYOO PnP expansion board port **P0** with 3-pin PnP wire as below.

Please pay attention:

1. Please connect VCC to 3.3V on PnP board with jump cap. All project are same on these connections except we emphasis in the tutorial

2. Please turn switch to **ON** in OSOYOO PnP expansion board when you run the project, otherwise the PnP board may lost power









HOW TO CODE

Step 0. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro:bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>



Step 1. In the Toolbox, click on the Pins category under Advanced







Step 2. Drag and drop a **digital write pin P0 to 0** block inside the **forever** block, and choose **1** from the drop-down menu.We can light up the LED with this program block.



Step 3. You can download this as "**.hex**" file and send it to your **MICROBIT** disk to see the code result.



Now let's make the project more interesting and set a flashing LED. **Step 4.** In the Toolbox, click on the **Basic** category, click and drag the **pause (ms)** block and place it inside of the **forever** block. You can set time of the **PAUSE** block as following:







Step 5. To simply the step, you can right click the **digital write pin P0 to 1** block and duplicate a similar block. Change the new block "**to**" value from **1** to **0**. This block will turn off the LED.



Step 6. Go on and duplicate pause (ms) block, you can set the same time as LED light on for LED off, and drag this block under **digital write pin P0 to 0** block



Step 7. Drop these two blocks again and place them inside the **forever** block. The final blocks are as following figure:



Step 8. Give a name for your project and download the hex file as following:






Step 9. Send new project to your MICROBIT disk

File Life View Tools Help		• 49 Seen Downlass P
Open * Canad O	Ren holds Ren holds Send to Cut Copy	κ ·] θ
Annex Minerel Min	Copying Copying from Develoption Discovering terms.	

Below link is the full code of twinkling LED for you as reference: https://makecode.microbit.org/_i6R4CE6rwgC0

PROGRAM RUNNING PROCEDURE



HOW TO USE

LED has wide applications. Most signal lights we saw in our daily life use LED as its major light source



Ceiling lamp



Car lights





Lesson 5 Mini Traffic Light



PARTS & DEVICES

- OSOYOO LED lamp x 3
- OSOYOO 3-pin PnP cable x 3
- BBC micro: bit board x 1
- OSOYOO Plug&Play(PnP) board for micro: bit x 1





ABOUT MODULE

LED is the abbreviation of Light Emitting Diode. It is a kind of semi-conductor diode and can convert electricity into light (When the current passes, it will light on). White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

HOW TO MAKE

Connect green LED lamp with OSOYOO PnP board for micro: bit **P0** with OSOYOO 3-pin PnP cable;

Connect yellow LED lamp with OSOYOO PnP board for micro: bit **P1** with OSOYOO 3-pin PnP cable;

Connect red LED lamp with OSOYOO PnP board for micro: bit **P2** with OSOYOO 3-pin PnP cable as below;









HOW TO CODE

Step 0: Go to URL: https://makecode.microbit.org, click New Project, right click on start block and delete it.



Step 1: In the Toolbox, click on the Pins category and then click the digital write pin block, and then Drag and drop the block inside the forever block. Set digital write pin P0 value to 1 as following figure:



Step 2. Click on the Basic category. Then drag the Pause (ms) block and drop it inside





the **forever** block just below **the** digital write pin block, and set pause time 5000 ms from the drop-down menu as following figure.



Step 3. In the Toolbox, click on the **Loops** category and then click the **repeat times do** button, and then Drag and drop **repeat times do** block inside the **forever** block just below the pause (ms) block. Set repeat times to **4**.



Step 4. Click on the **Pins** category again and then click the **digital write pin** block, then Drag and drop the block inside the repeat times do block. Set **digital write pin P0** value to 1 as following figure:



Step 5.Click on the **Basic** category. Then drag the **pause (ms)** block and drop it inside the repeat times do block just below the digital write pin block ,and set pause time **500** ms from the drop-down menu as following figure.







Step 6.Repeat duplicate method to make another **digital write pin** blocks and another **pause** (ms) blocks. Set **P0** *value* to **0** exactly same as following figure.



Step 7.Click Duplicated the repeat 4 times do block. Now we should have a same block like the repeat 4 times do block .put it inside the forever block under the repeat 4 times do block, then put the repeat times to 3,set write pin P0 to P1 as following figure:



Step 8.Click on the **Pins** category again and then click the **digital write pin** block, then Drag and drop the block inside the forever block. Set digital write pin **P0** to **P2**, set **P2** *value* to **1** as following figure:



Step 9.Click on the **Basic** category again. Then drag the **Pause (ms)** block and drop it inside the **forever** block just below **the** digital write pin block, and set pause time 5000 ms from the drop-down menu as following figure.





http://osoyoo.com/?p=25057



Step 10.Click Duplicated the **repeat 3 times do** block. Now we should have a same block like the **repeat 3 times do** block .put it inside the **forever** block under the **repeat 3 times do** block, then put the repeat times to 4,set write pin P1 to P2 as following figure:



Step 11. Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following figure.

	1	2
	Send to	MICROBIT (I:)
microbit-Traffic -Light.hex	Cut	
_	Сору	
	3 pying	
	from Downloads Discovering items	to MICROBIT (I:)

Below link are the full Graphic programming code blocks we have done for you as reference: <u>https://makecode.microbit.org/_dwCfHAdXj6YF</u>



OSÓYOO

http://osoyoo.com/?p=25057

PROGRAM RUNNING PROCEDURE



HOW TO USE







Lesson 6 Colorful Neon Light





Whenever I see this colorful light at night, I think I have come to the fairy tale world.

Let's make a colored light strip in the garden!

PARTS & DEVICES

- BBC micro: bit board x 1
- OSOYOO RGB module x 1
- OSOYOO 4-pin PnP cable x 1
- OSOYOO Plug&Play(PnP) board for micro: bit x 1





ABOUT MODULE



This is a full-color LED module, which contains 3 basic colors—red, green and blue. They can be seen as separate LED lights. After programming, you can turn them on and off by sequence or can also use PWM analog output to mix three colors to generate different

HOW TO MAKE

colors

Connect RGB module to OSOYOO PnP board with a 4-pin PnP cable, make sure the pin connections must be exactly same as following figure;



HOW TO CODE

Step 0: Go to URL: <u>https://makecode.microbit.org</u>, click New Project.





œmicro:bit		倄 Home		📒 Mici	rosoft
		show leds		2	
My Projects >	9			± Import	
+ New Project	Temp and Humi Meter 21 hours ago	fire alarm 22 hours ago	fire alarm 22 hours ago	Fan 22 hours ago	Temp
Tutorials	MICRO ^D		a <mark>P</mark> onto		N.

Step 1. In the Toolbox, click on the **LED** category and then drag a **led enable false** block and drop it inside the **on start** block



Step 2. Click on the **Pins** category, drag an **analog write pin** block and drop it below **LED enable false** block. Set write pin# to P2, value to **1023** as following figure.



Step 3.Right click **analog write pin** block and use Duplicate method twice. You will get two duplicated blocks, and place them just below the first **analog write pin** block (still inside the **on start** block).

Set the pin# in two new blocks to P1 and P0 as following figure.







Step 4. Click on the **Pins** category. Drag an **analog write pin** block and drop it inside the **forever** block, and set the write value from **1023** to **0** as following figure.



Step 5. In the Toolbox, click on the **Basic** category, drop a **pause (ms)** block drop it below **analog write pin** block (still inside the **forever** block) .Set the pause (ms) to **1000** as following figure.



Step 6. Repeat duplicate method to make another five **analog write pin blocks** and three **pause(ms)** blocks .Set the **pin#** and **to** value exactly same as following figure.







Step 7. In the Toolbox, click on the **Loops** category, drag a **repeat times do** block and place it below the last **analog write pin P2 to 1023** block(inside the **forever** block). Set repeat times to **1** as following figure.



Step 8. Click on the **Loops** category. Drag a **for index from** block and drop it inside the **repeat times do** block.

Right click the red **index** oval and then select **rename variable** from drop-down menu to create "**Val**" as a new variable name, then click on the **Ok** button. Replace the value to **513** as following figure.



Step 9.In the Toolbox, click on the **Pins** category. Drag an **analog write pin** block place it inside the **for val from 0 to 513** block.







Step 10. Click on the **Variables** category and then click a **Val** block over, and then Drag and drop the **Val** block inside the **analog write P0 to** block as following figure.



Step 11. In the Toolbox, click on the **Pins** category again. Then click and drag the **analog write pin** block and drop it inside the **for val from 0 to** block.



Step 12. Click on the Math category and drag an 0-0 block and place it below analog write pin to Val block. Then set left value in 0-0 block to 1023 as below figure.







Step 13. Click on the **Variables** category, Drag and drop the **Val** block to replace 0 value in the **1023-0** block as following figure.



Step 14. Use duplicate method to make another **analog write pin P1 to 1023-Val** block, drop this new block below original **analog write pin P1 to 1023-Val** block. Then the new block set write pin# to **p2**, replace **1023** with **512** as following figure.



Step 15: Click on the **Basic** category, drop a **pause (ms)** block and drop it below last **analog write pin P2 to 512-Val block** (inside the **for val from),** set the ms *value* to **1** as following figure.



Step 16. Repeat Step 8 to 15 and make another **for Val from 0 to 513 loop** block, place this new loop block just **below** the old **for Val from 0 to 513** loop block . Change the pin# *P0* and *P1*, P2 value and "to" statement as per following figure.

do	analog write pin	P0 -		Val 🔻		do	analog write pin P0 👻 to 🔂 - 👻 Val
	analog write pin	P1 👻	to	1023	Val 🗸		analog write pin P1 🔻 to 🛛 1023 - 🗸 🗸 Va
	analog write pin	P2 🔻	to (512	Val 🔻		analog write pin P2 🔹 to 🛛 🔽 🔹
	pause (ms) 1 🔹	-	-	÷.		+	pause (ms) 1





Step 17: In the Toolbox, click on the **Pins** category. Drag the **analog write pin to** block and place it below made-in-Step-16 **Loop** block (still inside the **forever** block) .set write pin# to **P2** as following figure.



Step 18. Use duplicate method to make another two **analog write** blocks. Place them below **analog write** block made in Step 17. Then change the Pin to *P1*, *P0* as following figure.



Step 19.Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following figure.



Below link are the full Graphic programming code blocks we have done for you as reference:

https://makecode.microbit.org/_5crDYtDJLbjk





PROGRAM RUNNING PROCEDURE

Step1 RGB LED emits white color at the beginning Step2 RGB LED emits RED,BLUE,YELLOW color alternatively, each color lasts 1 second.

Step3 RGB LED shows white color again.

Step4 RGB LED shows multiple colours alternatively

Step5 RGB LED transforms color from white to multiple colours gradually and finally change back to white again.

Program loop back from step2 to 5 again and again until power is turned off.



HOW TO USE

RGB module is widely used in our life,Stages, squares, hotels,and so on





- ----





Lesson 7: Whose actions is faster?



PARTS & DEVICES

- BBC micro:bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Play (PnP) board for micro:bit x 1
- OSOYOO button module x 2
- OSOYOO 3-pin PnP cable x 2
- Computer/Tablet PC/Phone x1





ABOUT MODULE



HOW TO MAKE

- Connect **blue** button module to PNP board port **P0** with 3-pin PnP cable as below;
- Connect **red** button module to PNP board port **P1** with 3-pin PnP cable as below;











HOW TO CODE

Step 0. Using your web browser, go directly to https://makecode.microbit.org to land the MakeCode for micro: bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project .For more information about MakeCode, please go to our tutorial: What is MakeCode.



Step 1. In the Toolbox, click on the Logic category. Then drag an if-then block and place it inside the forever block



Step 2. In the Toolbox, click on the Input category. Then drag a pin P0 is pressed block and place it inside the **condition** field of the if-then block.





Search	🔍 💿 Input			-		3		7	4	8	1	-
III Basic	1)		start		ores		2	_				
	on button A 🕶	pressed			ľ.	1	n Pe		is pre	ssed	> th	en
••• more	1.00				\odot							
O Music												
C Led					μ.							
I Radio												
C Loops	on pin P0 - pr	essed										
C Logic	Distantion of the local distance of the loca				÷.,							
Variables												
Math	2)an A * 15	pressed										
✓ Advanced	pin P0 + is p	pressed = =	 	 								
	acceleration (mg) x •										
	light level											
	compass heading	(*)										
	temperature (+C)											
	is shake * ge	isture										

Step 3. In the Toolbox, click on the Basic category, drag a show leds block and place it inside the if-then block, then draw a " \leftarrow " by clicking the dots in the 5×5 matrix (see following picture)



Step 4. Right-click on the If-then block and click Duplicate from the shortcut menu and you will get whole duplicated block. Change *P0* to *P1, draw a "→" to replace "←" in the 5×5 matrix* and drag and drop the new block inside the **forever** block. See following figure:







Step 5. Name your project in field (1) of following picture and click download as following picture:



Step 6. Send new project to your MICROBIT disk

- Anne	E-mail New folder	ו 🖬 🛛
Favorites Desktop Dounloads Recent Places Libraries		
Music Fictures Videos		
Nomegroup	microbit-push-button.hex	MICROBIT (I:)
Computer	Cut Copy	
🗣 Network	Copying	
microbit-Flashing- HEX File	heart (1).hex Date modified. 7 Copying	
	from Downloads Discovering items	to MICROBIT (1.)

Below link are the full program blocks we made for your reference: https://makecode.microbit.org/ E0JMcYae9F2F





- -----

PROGRAM RUNNING PROCEDURE



HOW TO USE

Push buttons have wide applications such as elevator keys, keys on keyboard and so on



Elevator keys



Keyboard





Lesson 8 Play Music



PARTS & DEVICES

BBC micro: bit board x 1 OSOYOO Plug&Play(PnP) board for micro: bit x 1 OSOYOO Passive Buzzer module x 1 OSOYOO 3-pin PnP cable x 1







ABOUT MODULE



In this tutorial, we will use passive buzzer to produce music sound. A passive buzzer does not have oscillator to produce sound. Its sound frequency(tone) and magnitude(loudness) are all decided by input signal coming from micro:bit. Therefore, we can use Arduino to feed a sequence of signal to buzzer and make it play simple and nice music.

HOW TO MAKE

Connect Passive buzzer module with OSOYOO PnP board for micro: bit **P0** with OSOYOO 3-pin PnP cable as below;



HOW TO CODE

Step 0: Go to URL: https://makecode.microbit.org, click New Project, right click on start block and delete it.







Step 1. In the Toolbox, click on the **Basic** category and then click the **show icon** block over, and place it inside the **on start** block. Click the music note patterns from the block choices as following:



Step 2.Click on the **Music** category. Then drag the **Play tone for beat** block over, and drop it down inside the **on Start** block.



Step 3. The **Play tone (Hz) for beat** block allows you to play a tone of specific frequency. The default frequency of the **Play tone (Hz) for beat** block is set to 262 Hz (tone), which is Middle C (note). When you click on the parameter box of the play tone block, a 21-key visual piano keyboard will display and allows you to choose a note.







When you choose a note from the visual piano keyboard, the frequency of the note will display in the parameter box of the ring tone (Hz) block. If you know the frequency of the note you want to play, just type the frequency in the parameter box without choosing it from the visual piano keyboard. The precision of the frequency of a note is \pm 1 Hz. As an example, for Middle C, the valid frequencies are 261, 262, and 263 Hz. Following picture shows the notes name in the 21-key piano keyboard and their frequencies in Hertz.



This is Piano score for **Ode to Joy**:



Step 4. According the Piano score for *Ode to Joy* ,Choose the note click on the parameter box of the **Play tone (Hz) for beat** block ,then put it below the last **Play tone (Hz) for beat** block .Every note in one **Play tone (Hz) for beat** block. Click the **button A**, you can check if the music note you are doing well.







Step 5. Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following picture.



Below are the full Graphic programming code blocks to play the music of Ode *to Joy* <u>https://makecode.microbit.org/_RVbasFR1yPcC</u>

PROGRAM RUNNING PROCEDURE



HOW TO USE







Lesson 9: Eye protection Lamp



PARTS & DEVICES

- BBC micro:bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Play (PnP) board for micro:bit x 1
- OSOYOO Potentiometer module x 1
- OSOYOO LED module x 1
- OSOYOO 3-pin PnP cable x 2
- Computer/Tablet PC/Phone x1





ABOUT MODULE



A potentiometer is a simple knob that provides a variable resistance, which we can read into the Arduino board as an analog value.In this example, that value controls the rate at which an LED blinks. OSOYOO potentiometer module using high-quality sliding electrical appliance, has the performances of stability and reliability.

HOW TO MAKE

_ ____

- Connect Potentiometer module to OSOYOO PnP board port P2 with 3-pin PnP cable as below;
- Connect LED module to PnP board port **P0** with 3-pin PnP cable as below;









HOW TO CODE

Step 0. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro: bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project .For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>



Step 1. In the Toolbox, click on the Variables category and then click the **Make a Variable** button.



Step 2. In the **New Variable name** window, type "**potentiometerval**" as the variable name, then click on the Ok button.







Step 3. Drag and drop a set *potentiometerval* to 0 block inside the forever block.



Step 4. In the Toolbox, click on the Pins category under Advanced.



Step 5. Now, click and drag the analog read pin P0 block over and place it inside the placeholder of the set *potentiometer* to 0 block. Then choose P2 from the drop-down menu.







Step 6. Drag and drop an *analog write pin P0 to 1023* block from Pins category over and place it inside **forever** block.

0	Input	Pins	
ନ	Music		on scarc
O	Led	digital read pin P0 -	
-al	Radio	digital write pin P0 ▼ to 0	
С	Loops		TOREVER
24	Logic	3 log read pin P0 •	4: potentiometerVal ▼ to analog read pin P2 ▼
=	Variables	analog write pin P0 ▼ to 1023	analog write pin P0 🔻 to 1023
	Math	analog set period pin P0 - to (µs) 20000	
X	Advanced	map 0	
fw)	Functions	from low 0	
≡	Arrays	from high 1023	
Т	Text	to low 0	
00	Game	to high 4	
-	Image 2	serve write pin PB = to 180	
۲	Pins 🗸		
	more	servo set pulse pin P0 ▼ to (μs) 1500	
	Serial		
=	Control		

Step 7. Drag and drop **potentiometerVal** block from **variable** category and place it inside the placeholder of the **analog write pin to** block



Step 8. Rename the project b and download it





	 Input Music Led Adia Loops Variables Math Advanced Functions Arrays
0, 7, 0,	T Text Co Game Came Images
2	Prins Prins Print Print Prin

Step 9. Download this ".hex" file and send it to your MICROBIT disk.



Below link is the full code we have done for you as reference: https://makecode.microbit.org/_faXAHeJTJHmM

PROGRAM RUNNING PROCEDURE







HOW TO USE

Potentiometer has wide applications such as audio console, variable-speed switch, volume switch and so on



Audio mixing console



Variable-speed Switch





Lesson 10: Smart Street Lamp



PARTS & DEVICES

- BBC micro:bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Play (PnP) board for micro:bit x 1
- OSOYOO Photoresistor module x 1
- OSOYOO LED module x 1
- OSOYOO 3-pin PnP cable x 2
- Computer/Tablet PC/Phone x1




ABOUT MODULE



In this tutorial, we use the photoresistor which is a light-controlled variable resistor. In the dark, a photoresistor can have a resistance as high as several megohms(MΩ), while in the light, a photoresistor can have resistance as low as a few hundred ohms.

HOW TO MAKE

- Connect **Photoresistor module** to **P0** of OSOYOO PnP board for micro: bit with 3-pin PnP cable as below;
- Put the D/A Switch of OSOYOO Photoresist or module to A
- Connect LED module to P1 of PnP board with 3-pin PnP cable as below;



HOW TO CODE

Step 0. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro: bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project .For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>







Step 1. In the Toolbox, click on the **Variables** category and then click the **Make a Variable** button, and then In the **New Variable name** window, type "**reading**" as the variable name, then click on the **Ok** button

	Basic	2 Variables Make a Variable
	G Music	number 👻
	Led	reading -
Δ	all Radio	
00000	C Loops	set number 🕶 to 💿
0 1 2 3V GN	D C Logic	change number 🕶 by 1
	🔰 🔳 Variables	
	Math	
3 New variable na	ame:	
reading		

Step 2. Drag and drop a **set** *number* **to 0** block inside the **forever** block, and choose *reading* from the drop-down menu.



Step 3. In the Toolbox, click on the **Pins** category under **Advanced**. Now, click and drag the **analog read pin P0** block over and place it inside the placeholder of the **set** *reading* **to 0** block. Then choose P0 from the drop-down menu if it has not already been selected







Step 4. Drag and drop a set *reading* to 0 block inside the **forvever** block just below the set reading to block , and choose *new variable* from the drop-down menu to create "*number*" as a new variable name.



Step 5. In the Toolbox, click on the **Math** category and Click and drag the **square robot 0** block over and place it inside the placeholder of the **set** *number* **to 0** block. Then choose **integer** ÷ from the drop-down menu



Step 6. Drag and drop a *reading* block from **variable** category over and place it inside the placeholder of the **integer** ÷ block, and change **0** to **50**.



Step 7. In the Toolbox, click on the **Basic** category, click and drag the **show number 0** block over and place it inside of the **forever** block. The simulator area will show **0**







Step 8. Drag and drop a **number** block from **variable** category over and place it inside the placeholder of the **show number 0** block



Step 9. In the Toolbox, click on the **Logic** category. Then click and drag the **if-then-else** block over and place it inside the **forever** block just below the **show number** block.



Step 10. Click on the Logic category again. Under the **Comparison** section, click and drag one of the blocks over, and place it on the placeholder of the **if-then-else** block (by default, the placeholder has a true-false block). Then choose ">" from the dropdown list.







Step 11. Drag and drop a **number** block from **variable** category over and place it on the first placeholder of the **Comparison** block. Also, change the second placeholder of the **Comparison** block to **5**



Step 12. Click on the **Pins** category and drag and drop the **digital write pin P0 to 0** block over and place it inside the "**then**" section of the **if-then-else** block. Then choose P1 from the drop-down menu and change **0** to **1**







Step 13. Right-click on the **digital write pin P1 to 1** block and click Duplicate from the shortcut menu and you will get a duplicated block. Change **0** to **1** and drag and drop the duplicated block inside the "**else**" section.



Step 14. Download this ".hex" file and send it to your MICROBIT disk.

	D	2
	Send to	MICROBIT (I:)
microbit-Automa tic-Street-Lamp.h	Cut	
]	- COPJ	
	3	
	opying	
	Copying	
	from Downloads Discovering items	to MICROBIT (I:)
	More details	Cancel
	More details	Cancel

Below link is the full code we have done for you as reference: https://makecode.microbit.org/_4k2ehWJgP7wL





PROGRAM RUNNING PROCEDURE



HOW TO USE

Smart photoresistor light is widely used in smart phone to set auto-brightness and park, street lights, and so on





- -----

Smart phone

Park lamb





Lesson 11 Voice-activated Light



PARTS & DEVICES

- BBC micro: bit board x 1
- OSOYOO sound module x 1
- OSOYOO LED module x 1
- OSOYOO 3-pin PnP cable x 2
- OSOYOO Plug&Play(PnP) board for micro: bit x 1





ABOUT MODULE





HOW TO MAKE

Connect Sound module with OSOYOO PnP board for micro: bit **P0** with OSOYOO 3-pin PnP cable;

Connect LED module to **P1** port of OSOYOO PnP board with OSOYOO 3-pin PnP cable as below;



HOW TO CODE

Step 0: Go to URL: https://makecode.microbit.org, click New Project, right click on start block and delete it.







Step 1. In the Toolbox, click on the Basic category, click and drag the show number block over and place it inside the placeholder of the forever block as following figure.



Step 2. Click on the **Pins** category. Then click and drag the **analog read pin** block over, and place it inside the placeholder of the show number block as following figure.



Step 3. In the Toolbox, click on the **Logic** category. Now, click and drag the if ~then~else block over and place it inside the **forever** block as following figure.



Step 4. Drag and drop a **0**<**0** block, and place it inside the placeholder of the **if ~then~else** block, just below the show number block as following figure.





Search Q	if true • then
Basic	forever
 Input 	digital read pin P0 -
G Music	if true - then
Led	else
Il Radio	else \varTheta
C Loops	
🗙 Logic	Comparison
Variables	2
Math	
Advanced	

Step 5. In the Toolbox, click on the **Pins** category and Click and drag the analog read pin block over and place it inside the 0 < 0 block. Then set analog read P0 \leq **700** in it as following figure.



Step 6.Click on the **Pins** category. Then click and drag the **digital write pin** block and drop it inside the **if ~then ~else** block. Then choose digital write pin to **P1** from the drop-down menu as following figure.



Step 7. Click duplicate from the **digital write pin to** block over. You will get a duplicated block, and place it inside the **else** block .set the digital pin value to **1** as following figure.







Step 8. Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following figure.



Below link are the full Graphic programming code blocks we have done for you as reference:

https://makecode.microbit.org/_0Th0VDMH0Frg

PROGRAM RUNNING PROCEDURE



HOW TO USE







Lesson 12 Home Appliance Control



PARTS & DEVICES

- BBC micro: bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Play (PnP) board for micro: bit x 1
- OSOYOO Relay module x 1
- OSOYOO LED module x 1
- OSOYOO 3-pin PnP cable x 1
- 2pin female to female jumper wire
- 1pin male to female jumper wire
- Computer/Tablet PC/Phone x1





ABOUT MODULE



Relays are the Hulks (tm - DC Comics) of the electronics world. Often dumb and simple, but they can control lots of power. These are ideal in situations where you need to comfortably control AC or DC power levels. Transistors and FETs can do the same job, but often not with the convenience and reliability of a good old relay.

HOW TO MAKE

- Connect Relay module to P7 of OSOYOO PnP board for micro: bit with 3-pin PnP cable as below;
- Connect NO of relay module to VCC of PnP board for micro: bit with 1pin male to female jumper wire as below;
- Connect **SIG** of LED module to **COM** of relay module with 1pin male to female jumper wire as below;
- Connect VCC of LED to VCC of PnP board for micro:bit with 1pin female to female jumper wire as below;
- Connect **GND** of LED to **GND** of PnP board for micro: bit with 1pin female to female jumper wire as below;
- Connect 5V to VCC on PnP board with jumper cap as below;
- Connect H to middle pin on relay module with jumper cap as below, this will make the Relay work in **Active-High** mode(when **SIG** input is **HIGH or 1**, the Relay is Active and COM to NO is connected, otherwise COM to NO is disconnected);









HOW TO CODE

Step 0. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro:bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>



Step 1. In the Toolbox, click **Led** category and then **more.** Drag and drop *led enable false* block over and place it *inside on start block*



Step 2. In the Toolbox, click on the Pins category under Advanced.







Step 3. Click on the Pins category and drag and drop the digital write pin P0 to 0 block over and place it inside the **forever** block.



Step 4. Choose **P7** from the drop-down menu, and change "**to**" value from 0 to 1 as following picture:



Step 5. In the Toolbox, click on the Basic category, click and drag the pause (ms) block over and place it inside of the forever block, and choose **1000ms** as following figure:





Search	Basic	
III Basic		on start
more	show number 0	led enable false 🔻
 Input 	show leds	
O Music		forever
C Led		
I Radio		jital write pin P7 ▼ to 1
C Loops		
X Logic		
Uariables		100 ms
Math	show string "Hello!"	500 ms (4)
Advanced	forever	1 second
f Functions		2 seconos
}≡ Arrays	2	
T Text	pause (ms) 100 -	
😎 Game		
Images	on start	1

Step 6. Right click **digital write** and **pause** block, then select Duplicate to copy these two blocks as following.



Step 7. Change new digital write block 'to' value from 0 to 1, and place these block inside forever block



Step 8. Rename the project and download it as following.



Step 9. Download this ".hex" file and send it to your MICROBIT disk.





Organize Open E-mail Ne	A.14	
	in rouper	ו 01 1
🔆 Fevorites		
Desktop		
Downloads		
22 Recent Places		
and the second se		
Up Loranes		
Myse Myse Myse		
Pictures		
a viotos		
2 Manual A	Send to	MICROBIT (I:)
no nonegrosp		
Secondary	Cut	
A Local Disk (C)	Conv	
G Software (D)	copy	
microhit	-Home-Appliance-Control.bex	
0	19	
TVEENOR	👘 Copying	
- retinion		
· Puttwork		
microbit-flashing-heart (1).hex (Determotifies 7 Copying	
microbit-Flashing-heart (1).hex (Date and dified. 7 Copying	
microbit-Flashing-heart (1).hex (Cotempofied 7 Copying	to MICROBIT (L)
microbit-Flashing-heart (1).hex (HEX File	Date modified 7 See 7 from Downloads Discovering items	to MICROBIT (L)
microbit-Flashing-heart (3).hex (HCX // fie	Set == 54fed. 7 See 7 from Downloads Discovering items	to MICROBIT (I:)

Below link is the full program we have done for you as reference: https://makecode.microbit.org/_UXK7HPh31frL

PROGRAM RUNNING PROCEDURE

- Start this project
- Give HIGH signal to SIG pin and make Relay active.
- Then the LED will turn on and pause for 1s
 Input low voltage level to relay and make it
- inactive. • Then the LED will turn off and pause for 1s
- Then the LED will turn on and pause for
 The process will repeated











Lesson 13 Mini Electronic Door



PARTS & DEVICES

- BBC micro: bit board x1
- OSOYOO button module x 1
- OSOYOO servo motor x 1
- OSOYOO 3-pin PnP cable x 1
- OSOYOO Plug&Play(PnP) board for micro: bit x 1





ABOUT MODULE



HOW TO MAKE

Connect servo motor with OSOYOO PnP board for micro: bit **P0** with OSOYOO 3-pin PnP cable;

Connect button module with OSOYOO PnP board for micro: bit **P1** with OSOYOO 3-pin PnP cable as below;



HOW TO CODE

Step 0: Go to url: https://makecode.microbit.org, click New Project







Step 1. In the Toolbox, click on the **Logic** category and then click the **if-then-else** block and place it inside the **forever** block.



Step 2. Drag and drop a **0=0** block inside the **if-then-else** block, and place it on the placeholder of the **if-then-else** block. Then set **0= 1** in it as *below figure*.



Step 3. In the Toolbox, click on the **Pins** category under **Advanced**. Now, drag the **digital read pin P0** block and place it inside the placeholder of the **0=0** block. Then set read pin to **P0** from the drop-down menu *as below figure*.



Step 4. Drag and drop a **servo write pin** block, place it inside the **"then"** section of the **if-then-else** block. , set value to 100 from the drop-down menu *as below figure*.







Step 5. Click on the **Basic** category, drag the **show leds** block and place it inside the **then** block just below the **servo write pin to** block. Then draw a "square" by clicking the dots in the 5×5 matrix *as below figure.*



Step 6. Drag a **pause (ms)** block from **Basic** category over and place it inside the **then** block just below the **show leds** block, and set the pause time (ms) to **1000** as below figure.



Step 7. In the Toolbox, click on the **Pins** category, drag the **servo write to** block and place it inside the **else** block. And set write pin value to *0* from the drop-down menu as below figure.







Step 8. Click on the **Basic** category again, drag the **show leds** block place it inside the **else** block just below the **servo write pin** block. Then draw an "X" by clicking the dots in the 5×5 matrix *as below figure.*



Step 9.Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following figure.

	1	2
	Send to	MICROBIT (I:)
microbit-Electr onic-Door.hex	Cut	
	3 prving	
	Copying	
	from Downloads Discovering items	to MICROBIT (I:)
	More details	Cancel

Below link are the full Graphic programming code blocks we have done for you as reference:

https://makecode.microbit.org/_3Fecm6bdK5xg





- ----

PROGRAM RUNNING PROCEDURE



HOW TO USE







Lesson 14 Advertising Board



PARTS & DEVICES

- BBC micro:bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Play (PnP) board for micro: bit x 1
- OSOYOO 1602 I2C LCD x 1
- OSOYOO 4-pin PnP cable x 1
- Computer/Tablet PC/Phone x1





ABOUT MODULE



1602 I2C module is a 16 character by 2 line LCD display with Blue background and White backlight. It is built with Arduino IIC/I2C interface. This LCD is ready-to-use because it is compatible with the Arduino Liquid Crystal Library.

HOW TO MAKE

- Connect 1602 I2C LCD module to OSOYOO PnP board port **SCL/SDA(P19/20)** with 4-pin PnP cable as below;
- Connect 5V to VCC on PnP board with jumper cap as below;



HOW TO CODE

Step 0. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro:bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project .For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>







Step 1. Use the + (add) Extensions under the Advanced tab



Step 2. In the Extensions page, enter

"*https://github.com/makecode-extensions/i2cLCD1602*" to search the extension, and then click on the extension to add it to your project



Step 3. The Blocks and JavaScript definitions for the new extension will be automatically loaded into the editor and can be found in the Toolbox as **I2C_LCD1602** Category







Step 4. Drag and drop a LCD initialize with Address 0 block inside the on start block.



Step 5. Overhere, we type "0" if you don't really confirm the address of the LCD, it will automatically match the correct address. If the back of LCD shows PCF8574, you can type address "39", if the address from Arduino is 0x3F, you can type address "63".



Step 6. Drag and drop *turn off backlight* block from I2C_LCD1602 category over and place it *inside the* **on start** block.







Step 7. In the Toolbox, click on the **Basic** category, click and drag the **pause(ms)** block over and place it inside of the **on start** block, and choose **500** ms from drop-down menu as following:



Step 8. Drag and drop *turn on backlight* block from **I2C_LCD1602** category over and place it *inside the on start* block.



Step 9. Drag and drop *show string hello at x0 y0* block from I2C_LCD1602 category over and place it *inside the on start* block.







Step 10. The value of X is from 0-15, and the value of Y is 0-1, it will show "hello" as the following photo if you use *show string hello at x0 y0* block



Step 11. Drag and drop *show string hello at x0 y0* block again and place it *inside the on start* block.



Step 12. Change Hello to This is OSOYOO (whatever you like), and choose x2 and y1





LCD initialize with Address 0	
turn off backlight	
pause (ms) 500 -	
turn on backlight	
show string "Hello" at x 0 y 0	
show string "Hello" at x 0 y 0	10
	show string This is 050100 at x 0 y 0
show string 'This is OSOYOO' at x 2 y 0	show straing "Inis is 050700" at x 2 y 1
× 2	Y 1

Step 13. Drag the *pause (ms)* block over and place it inside of the *on start* block, and choose **2000** ms as following:



Step 14. Drag and drop *clear LCD* block from *I2C_LCD1602* category over and place it *inside the on start* block.



Step 15. Drag and drop *show number 10 at x0 y0* block from I2C_LCD1602 category over and place it *inside the forever* block.







Step 16. Drag and drop *pick random 0 to 10* block from **Math** category over and place it *inside the placeholder of the show number 10 block, and then change* **10** *to* **9**



Step 17. Duplicate pick random block twice and place one *inside the placeholder of the x0* and change 9 to 15, and then place the other inside the placeholder of the y0 and change 9 to 1

forever				
show number pick rand Du Ad De He	dom 6 to 9 at x uplicate dd Comment elete Block elp	pick random 0 to	15 y pick rando	0 to 1

Step 18. Drag the *pause (ms)* block over and place it inside of the *forever* block, and choose **100** ms





Search	Basic	on start
Basic		LCD initialize with Address 0
••• more	show number 0	turn off backlight
 Input 	show leds	pause (m) 500
O Music		turn en hucklight
C Led		
I Radio		show string 'Hello' at x 0 y 0
C Loops		show string 'This is OSOYOO' at x 2 y 1
X Logic	shew icon iiii *	pause (ms) 2000 •
Variables	1.51	clear LCD
Math Math	show string "Hello!"	
I2C_LCD1602	Torever	forever
Advanced		3 number pick random 0 to 9 at x pick random 0 to 15 y pick random 0 to 1
for Functions	2	pause (ms) 100 -
j≡ Arrays	pause (ms) 100 -	*
T Text		
😎 Game	Shi start	
Images		

Step 19. Rename the project and download it



Step 20. Download this ".hex" file and send it to your MICROBIT disk.



Below link is the full code we have done for you as reference: https://makecode.microbit.org/_FjYhyKc05KCy





PROGRAM RUNNING PROCEDURE









Lesson 15 Mini Weather Station



PARTS & DEVICES

- BBC micro: bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Play (PnP) board for micro: bit x 1
- OSOYOO 1602 I2C LCD x 1
- OSOYOO Temperature and humidity module x 1
- OSOYOO 4-pin PnP cable x 1
- OSOYOO 3-pin PnP cable x 1
- Computer/Tablet PC/Phone x1





ABOUT MODULE

DHT11 Temperature and Humidity Sensor is a composite sensor which contains a calibrated digital signal output of the temperature and humidity.

HOW TO MAKE

Connect 1602 LCD to OSOYOO PnP board port "scl, sda,vcc,gnd" with OSOYOO 4-pin PnP cable as below;

Connect Temperature and humidity module to PnP board port **P8** with 3-pin PnP cable as below;

Connect 5V to VCC on PnP board with jumper cap as below;










HOW TO CODE

Step 0. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro:bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project .For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>



Step 1. Please read tuturial about LCD1602 to add I2C_LCD1602 Category



Step 2. Drag and drop a LCD initialize with Address 0 block inside the on start block.







Step 3. Drag and drop *turn off backlight* block from I2C_LCD1602 category over and place it *inside the on start* block.



Step 4. Click on the Basic category, click and drag the pause (ms) block over and place it inside of the on start block, and choose **500** ms



Step 5. Drag and drop *turn on backlight* block from **I2C_LCD1602** category over and place it *inside the on start* block.







Step 6. Drag and drop *show string hello at x0 y0* block from I2C_LCD1602 category over and place it *inside the on start* block.



Step 7. Drag and drop *show string hello at x0 y0* block again and place it *inside the on start* block.



Step 8. Change Hello to OSOYOO DHT11, and choose y1







Step 9. Drag the *pause (ms)* block over and place it inside of the *on start* block, and choose 2000 ms



Step 10. Drag and drop *clear LCD* block from I2C_LCD1602 category over and place it *inside the on start* block.







Step 11. Drag and drop *show string hello at x0 y0* block from I2C_LCD1602 category over and place it *inside the forever* block, and change **hello** to **Temp:**.



Step 12. Drag and drop **show number 10 at x0 y0** block from **I2C_LCD1602** category over and place it inside the **forever** block.



Step 13. Search Extensions with keywords IOT , in search result, select an **iot-environment-kit** extension as following:







Step 14. Octopus Category can be found in the Toolbox



Step 15. Click **Octopus** category **and then more.** Drag and drop **value of dht11 at** *pin* block over and place it *inside the placeholder of the show number 10 block*



Step 16. Choose temperature(℃) from the drop-down menu if it has not already been selected, and choose at pin P8, and x6

show string 'Temp:' a	t x 🕘 y 🕘	3
show number value of d	Int11 temperature(°C)	at pin P8 • at x 🗟 y
	<pre> temperature(%) temperature(%) humidity(0~100) </pre>	P15 P0 P1 P2 P3 P4 P5
		P6 P7 P8 P9





Step 17. Drag the *pause (ms)* block over and place it inside of the *forever* block, and choose 2000ms



Step 18. Duplicate these three blocks and change Temp: to Humi:, both y0 to y1,





Step 19. Drag and drop *clear LCD* block from I2C_LCD1602 category over and place it *inside the forever* block.



Step 20. Rename the project and download it







Step 21. Download this ".hex" file and send it to your MICROBIT disk.



Below link is the full code we have done for you as reference: https://makecode.microbit.org/_KFrTfkTJdW8Y





PROGRAM RUNNING PROCEDURE



HOW TO USE

Temperature and humidity sensor has wide applications such as thermohygrometer, temperature control plug, and so on



Temperature control plug



- -

Thermohygrometer





Lesson 16 Mini Electric Fan



PARTS & DEVICES

- BBC micro: bit board x 1
- OSOYOO motor module x 1
- OSOYOO 3-pin PnP cable x 1
- OSOYOO Plug&Play(PnP) board for micro: bit x 1





ABOUT MODULE





HOW TO MAKE

Connect Passive buzzer module to **P1** port of OSOYOO PnP board with 3-pin PnP cable as below;



HOW TO CODE

Step 0: Go to URL: <u>https://makecode.microbit.org</u>, click New Project







Step 1. In the Toolbox, click on the **Input** category. Drag an **on button pressed** block and place it inside the placeholder.



Step 2.Click on the Pins category. Drag a digital write pin block and place it in the on button pressed A block. Then choose *P1* from the drop-down menu, also set "to" value as 1.



Step 3. In the Toolbox, click on the **Input** category again. Drag another **on button pressed** block and then place it inside the placeholder .Then choose *B* from the dropdown menu.



Step 4. Click on the **Pins** category again. Drag a **digital write pin** block and place it in the **on button pressed B** block. Then choose *P1* from the drop-down menu, also set "**to**" value as **0**.





Step 5. Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following figure.

	1	2
microhit Ean ha	Send to	MICROBIT (I:)
x	Cut Copy	
	3	
	Copving	
	from Downloads	to MICROBIT (I:)
	More details	Cancel
	L'	

Below link are the full Graphic programming code blocks we have done for you as reference:

https://makecode.microbit.org/_M3dFJpaUPUUC





PROGRAM RUNNING PROCEDURE



HOW TO USE

The motor module is commonly used for STEM class. Make an air aerial propeller vessel, a cooling system, or spinning machine with this small motor module.









Lesson 17 Smart Fire Alarm





PARTS & DEVICES

- BBC micro:bit board x 1
- Micro USB Cable x 1
- OSOYOO Plug&Play (PnP) board for micro: bit x 1
- OSOYOO flame sensor module x 1
- OSOYOO LED module x 1
- OSOYOO buzzer module x 1
- OSOYOO 3-pin PnP cable x 3
- Computer/Tablet PC/Phone x1





ABOUT MODULE



HOW TO MAKE

- Connect buzzer module to OSOYOO PnP board port P0 with 3-pin PnP cable as below;
- Connect LED module to PnP board port P1 with 3-pin PnP cable as below;
- Connect flame sensor module to PnP extension board for micro: bit port **P2** with 3-pin PnP cable as below;
- set the D/A Switch of flame sensor module to D











HOW TO CODE

Step 0. Using your web browser, go directly to <u>https://makecode.microbit.org</u> to land the MakeCode for micro: bit home page. You can bookmark this package to easily open this package for next project. In the My Projects section, click on the New Project .For more information about MakeCode, please go to our tutorial: <u>What is MakeCode</u>



Step 1. In the Toolbox, click on the Led category and then click **more**, and then drag and drop a **led enable** false block inside the **on start** block



Step 2. In the Toolbox, click on the Logic category. Then click and drag the if-then-else block over and place it inside the forever block.







Step 3. Click on the Logic category again. Under the Comparison section, drag " $\mathbf{0} = \mathbf{0}$ " blocks over, and place it on the placeholder of the if-then-else block, then choose "=" from the dropdown list.



Step 4. Click on the Pins category and drag and drop the digital read pin P0 block and place it on the first placeholder of the Comparison block and change **P0** to **P2**. Also, change the second placeholder of the Comparison block to *1 as following picture:*







Step 5. In the Toolbox, click on the Music category. Then click and drag the stop melody all block over and place it inside the **"then"** section of the **if-then-else** block.



Step 6. Click on the Pins category and drag and drop the digital read pin P0 to 0 block over and place it inside the "**then**" section and under stop melody all block and then change **P0** to **P1**.



Step 7. Click and drag the **start** melody xxx repeating xx block over from music category and place it inside the **"else"** section and choose music as you like and choose forever for repeating.



Step 8. Right-click on the digital write pin P1 to 0 block and click Duplicate from the





shortcut menu and you will get a duplicated block. Change **0** to **1** and drag and drop the duplicated block inside the "**else**" section.



Step 9. In the Toolbox, click on the Basic category, click and drag the pause (ms) block over and place it inside of the forever block, and choose **2000** ms from drop down menu.



Step 10. Rename the project name and download it

	Search Q		
	III Basic	an start	forever
	⊙ Input	led enable false ->	if digital read pin P2 * = 1 the
	G Music		stop melody all *
00	C Led		digital write pin P1 = to 💿
	al Radio		else 🤤
5	C Loops		start melody be ding * repeating forever *
- 'A	< X Logic		digital write pin Pl = to 1
	Variables		pause (ms) 2000 -
	Math		0
	► Advanced		
2		100 0 0 0 <u>0</u>	
🖌 🕹 Download	fire alarm		
Download this projec	t Rename th	is project	

Step 11. Download this ".hex" file and send it to your MICROBIT disk.





	lider	× 11 (
🖈 Favorites		
Cesktop		
🚴 Downloads		
Sig Recent Places		
Cig Libraries		
 Music 		
Pictures		
Videos Videos		
2.11	Send to	MICROBIT (I:)
eg nonegoup		
S Computer	Cut	
Local Disk (C)	Conv	
Ca software (D)		
micr	obit-fire-alarm.hex	
C restored as		
On Manual		
- retrace		
	The Copying	
minuth flathing hand (1) has fine	Coming	
HEXFla	Seed	
	from Download	
	• • • • • • • • • • • • • • • • • • •	
	Discovering items	
	Discovering items	

Below link is the full code we have done for you as reference: https://makecode.microbit.org/_b99Xdw7e4Uj1

PROGRAM RUNNING PROCEDURE

Start this project The project will identify if the flame sensor detect flame

When the flame sensor detects flame, buzzer

rings and LED turns on for 2s.

 When the flame sensor doesn't detect flame, the buzzer stops and the LED turns off.

The process will repeated



HOW TO USE

Flame sensor has wide applications such as flame detector, firefighting robot, and so on



Firefighting robot



Flame detector



Lesson 18 Mini Reverse Radar



PARTS & DEVICES

- BBC micro: bit board x 1
- OSOYOO LED module x3
- OSOYOO 3-pin PnP cable x 3
- OSOYOO 4-pin PnP cable x 1
- OSOYOO Ultrasonic detector module x 1
- OSOYOO Plug&Play(PnP) board for micro:bit x 1





ABOUT MODULE





The Ultrasonic detector module can provide 2cm-450cm non-contact sensing distance, and its ranging accuracy is up to 3mm. As the ultrasonic has strong directivity, slow energy consumption and far spread distance in the media, so it is commonly used in the measurement of distance, such as range finder and position measuring instrument. Using ultrasonic is more rapid, convenient, simple to calculate and more easier to achieve real-time control.

HOW TO MAKE

Connect Ultrasonic detector module to the 4-pin port **"+, p8, p16,-**" of PnP board with a 4-pin PnP cable;

Connect green LED module to port **P0** in OSOYOO PnP board with OSOYOO 3-pin PnP cable;

Connect yellow LED module to PnP board port P1 with 3-pin PnP cable;

Connect red LED module to PnP board port P2 with 3-pin PnP cable as below;







HOW TO CODE

Step 0: Go to url: https://makecode.microbit.org, click New Project



Step 1. In the Toolbox, click on the **Variables** category and then click the **Make a Variable** button, and then In the **New Variable name** window, type "**range**" as the variable name, then click on the **Ok** button as following figure.

	Search Q The Variables 2
	Make a Variable
	● Input
·C1 C	• Music
	Radio
.000	
0 1 2 3V G	
■ 2 ¥ 4 X	
O Ne	w variable name:
ra	Inge
	Ok 🗸 Cancel 🛪
📥 Download	



Basic		1 .	forev	ver					
 Input 	Make a Variable	100	set	t Pa	ange 🖣	to	0		
O Music	range • 2								
C Led	set range • to 0	44							
I Radio									
C Loops	change range • by 1								
🔀 Logic									
Variables									

Step 3. In the Editor Controls, click on the **Advanced** button and then **Extensions** as following figure.







Step 4.In the **Extensions** page, enter project "Sonar" in the Search textbox and click on the **Search** button. The page will show you all the matching extensions based on your search string. Now, click on **sonar** to add it into your project as following figure.



Step 5. In the Toolbox, click on the Sonar category. Drag the ping trig echo unit block and place it inside the placeholder of the set range to 0 block. Then choose P8 in ping trig, choose p16 in echo pin, choose cm in unit from the drop-down menu as following figure.









placeholder of the **forever** block just below the **set** *range* **to 0** block as following figure.



Step 7.In the Toolbox, click on the **Variables** category. Drag the **range** block and place it inside the placeholder of the **show number** block as following figure.



Step 8. In the Toolbox, click on the Logic category and drag the if-then-else block over.



Step 9. Place the **if-then-else** block inside the placeholder of the **forever** block below the **show number 0** block. Click on the **plus icon** to add another section to the **if-then-else** block as following figure.



Step 10. In the Toolbox, click on the **Logic** category again, click and drag the **0=0** block over and place it inside of the **forever** block below the **show number** block. Then set





"0≥0" from the drop-down menu as following figure.



Step 11. Drag and drop a **range** block from **variable** category and place it inside the placeholder of the **0≥0** block .Then set range≥**20** in it as following figure.



Step 12. In the Toolbox, click on the **Pin** category. Then drag a **digital write pin to** block and place it inside the **forever** block. Then set write pin value to "**1**" from the drop-down menu as following figure.



Step 13. Right click duplicate digital write pin to block select duplicate twice. You will get





two duplicated **digital write pin** blocks ,and place them inside the on **forever** block just below the if **range \geq20 then** block .set write pin to P1 \rightarrow P2 as following figure.

orever	ning trig D8 *	ping trig P8 ♥
		set range ▼ to echo P16 ▼
set range	to echo P16 👻	unit cm 🕶
	unit cm 🕶	show number range 💌
show number	range 💌	i range ▼ ≥ ▼ 20 then
if ran	ge 1 20 then	3
		al write pin P0 V to 1
digital wr	ite ni P0 - to 1	digital write pin P1 ♥ to 0
else if	Duplicate	digital write pin P2 ♥ to 0
	Add Comment	
else	Delete Block digital write pin P1 - to 0	else if then
	Help digital write pin P2 🕶 to 0	
\odot		
	a a a a a a a	\odot

Step 14. Click on the **Logic** category. Then click and drag the **and** block over and place it inside the placeholder of **else** block.



Step 15. Click on the Logic category again and drag the **0** <**0** block and place it in front the **"and"** section of the **else** block.

pearcn Q	Conditionals		unit cm 🔻	 B. B. B.
Basic	if true • then	show number range 🔻	8 18 a a	
 Input 		if range 🔹 🛓 🖛	20 then	
O Music	\odot	digital write pin P0	• to 1	
C Led	if true 🕶 then	digital write P1	- to 0	
al Radio	else 🖓	digital write P2	• to 0	
C Loops			and •	then 🖨
X Logic	\odot			
Variables	Comparison	else		Θ
Math	0 = -			1
- Sonar				

Step 16. Drag and drop a **range** block from **variable** category and place it inside the placeholder of the 0 < 0 block. Then set range < 20 in it as below figure.







Step 17. Click on the Logic category again , drag an 0 < 0 block and place it behind the "and" section of the **else** block. Then set $0 \ge 10$ in it as below figure.



Step 18. Drag a **range** block from **variable** category again. And place it in front the placeholder of the **0≥10** block



Step 19. use duplicate method to make another three digital write pin block , drop these new block below else if range <20 and range ≥10 then block .Then Set the pin# toP1, P2, the value o to 1 as following figure.</p>





	ping trig P	8 -					
set range 🕶							
	unit cm •						
show number	ange 👻			2			
if range	2 * 1 *	en 👘 👘		digital	ritepin PO	• to 1	
digital write	nin Pa - 1	1 A A		digital	eritepin P0	- to (1)	
digital write	Duplicate			digital	mitepin P0	- to (1)	
digital write	Add Comment			-			
ulgital write	Delete Direct						
else if re	Delete Block		range -	2 • 10	then Θ		
	Help				-		
else					Θ		
•							
forever							
ene recorderes	ping trig P8 -						
set range • t	unit cm -						
S.C. Samon a	20 (1181)						
if range •							
if range - digital write	pin F0 - to 1						
if range - digital write (digital write)	pin P0 + to 1 pin P1 + to 0						1
if range - digital write (digital write)	pin P0 = to 1 pin P1 = to 0 pin P2 = to 0			10, 110, 0 20, 140, 14 20, 140, 14			
if range + digital write digital write digital write digital write range +	pin P0 + to 1 pin P1 + to 0 pin P2 + to 0 gt + < 20	and •	range 🔹 z	• 19 th	• 0		
if range - digital write digital write digital write a digital write ran	pin P0 + to 1 pin P1 + to 0 pin P2 + to 0 W2 + c 20 pin P0 + to 0	and •	range 🔹 👔	• 10 th	• O		
if range - digital write digital write 3 write 1 write digital write digital write	pin P0 + to 1 pin P1 + to 0 pin P2 + to 0 pin P2 + to 0 pin P0 + to 0 pin P0 + to 1	and •	range 🔹 🗈	- 10 th	• ⊖		
if range - digital write (digital write (digital write (digital write (digital write (digital write (pin P0 + to 1 pin P1 + to 0 pin P2 + to 0 pin P2 + to 0 pin P9 + to 0 pin P1 + to 1 pin P2 + to 0	and •	range 🔹 Iz	- 10 th	∝⊖		
if range - digital write (digital write (3) rante (digital write (digital write (digital write (digital write (pin P0 + to 1 pin P1 + to 0 pin P2 + to 0	and -	700ge • 2	• 10 th	• 0		
if range - digital write (digital write (3) a write (3) raw algital write (digital write (digital write (digital write (pin P0+ to 1 pin P1+ to 0 pin P2+ to 0 max pin P2+ to 0 pin P2+ to 0 pin P2+ to 0 pin P1+ to 0 pin P1+ to 0 pin P2+ to 0	and •	range v 2	• 10 th	 □ □ 		

Step 20. Repeat duplicate method to make another three **digital write pin blocks**. Drop these new blocks below **else** block. Set the **pin#** to **P1, P2**, and the value **o** to **1** as following figure.

forever	2 - 14 - 14 - 14 - 14 - 14 - 14 - 14 - 1					
ping tr	ig P8 -					
set range • to echo F	16 -					
unit	*					
if range ♥ ≥ ♥ 20	then					
digital write pin P0 → to	1					
digital write pin P1 → to	O O					
digital write pin P2 🕶 to	O O					
else if range 🗸 🧹	and - (range -	- 10	then $igodot$		
digital write pin . DB =						
	4					
digital with Duplicate	-				•	
Add Commen				0		
Delete Block				Θ		
Help					digital write nin Date to	0
					digital write on Dro to	0
forever						
ping trig a	8 -					
set range ≠ to echo P16 ≠						
unit on •						
digital write pin 10 + to 1	a (6. m. a					
digital write pin P2 - to 0						
else if name * 4* 30	and w		then 👄	1.0		
				1 - C		
dig 3 pin P2 - to 0						
else			Θ			
digital write pin 19+ to 📀	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			2		
digital write pin P1 🔹 to 📀						
digital write pin P2 🕶 to 1	1.00	(- 10 - 10	0.0		
•						





Step 21. In the Toolbox, click on the **Basic** category. Then drag the **pause (ms)** block and place it inside the **else** block below the three **digital write pin to** block.

Search 1 a		else if range 🔹 < 🔹 20	and 💌	range 🔻	2 10
🔡 Basic		digital write pin P0 ♥ to 0			
••• more		digital write pin P1 🔻 to 🔟	2.1		
 Input 		digital write pin P2 🕶 to 📀	- 1 - 1		
O Music	show icon 🔹 💌	else	8		
C Led	show string "Hellol"	digital write pin P0 ▼ to 0		- 18 - 18 - 19 - 19 - 19 - 19 - 19 - 19 - 19 - 19	1
Radio		→+al write pin P1 • to 0			
C Loops	forever	3 al write pin P2 • to 1			
🔀 Logic	2				
Variables					
Hath	pause (ms) 100 -		с. ж. ж	1.0	- x - x

Step 22. Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following figure.

	1	2
	Send to	MICROBIT (L)
microbit-Parkin g-Assistance-Sy stem.hex	Cut	
	3 pying	
	Copying	
	from Downloads Discovering items	to MICROBIT (I.)

Below link is the full Graphic programming code blocks we have done for you as reference:

https://makecode.microbit.org/_LbzbuR9MVV6P





PROGRAM RUNNING PROCEDURE



HOW TO USE

Ultrasonic detector module is commonly used in the measurement of distance, such as range finder and position measuring instrument. it has also been widely used in the development of reversing radar.





Lesson 19 Smart IR Controller





The lights on the opposite building are really interesting. Is someone controlled them ?

Yes, the infrared sensor can control them .do you want try it ?







PARTS & DEVICES

- BBC micro: bit board x 1
- OSOYOO infrared receiver module x 1
- OSOYOO 3-pin PnP cable x 1
- OSOYOO Plug&Play(PnP) board for micro: bit x 1

ABOUT MODULE

_ ____



HOW TO MAKE

Connect IR receiver module to OSOYOO PnP board **P0** port with OSOYOO 3-pin PnP cable as below;







HOW TO CODE

Step 0: Go to URL: https://makecode.microbit.org, click New Project



Step 1. In the Editor Controls, click on the **Advanced** button and then **Extensions** as following figure.



Step 2. In the Extensions page , enter project URL

"https://github.com/osoyoo/OSOYOO_IR_V3/" in the Search textbox and click on the **Search** button. The page will show you all the matching extensions based on your search string. Now, click on **OSYOO-IR-Silvery-Receiver** to add it into your project.



Step 3. Click on the **OSYOO_SilveryIR_V3** category . Drag **a connect ir receiver** block and place it inside the **on start** block.





http://osoyoo.com/?p=25057

	connect IR receiver at pin 20 + and	receiver at pin P0 + and decode 550920 +			3			
O input	~		ect IR receiver a	t pin P8	and	decod	e osovoo	
Music	Il data was received							
d nutr	TR Belles			PO			P3	
C Losos				P4			P7	
24 Logic	IX Sutton coos CH. •							
Variables	on 28 button CR- * pressed *			P8			P11	
🖬 Math				P12			P15	
CSOYOO_SilveryIR_V3	the second se	· · · · ·					-	

Step 4. From OSYOO_SilveryIR_V3 category, drag and drop an **on button pressed** block to blank area, set NUM1 from drop-down menu.



Step 5. In the Toolbox, click on the **Basic** category and Click and drag the **show number** block over and place it inside the **ON BUTTON PRESSED** block. Then changed the 0 to 5.



Step 6. Click on the Basic category again, Drag and drop a *pause (ms)* block , and place it below show number 5 block (inside the ON BUTTON PRESSED block), and choose
200 ms from the drop-down menu .



Step 7. Make another **show number** block and **pause (ms) 200** block same as Step 6. Place them below previous **PAUSE 200** block .change the show number block value from **5** to **4** as following figure.






Step 8. Repeat Step 7 and make three additional **show number** blocks and another two **pause (ms)** blocks. Set their value and position as per following figure.

Surda.		on 18 sho pau sho pau sho	t button 1 = ne number 5 use (ms) 200 ne number 4 use (ms) 200 ne number 3 use (ms) 200	i pressed				
P Music ● Led ■ ■ ■ 2 <		pau sho pau sho	ise (ms) 200 ni number 4 ise (ms) 200 ni number 3 ise (ms) 200					
A adio C toops C		sho	ise (ms) 200 w number 3 ise (ms) 200	Ţ				
		pau	ise (ms) 200	-				
SOSOYOO_SilveryIR_		sho	w number 2	Į –				
G Extensions	V3	sho	w number 1		-			
Advanced				-a - 1				

Step 9. Click on the **Basic** category again, Drag and drop a *showed leds* block , and place it inside the **ON BUTTON PRESSED** block , and draw a "crying face" by clicking the dots in the 5×5 matrix *as following figure*.



Step 10. Click on the **OSYOO_SilveryIR_V3** category again. *Drag and drop an on CH* + *button pressed* block to blank area.







Step 11. Click on the **Basic** category again, Drag and drop a *showed leds* block and place it inside the *on CH + button pressed* block , and draw a "l" letter by clicking the dots in the 5×5 square *as following figure.*



Step 12. Click on the Basic category and drag a **pause (ms)** block and place it below **Show "I" LED** block. Then choose 1 second from the drop-down menu as following figure.



Step 13. Repeat Step 12 and make another **show leds** block and **Pause** (ms) block. Use mouse to draw a"love heart" in the 5×5 square and set pause time to 1 second. Put these two blocks inside the **on CH + button pressed** block (see following *figure*).



Step 14. Repeat Step 13 and make another **show leds** block and pause block. Draw a "U" figure in the LED square block, put them inside the **on CH+ button pressed** block. *See following figure:*





http://osoyoo.com/?p=25057



Step 15.Click on the **OSYOO_SilveryIR_V3** category again. *Drag and drop another on CH button pressed block to blank area.*



Step 16.Click on the Basic category and drag and drop the **show leds** block and place it inside the **on CH + pressed** block. Then click a **coin** on the squares **as following figure.**



Step 17. Right-click duplicated from the **show leds** block over. You will get a duplicated blocks, and place it inside the **on CH button pressed** block .and click a small **heart** on the squares *as following figure.*



Step 18. Repeat step 17 and make some more **show leds** blocks as following picture, put them inside **on CH button pressed** block.





http://osoyoo.com/?p=25057



Step 19.Click on the **OSYOO_SilveryIR_V3** category again. *Drag and drop an on NUM2 button pressed block.*



Step 20.Click on the Basic category and drag and drop the **show leds** block and place it inside the **on NUM2 button pressed** block.



Step 21. Download this "**.hex**" file and save it to your **MICROBIT** disk Driver as following figure.







Below link are the full Graphic programming code blocks we have done for you as reference:

https://makecode.microbit.org/_aztV4f2cgaEY



 \odot When it received the signal, we can use the IR controller to control.

⊙ Pressed the NUM1, the LED matrix will be show countdown 5 to 1(every number paused 1s), then show "crying face" icon.

⊙Pressed the CH- ,the led matrix will be show I♥U, every icon paused 1s ;

⊙Pressed the CH, the led matrix will be show a beating heart icons;

⊙Pressed the NUM2, the led matrix will be off.







HOW TO USE

Infrared remote control and infrared receiving module are widely used in Sweeping robot, Infrared thermometer and so on.





