STARTER GUIDE

magicbit

www.magicbit.cc

Welcome to the world of Magicbit

Magicbit is a feature rich, easy to use and cost effective platform made for everyone. The inbuilt functionalities of Magicbit provide a unique advantage for users to learn and practice a wide range of application areas such as robotics, programming, Internet of Things(IoT) and electronics.

Magicbit is an innovation ecosystem with hardware, software, mobile app, content, community and partners. Integrated solutions can be developed more easily while exploring cross platform options such as programing with any other software or connecting to any cloud IoT platform.

A frequently asked question about Magicbit is "How many innovations can I develop with Magicbit?" The answer to that would be "It has no limits". Your creativity and innovative mindset has to decide the number of innovations you can do. After all, the world needs more solutions with technology to resolve some of the burning problems faced by the mankind. Making technology accessible and available to everyone is the passion Magicbit team would like to share with everyone.

So, Welcome to the world of Magicbit !!! Let's start your journey of innovation.

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Background

01

Magicbit Core is a tiny programmable computer which takes inputs from the environment, process them and drive outputs according to the programmed logic. You can find dozens of these type of tiny programmable computers in washing machines, Televisions, Microwave ovens and many more devices. These tiny computers are mostly either microcontrollers or system on chips (SoC).
There are three main components of a system (even for us humans) **Inputs**, **Output** and **Processor**.

Sensors act as **Input** to listen to physical world and convert physical property to an electrical signal. some examples are temperature, light & movement sensors.

Actuators act as **Output** to the physical world again to convert back electrical signal to a physical property like sound, light or movement.

Microcontrollers or **SoC** get inputs from sensors and drive output according to pre programmed logic. As an example, a light sensor sends light level to Magicbit and it turns on a bulb when dark or you can use temperature sensor reading to turn on a fan.
You can make amazing things by programming these tiny computers. It's all about your creativity to make a useful outputs from inputs. We, as Magicbit is here to make the process simple for you.

Programming Magicbit

Magicblocks.io is an IoT platform to create IoT projects in minutes for both beginners and experts

magicbit.cc/magicblocks

Age 12+

Arduino is C/C++ based language with a large community all around the world with lot of free resources

magicbit.cc/arduino

Age 12+

MicroPython is a programming language compatible with Python 3. It's a smart way to start learning Python

magicbit.cc/micropython

Age 12+

MagicCode is specially designed for kids to start learning programming with visual blocks. It's based on Scratch 3

magicbit.cc/magiccode

Age 8-16

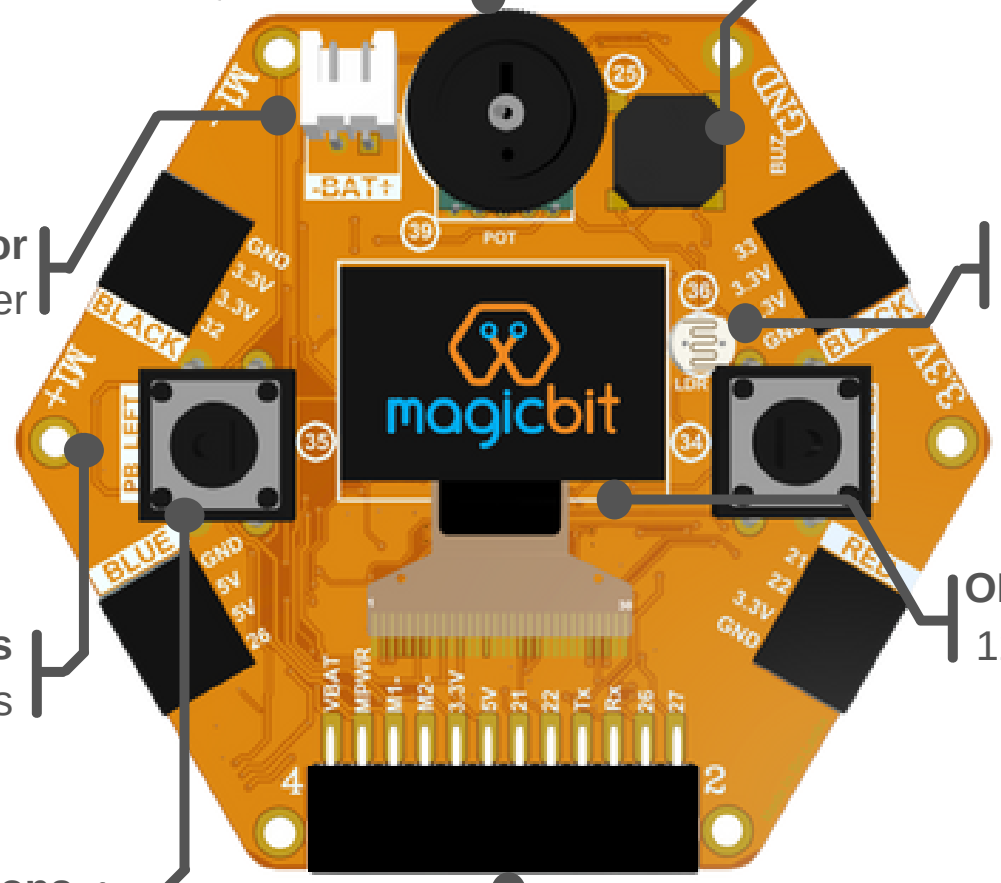
Magicbit Front

Potentiometer
Rotate to change a value

Buzzer
Play sounds

Battery Connector
Plug the battery holder

LDR
Light sensor



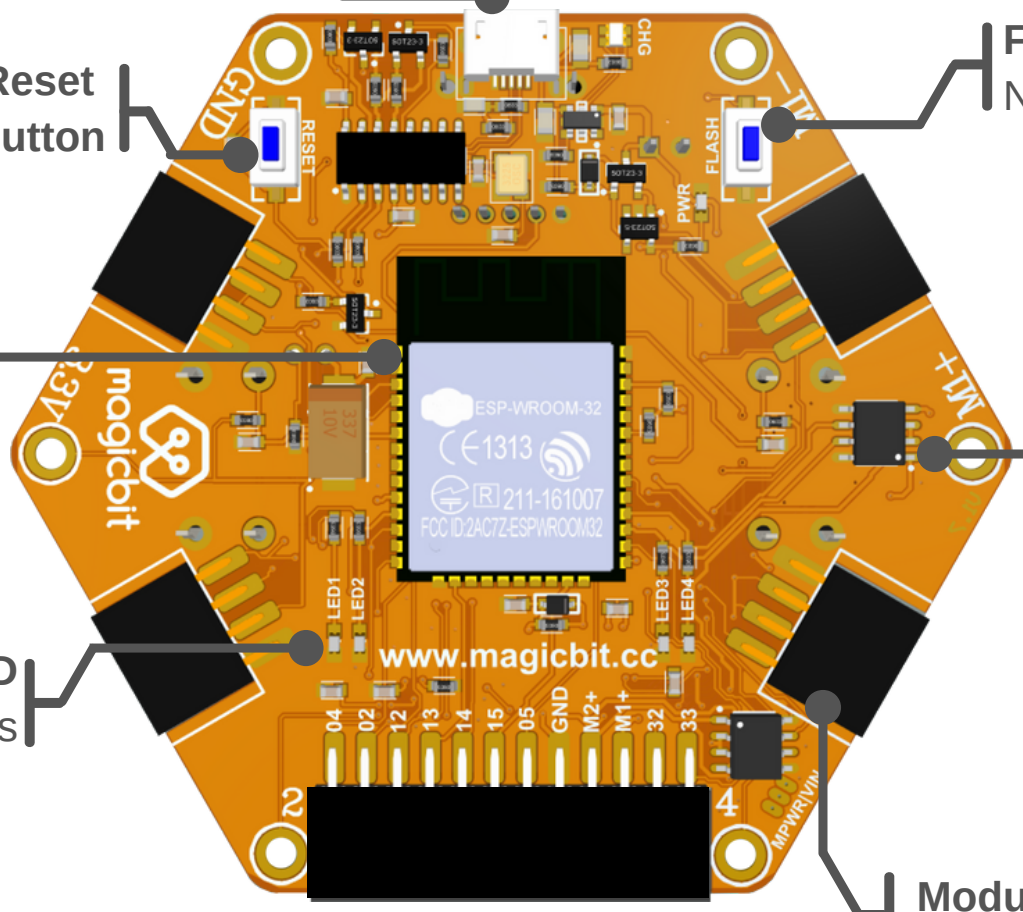
Crocodile Clip Holes
Attach crocodile clips

OLED Display
128x64 pixel display

Push Buttons
Digital inputs for Magicbit

Expansion Port
More connectivity options

Magicbit Rear



Micro USB
Connect to computer & Power Magicbit

Reset Button

Flash Button
Need for programming

ESP32 Module
Brain of the Magicbit

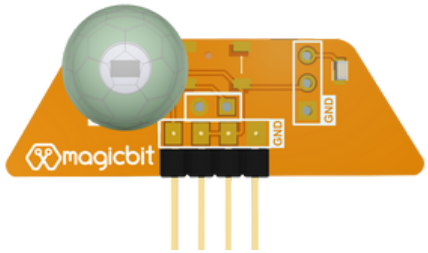
Motor Driver
Connect 2x Motors

LED
Indicators

Module Connectors
Plug modules

Magicbit Modules

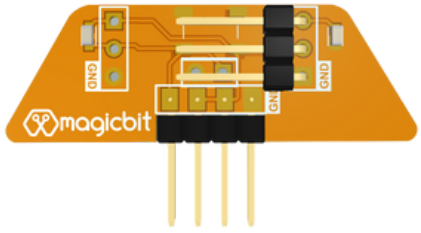
Motion Sensor



Detect the motion of a human or an animal

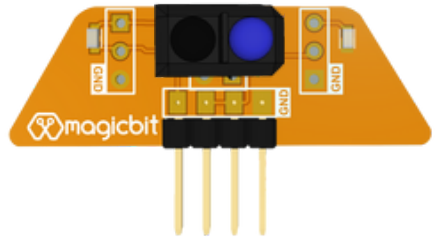
Digital Signal Range :5m

Black Ext Module



Connector to plug the soil Moisture and ultrasonic sensors to Magicbit

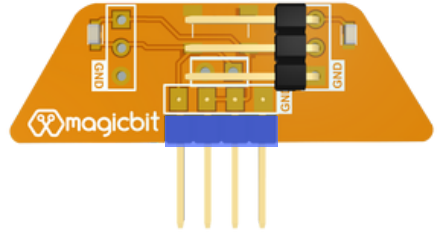
Proximity Sensor



Identify close objects without contact

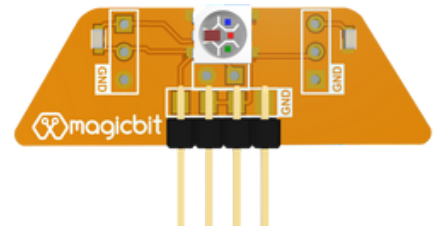
Digital/Analog Signal Range :5cm

Blue Ext Module



Connector to plug the servo motor to Magicbit

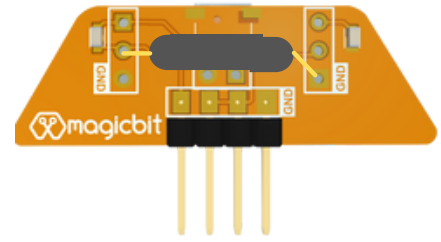
RGB LED



Create a combination of Red, Blue & Green lights

Neo Pixel

Tilt Sensor

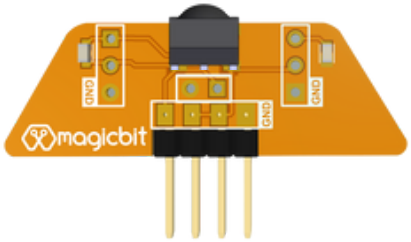


Detect the incline or motion of an object

Digital Signal

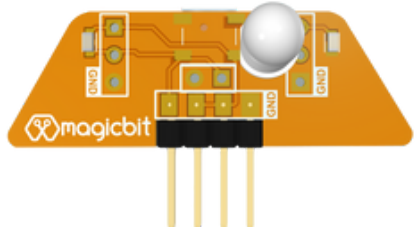
Magicbit Modules

IR Receiver



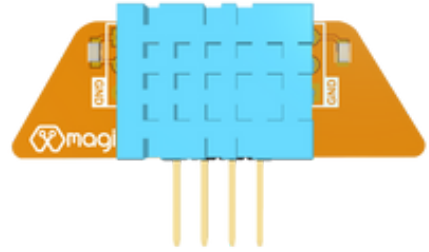
Detect signals from an IR remote

IR Emitter



Transmit IR signal patterns

Temp.& Humi.Sensor



Measure temperature and humidity in environment

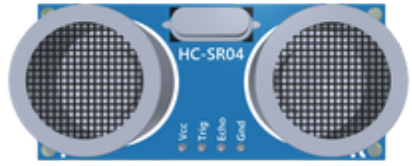
Temp- 0-50°C Humidity 20%-80%

Servo Motor

A motor to control the angle of rotation

Range 0-180 degrees

Ultrasonic Sensor



Measure the distance for a target object

Range : 2cm to 4m

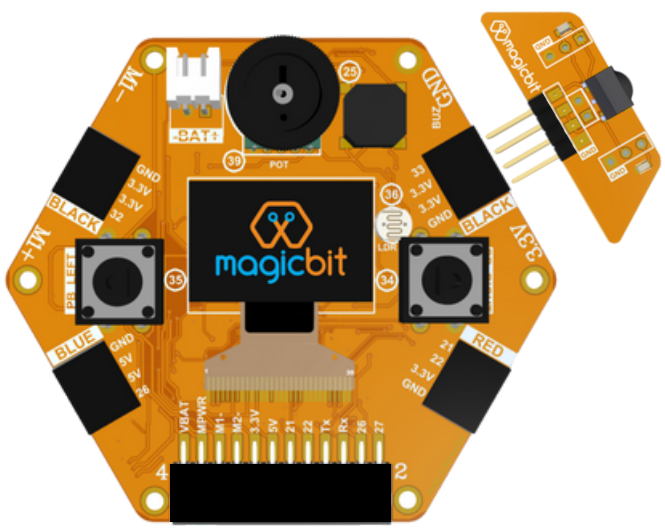
Soil Moisture Sensor

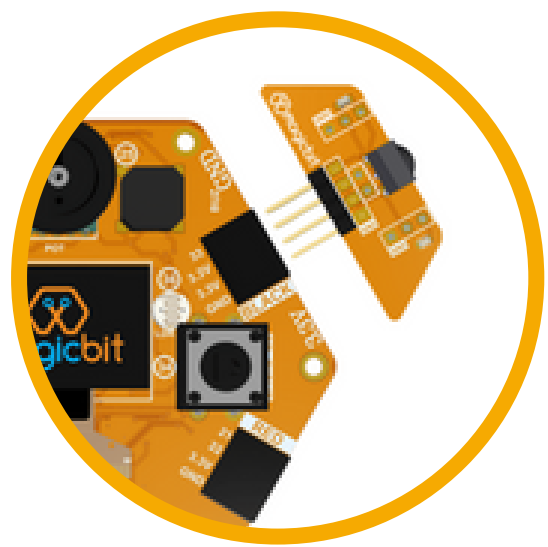
Determine the moisture level in soil

Analog Signal Range : 0-3V

Important

- Recommended for age 8 years and above.
- Magicbit is operated with a Voltage of 3.3V and should be handled with care to avoid any damage to user and the device.
- Following batteries can be used based on your battery holder selection.
    - 1x 18650 Li-ion battery
    - 3x AA Alkaline Battery
- Modules should be plugged to connectors aligning the logo printed on the sensor module with the display side on Magicbit.
- Connector should be plugged in by matching the connector color in module with the printed color on board.

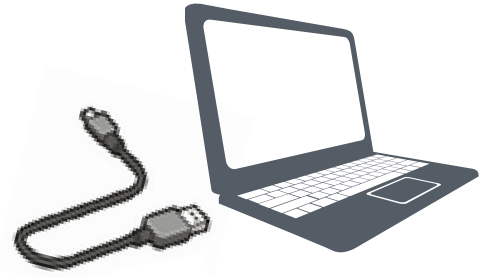




Getting Started

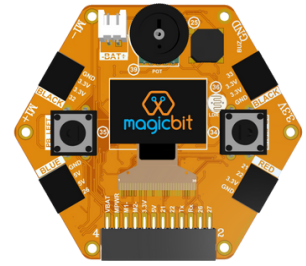
01

Connect the Magicbit to the computer via USB cable.



02

When using for the first time, Magicbit self-check program will run on the device displaying different features.



03

Download and install Magicbit upload tool with drivers
https://magicbit.cc/downloads/

Magicblocks.io

Visual code builder

Block based programming or visual coding is a popular concept to develop solutions with ease. Magicbblocks.io is a cloud based IoT software which can be used to program Magicbit and develop solutions. Even a novice in programming can use this to develop a solution following a logical sequence to connect the blocks.

Powered by Node-RED

Magicblocks.io was developed based on Node-RED open source framework. This provides some powerful integrations to APIs, Social media, Google services and many more. The customized blocks for Magicbit can be used to integrate Magicbit easily. The software has device management function and it supports Magicbit and other ESP 32 based hardware as well.

From beginner to expert

Magicblocks is a fast way to learn solution integration for a beginner. Complex applications can be developed with custom programming. The blocks can be custom coded with java script functions. Therefore it can be even used for expert level solution designing.

Setup Magicblocks

Sign Up & Login

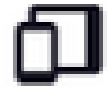
- Visit https://magicblocks.io and click signup to register as a new user.
- When you fill & submit the basic details, you will get the activation link via email.
- Click on the link in the email to activate the account.
- Once activated, you can login to the account in magicblocks.io

Click on "Start Playground" after login. Playground is the workspace to create logic using different functional blocks.

You can add coupon code provided with Magcbit to activate your standard subscription under the subscriptions tab. With standard subscription, you will have unlimited session time while you are working with Magicblocks. After you logout from the session, it will be automatically stopped after 1 hour.

Configure Magicbit

STEP 1 :

Login to Magicblocks account and open the **Device Manger** tab 

STEP 2 :

Click on

button and new device dialog will popup

STEP 3 :

Add a Name and keep other fields with default values. Click on **save changes**

STEP 4:

Click on the **configure button** and refer to the below instructions

1. Upload magicblocks firmware using the uploader
2. Add your WiFi network SSID (name) and password
3. Connect to Magicbit WiFi network and wait for a beep sound
4. Click on 'Finish' button to complete the configuration

STEP 1 :

If everything fine, you can see wireless mark on your Magicbit display. If you get an error please check SSID & password are correct or playground is running.

Playground

The playground is a hosted instance of a customized version of the open source, Node-Red . On the left you will find the palette with all the blocks. Once you have created your program, the **Deploy** button on the top right corner will be used to update and save all your changes.

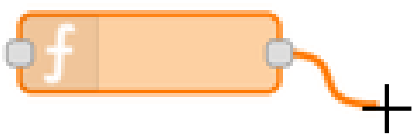
Blocks or Nodes

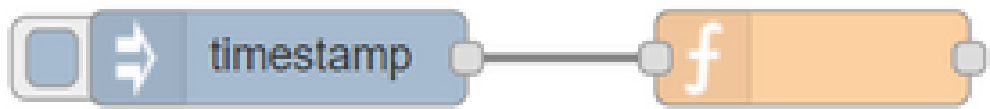
Blocks are the basic units of creating logic. There are many blocks for different functions in the palette. Blocks can be added to the workspace by dragging them from the palette.

A node's configuration can be edited by double clicking on the block. If a node has any undeployed changes, it displays a blue circle above it. If there are errors with its configuration, it displays a red triangle.

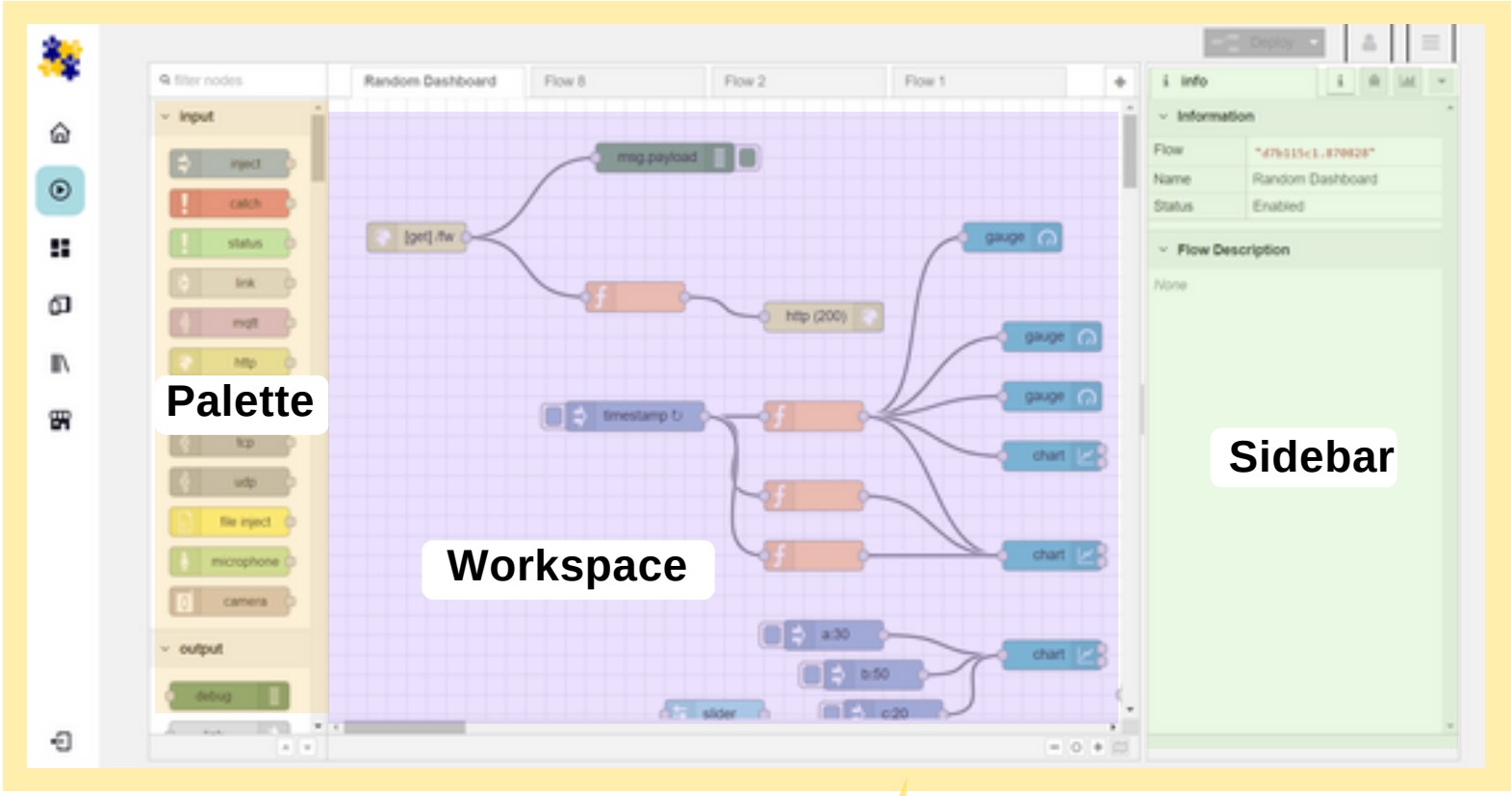
Wire

Nodes are wired together by pressing the left-mouse button on a node's port, followed by dragging to the destination node and releasing the mouse button.





Magicblocks Interface



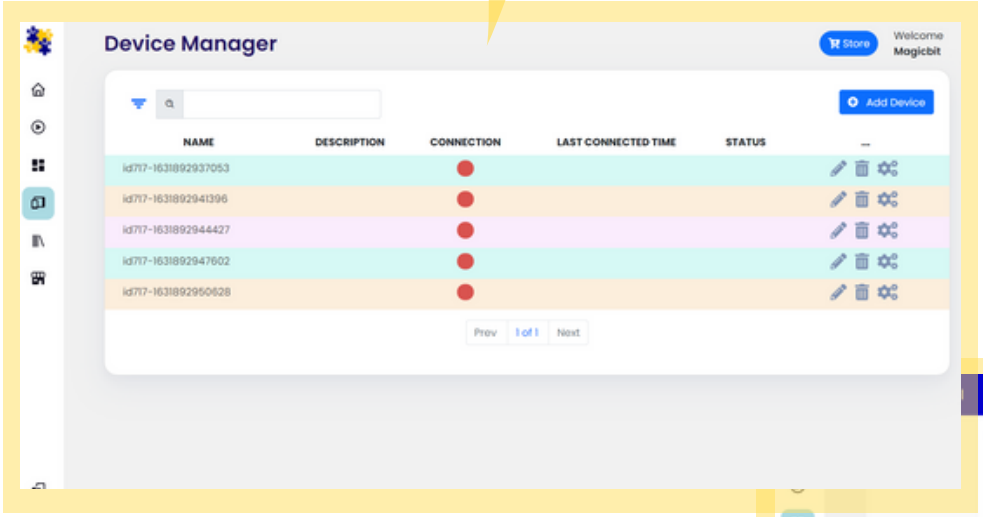
Playground

Create logic using visual programming

Magicblocks Interface

Device Manger

Add, edit, configure & view hardware devices



Dashboard

Create dashboards to visualize data

Hello Magicbit

Display text on Magicbit

Your first project, OLED, Inject node

Level :

Time : 30 mins

Say hello to your Magicbit. You can display any text on your Magicbit display.

STEP 1 :

Power up your Magicbit using USB cable and get connected to Magicblocks cloud. Check page 11 to configure Magicbit for Magicblocks.

STEP 2 :

Open playground and drag following blocks to workspace from the block pallet.

Inject block is used to input data to another block. Double click on inject block to see the properties. Change **Payload** to String and type **Hello Magicbit.** Click done.

Display block sends text data to Magicbit OLED display. Open properties and set **Device ID** of your Magicbit. Device ID can be found on your account Device Manager.

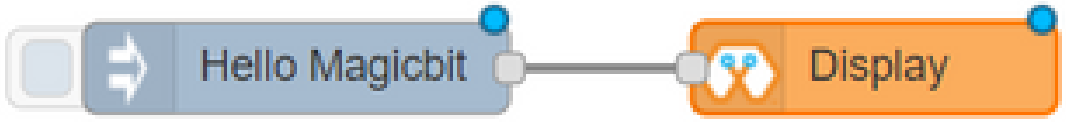
STEP 3 :

Connect Inject block with Display block using a wire. Drag your mouse from small square on Inject to small square on Display block.

Drag from here to display block

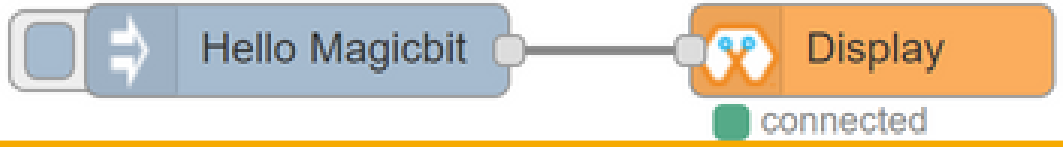
STEP 4 :

Click **Deploy** button to apply all changes. You can see the blue color dot on blocks disappearing after correctly deployed.



STEP 5 :

Once above steps are completed, you will see a connected mark under the Display block. Click switch (small square) at the left side of Inject block to see the Magic.



Activity

Change payload, add text to 'Topic' field in inject block and check the result

Smart Light

Control a LED through internet

Control the onboard LEDs on Magicbit via internet. Try different patterns with colors.

STEP 1 :

Power up your Magicbit using USB cable and get connected to Magicblocks cloud. Check page 11 to configure Magicbit for Magicblocks.

STEP 2 :

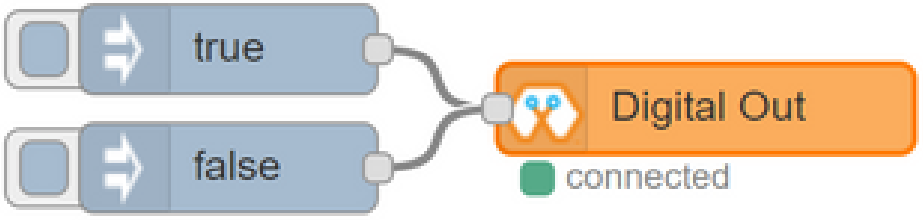
Open playground and drag following blocks to workspace from the block pallet.

Add two **Inject** blocks to workspace. Change **Payload** to boolean and set ***true*** for one block and ***false*** for other block.

Digital Out block from Magicbit blocks to change pin status of the Magicbit. You can input ***1*** or ***true*** to turn on a pin and ***0*** or ***false*** to turn off a pin. Open properties and set **Device ID** and **Pin** to ***LED Green(16)*** .

STEP 3 :

Connect Inject blocks to Digital out block using wires and Deploy. Click on inject block switches to see magic.



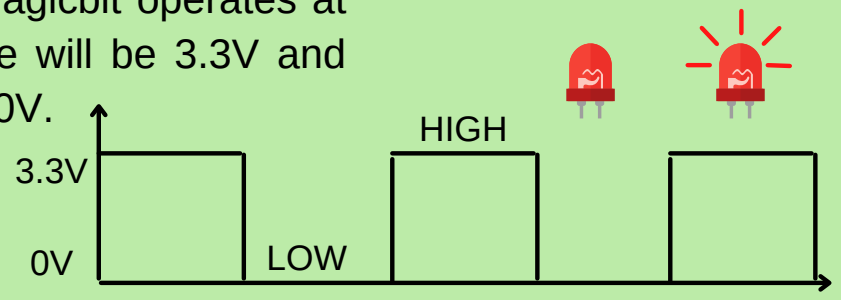
Activity

Try to work with other LEDs and blink a LED

Hint : Try repeat property in **Inject** and a **Trigger** Block

Do you know?

- **LED (Light Emitting Diode)** is an electronic component which emits light when electricity is passing through it. You need to use a resistor to limit the current through a LED.
- **Digital Output** - In digital electronics a pin can take a value such as **High** or **Low**. We call this as logic levels. Since Magicbit operates at 3.3V when a pin set to High state, the pin voltage will be 3.3V and when the pin is set to Low state pin voltage will be 0V.



Light Meter

Display light level on a dashboard

`Develop web based Dashboards with Magicbit to display sensor or input values.`

STEP 1 :

Power up your Magicbit using USB cable and get connected to Magicblocks cloud. Check page 11 to configure Magicbit for Magicblocks.

STEP 2 :

Open playground and drag following blocks to workspace from the block pallet.

Inject block to trigger Analog In block in every one second. Set **Repeat** interval to 1 second.

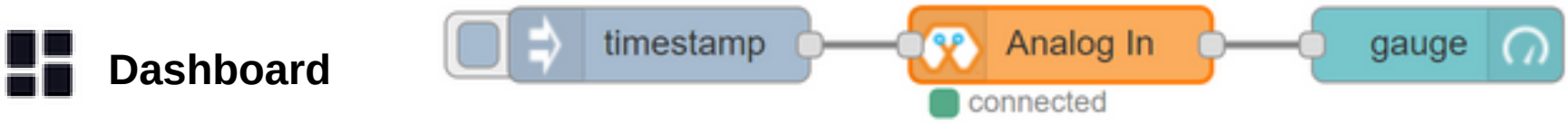
Analog In block reads analog input from Magicbit pins. Open properties and set **Device ID** , **Pin** to ***LDR(36).*** Keep **Method** as ***Poll*** and **Threshold** at default value. Output will be range of 0-4095.

gauge block from dashboard blocks. Set **Range** from ***0*** to ***4095***

Click on edit icon at **Group** property to assign a group. On next window click again on edit icon to set a **Tab.** Provide a name for Tab and click **Add** button. Then provide a name for Group and click **Update** button. Click **Done** to complete dashboard setup.

STEP 4 :

Click **Deploy** button to apply changes. Open dashboard on main sidebar menu. Cover LDR by hand to see the magic.



Activity

Add different dashboard widgets such as chart and text to view light level.
Try to turn on a LED when dark.
Hint: Use **Switch**, **Change**, **Digital Out** blocks

Do you know?

- **LDR (Light Dependent Resistor)** is a sensor that changes resistance with the light level.
- **Analog Input** - Magicbit has 12bit ADC (Analog to Digital Converter) to get analog voltage input from 0 to 3.3V and convert to digital value of 0 to 4095. That means if you supply 3.3V to analog pin Magicbit gives value as 4095.
  0V : 3.3V -> 0 : 4095

Weather Station

Monitor Temperature & Humidity

Develop web based Dashboards with Magicbit to display sensor values from different modules.

STEP 1 :

Power up your Magicbit using USB cable and get connected to Magicblocks cloud. Check page 11 to configure Magicbit for Magicblocks.

STEP 2 :

Open playground and drag following blocks to workspace from the block pallet.

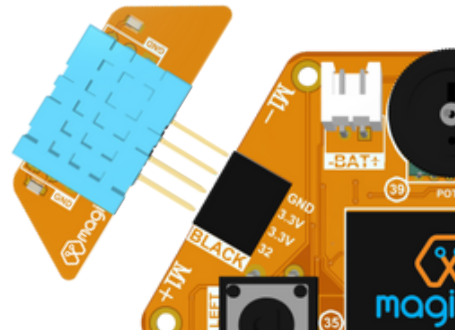
Inject block and set **Repeat** interval to 1 second.

Two **gauge** blocks from dashboard blocks. Set **Range** from ***0*** to ***100.*** Configure **Tab** and **Group** as in previous activity.

Two **DHT11** blocks to read sensor values. Open properties and set **Device ID** , **Pin** to ***32*** & **Mode** to ***Temperature*** in one block and ***Humidity*** in other block.

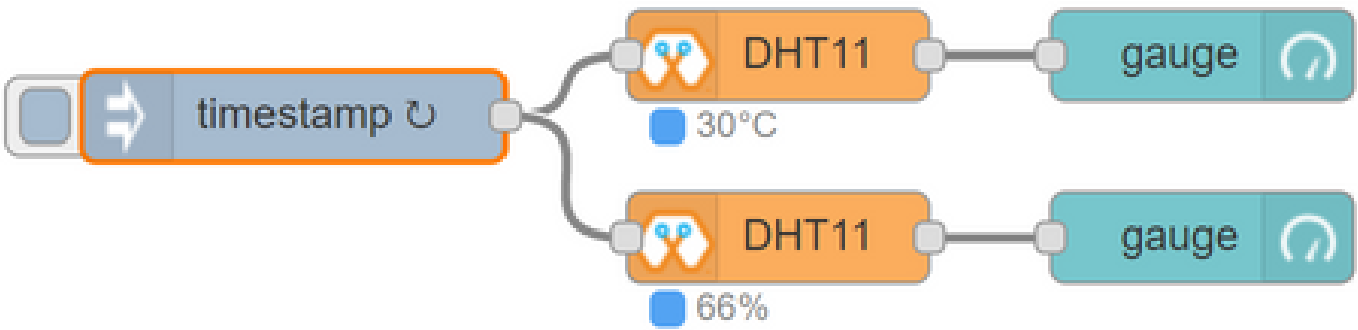
STEP 3 :

Connect Temperature & Humidity sensor module port with pin 32.



STEP 4 :

Click Deploy button to apply changes. Open dashboard on main sidebar menu. View temperature and humidity values on gauges.



Activity

Change gauge types from properties and add chart widgets. Add Light level to the dashboard.

Text to Speech

Try audio playing with Magicbit in different solutions such as text to speech.

STEP 1 :

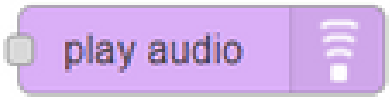
Power up your Magicbit using USB cable and get connected to Magicblocks cloud. Check page 11 to configure Magicbit for Magicblocks.

STEP 2 :

Open playground and drag following blocks to workspace from the block pallet.

Digital In block reads digital input from Magicbit pins. Open properties and set **Device ID** , **Pin** to ***PB Right(24)*** & **Method** as ***Interrupt***

template block can be used to set text templates. Type ***Button pressed*** in template property window



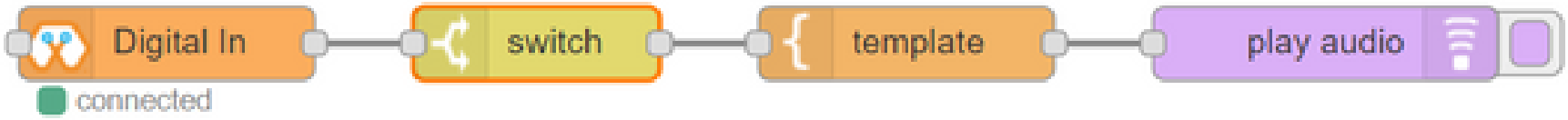
play audio block playbacks audio from the input text payload

switch block act as a conditional logic

block. Set ***value rule*** to 0.

STEP 4 :

Connect blocks and click **Deploy** button to apply changes. Press right push button on Magicbit to see the Magic



Activity

Try again without switch block. Change template with diffrent text and observe.

Do you know?

- **Method** in **Digital In** and **Analog In** blocks gives option to get data from Magicbit. When **Poll** option selected you need to request data from those blocks. You need to trigger it using a another block such as **Inject Block .** When ***Interrupt*** option selected, block will automatically output when the value changes. In **Analog In** you need to set threshold to trigger interrupt.
- Blocks exchange data through wires as a **payload** in **msg** object in JSON format.

What is Next

You have just started doing some magic with Magicbit. There are thousands of projects you can do. Here are some simple project ideas.

- Smart dustbin
- Plant watering
- Distance measuring
- Pet feeder
- Theft detector
- Personal assistant
- Water level monitoring
- Game console
- Ultrasonic radar
- Musical instrument
- IR Remote
- Smart AC controller
- Automatic night light
- Color Detector
- Counter

Follow our website, Youtube channel and Hackster.io channel to learn more about new projects of Magicbit. Since Magicbit is based on ESP32, any project done with ESP32 can be directly applied with Magicbit. Most of the Arduino and Microbit projects also can be tried as well.

Follow the below web sites for new project ideas

- www.magicbit.cc
- www.hackster.io
- www.instructables.com
- www.maker.pro

Supported Platforms

Magicbit is supported by most ESP32 compatible platforms

Cloud Platforms

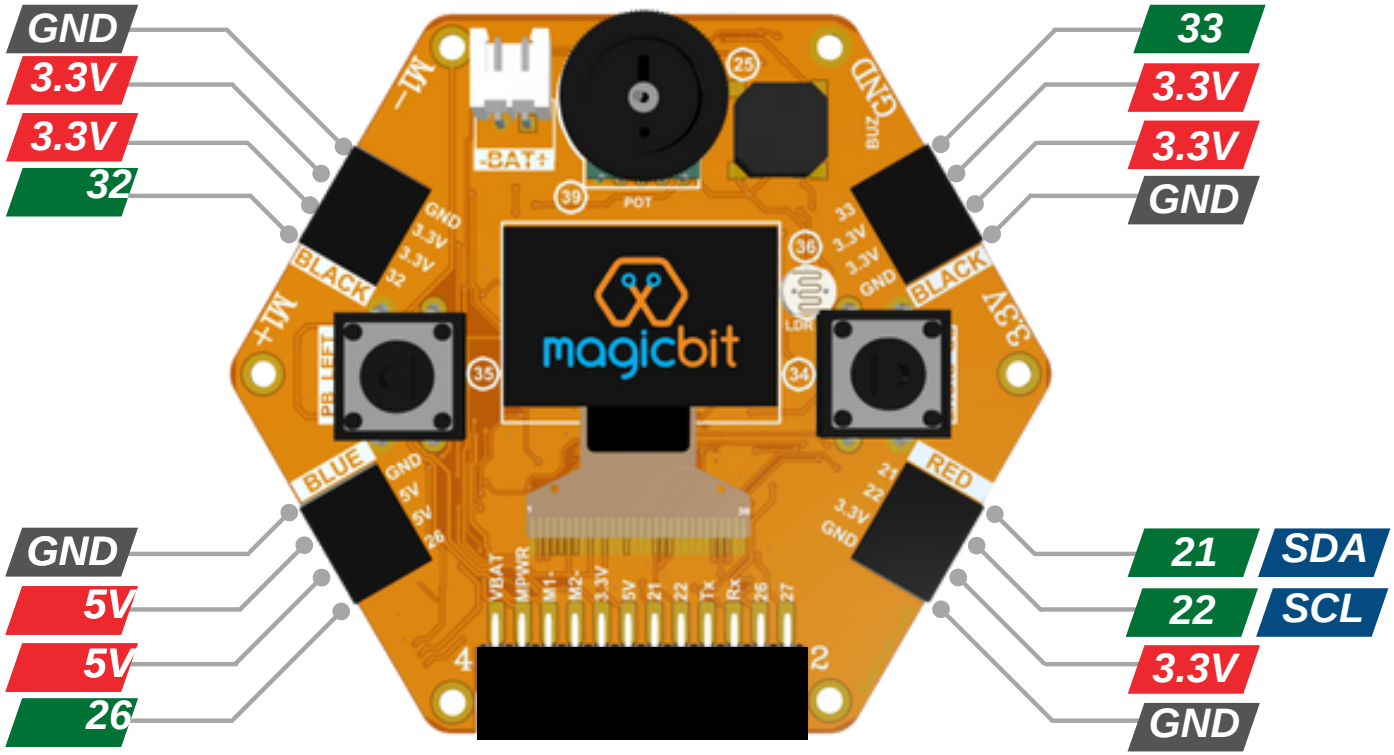
- Blynk - blynk.io
- Arduino Cloud - create.arduino.cc
- Thingsboard - thingsboard.io
- Microsoft Azure - azure.microsoft.com
- Google Cloud Platform - cloud.google.com
- Thinger.io - thinger.io
- Thingspeak - thingspeak.com
- ESP Rainmaker - rainmaker.espressif.com
- Amazon Web Services - aws.amazon.com
- TOIT - toit.io

Programming

- C# - nanoframework.net
- ESP-IDF - espressif.com
- BIPES (Block Python) - bipes.net.br
- JavaScript - johnny-five.io

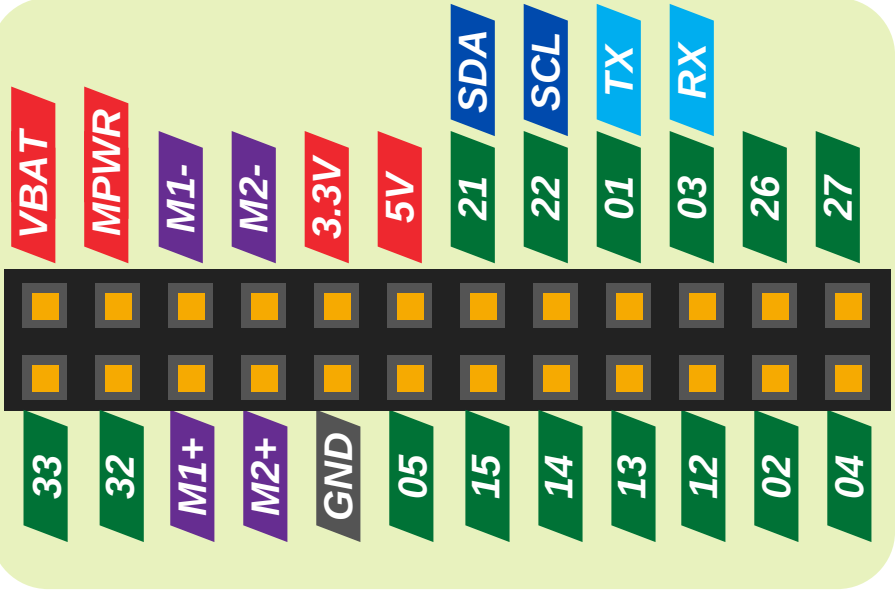
Magicbit Pinout

Red LED	27
Yellow LED	18
Green LED	16
Blue LED	17
Left button	35
Right button	34
Buzzer	25
POT	39
LDR	36
Motor 1	16/17
Motor 2	18/27



- All pins support PWM except pin 5
- 1,3,5,16,17,18,21,22 pins doesn't support analog in function
- When WiFi is enabled, Analog in working only for pin 32 to 39
- Max input voltage for any pin is 3.3V / battery connector is 4.2V
- 2,4,5,12,15 are strapping pins.

learn more at *magicbit.cc/pinout*



Our Products

Magicbit Plus

Magicbit Plus includes pluggable sensor modules to connect with Magicbit easily.

Magicbit Pro

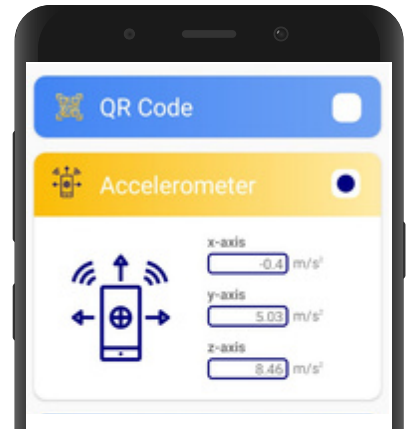
Magicbit Pro includes Magicbit Core and pluggable sensor modules to explore creativity with technology

Magicbot

Magicbot is a robotic platform developed to plug the Magicbit and program to learn the basics of robotics such as line following, obstacle avoiding and Bluetooth & WiFi controlling.

Mobile App

Magicbit mobile app supports to bring the sensor data in mobile to Magicblocks environment and provides an output interface for dashboards and notifications.



Magicbit is an innovation platform and a STEM tool made for Internet of Things (IoT), Robotics, Electronics & Programming. It's a great tool to explore creativity with technology.
Magicbit was created to make innovation with technology easy for everyone. Whether you are a kid trying to blink a LED or you are an expert working on your next complex IoT project, Magicbit is a perfect tool to solve any problem with innovation.

Let's create Magic with Magicbit

Designed & Manufactured by
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Funded with KICKSTARTER

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