Guide to Pluto Blocks V2.0

The Block Programming application for Pluto 1.2 and Pluto X

Version 2.0.3
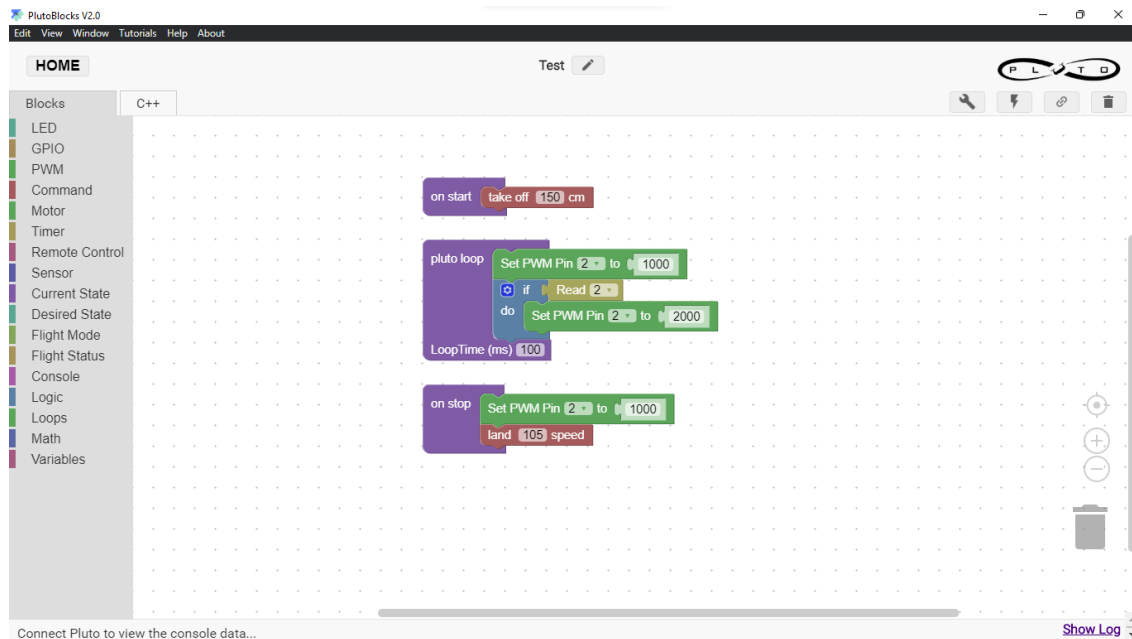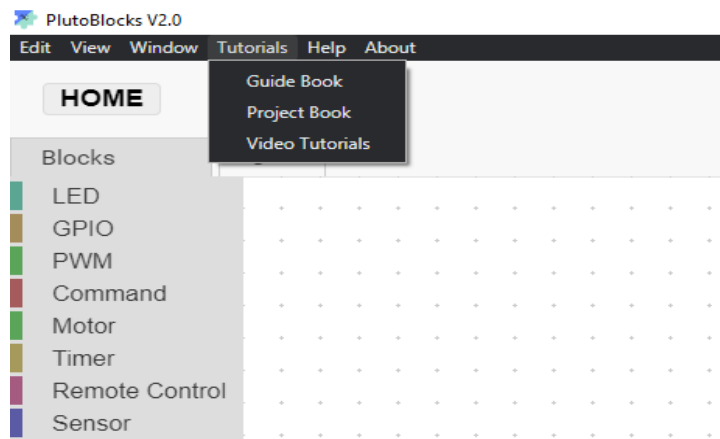
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ABOUT

Pluto Blocks is a block programming application used for programming Pluto 1.2 and Pluto X nano drones. This document contains details about the categories and the blocks available in Pluto Blocks.

Please refer to this guide in case of any doubt about any block.

Example of Pluto Blocks

Tutorial section of Pluto Blocks

Where you can find all the literature related to Pluto Blocks such as Project Book and Video tutorial too.

COMPATIBILITY

The Guide to Pluto Blocks (version 2.0.0) contains projects that are built on Pluto Blocks software and executed using Pluto nano drone. The compatibility for both are given below.
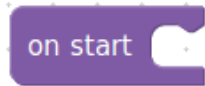
Software:
- Pluto Blocks 2.0.0

Drones:
- Pluto X nano drone
- Pluto 1.2 nano drone

TINKERING BLOCKS

These blocks occur on the home screen of the projects. The entire program will be coded within these blocks only. The purpose of each block is explained below.

---

on start

Do one time tasks over here. The program within this block runs only once, when the Developer Mode from Pluto Controller App is turned ON.

pluto loop
LoopTime (ms) 100
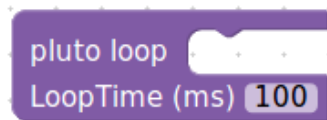
This is the block where the main program will be coded. The program within this block starts running after the execution of the ON START block. It will run continuously with a default loop time of 100 milliseconds. The loop time can be changed if required.

on stop
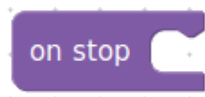
Do the cleanup tasks over here. The program in this block runs only once, when the Developer Mode from the Pluto Controller App is turned OFF.

LED

Primus X/Primus V4 contains three status LEDs - Red, Green and Blue. This category contains blocks to control all the LEDs.
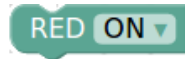
Description: This block enables the user to set the red LED in ON, OFF or TOGGLE state.

Description: This block enables the user to set the green LED in ON, OFF or TOGGLE state.

Description: This block enables the user to set the blue LED in ON, OFF or TOGGLE state.

GPIO

This category contains blocks to control all the GPIO as well as read the GPIO status.
It's useful when user wants to use the UniBus pin as digital input or output pins.
Mainly use for integrating external sensor or device.

Description: This block enables the user toto write data to a particular pin of unibus in LOW, HIGH or TOGGLE state.
Pin number: Pin2, Pin3, Pin6, Pin7, Pin8, Pin9, Pin10, Pin13, Pin14, Pin15, Pin16, Pin17, Pin18, Pin19
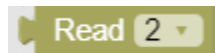
Description: This block enables the user to read data from a particular pin of unibus.
Pin number: Pin2, Pin3, Pin6, Pin7, Pin8, Pin9, Pin10, Pin13, Pin14, Pin15, Pin16, Pin17, Pin18, Pin19

Description: This block enables the user to read digital data from ADC pins
Pin number: Pin8, Pin13, Pin14, Pin15, Pin16, Pin17, Pin18, Pin19

PWM

This category contains blocks to control te PWM pins of Primus X and Primus V4.
This blocks are useful while integrating external devices requiring PWM. Eg. Motors, Servos, etc

Description: This block enables the user to give the PWM signal to selected Pin.

Pin number: Pin2, Pin3, Pin4, Pin5, Pin8, Pin9, Pin10, Pin13, Pin15, Pin18, Pin19 Value: 1000 - 2000 (Units: Hz)

COMMAND

This category contains blocks which give basic drone commands such as take off, land, arm, etc.

---

take off 150 cm

Description: This block commands the drone to Take Off to a default altitude of 150 cm, which can be changed.
Range: 100 - 250 cm

land 105 speed

Description: This block commands the drone to land.
Range: 0 - 255

flip

Description: This block commands the drone to perform a backflip

arm

Description: This block commands the drone to arm, i.e. the motors will get the power. Please note, it is different from the 'ARM' button in the Pluto Controller App, which essentially acts as a switch.

disarm

Description: This block commands the drone to disarm, i.e. the power to the motors will be cut off immediately.

MOTOR

This category contains blocks to control the power to the motors M5, M6, M7 and M8. When using Motor Blocks, remember to shut down all the motors in the On Stop Block by setting the motors at 1000 PWM. This will ensure that the motors do not run even after turning the Developer Mode OFF or disconnecting from the app.

Set M5 | 1000 | pwm

Description: This block sets the PWM for motor M5.
Range: 1000 - 2000

Set M6 | 1000 | pwm

Description: This block sets the PWM for motor M6.
Range: 1000 - 2000

Set M7 | 1000 | pwm

Description: This block sets the PWM for motor M7.
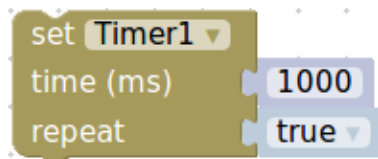**Range:** 1000 - 2000

Set M8 | 1000 | pwm

Description: This block sets the PWM for motor M8.
**Range:** 1000 - 2000

TIMER

Timer blocks can be used to perform a set of tasks repeatedly at specific time intervals. Use 'Create Timer' button to create new timer functions. When using more than one timer functions, the names will be available in the drop down menu.
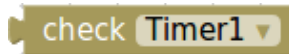

Description: This block enables the user to set time for the selected timer and the value to be repeated at the set time interval.
Range: 0 - 5000 milliseconds
Repeat: True, False
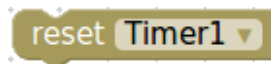
Description: This block will reset the selected timer back to zero.

Description: This block will return the set value (*true* or *false*) every time the set time in timer is reached.

REMOTE CONTROL

The Pluto Controller App has four control sticks - Roll, Pitch, Yaw and Throttle. When these sticks are moved, they generate a number corresponding to their movement. These numbers are called as Remote Control Data or RC Data. Also you can give commands through the block also.

RC Roll

Description: This block returns the RC Data value of the Roll stick.
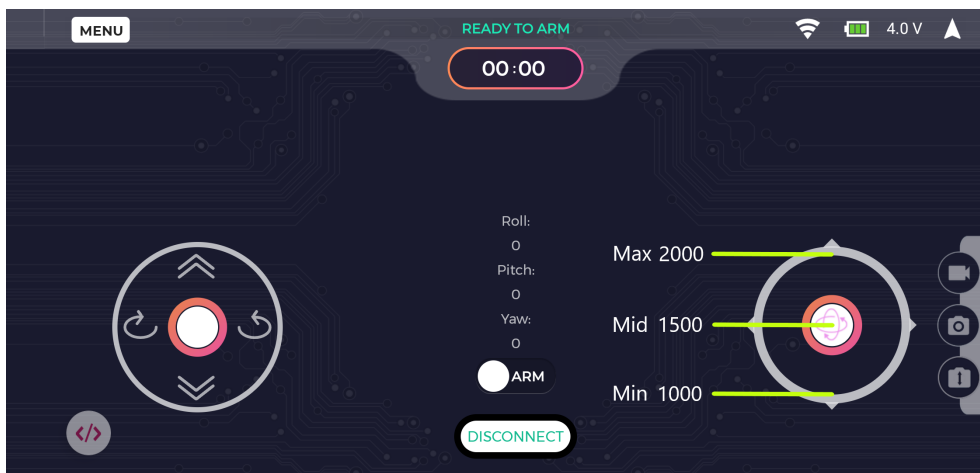**Range:** 1000 to 2000
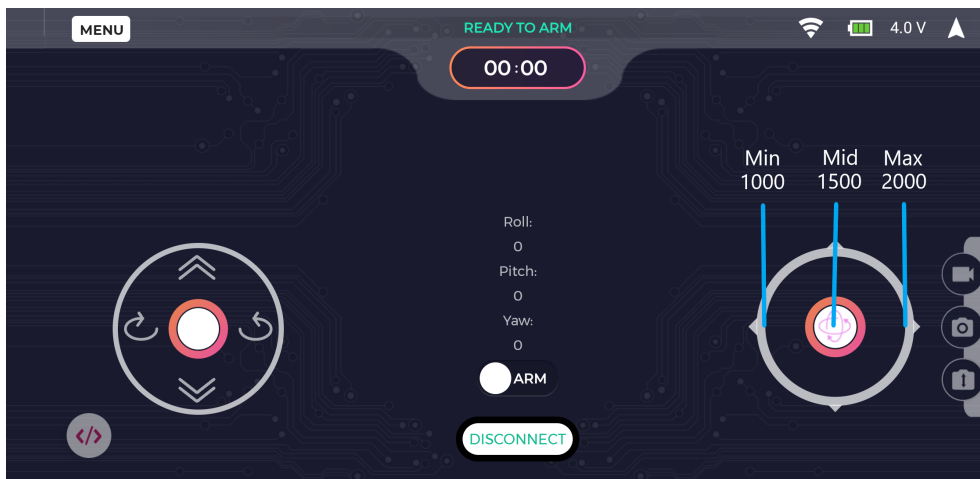
RC Pitch

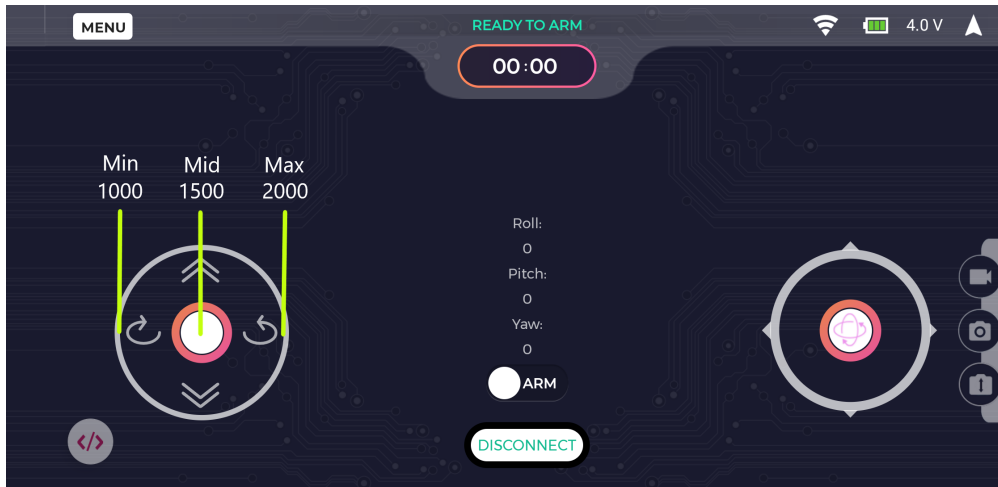**Description:** This block returns the RC Data value of the Pitch stick.
Range: 1000 to 2000

RC Yaw

Description: This block returns the RC Data value of the Yaw stick.
Range: 1000 to 2000

RC Throttle

Description: This block returns the RC Data value of the Throttle stick
Range: 1000 to 2000

Set Pitch `1000`
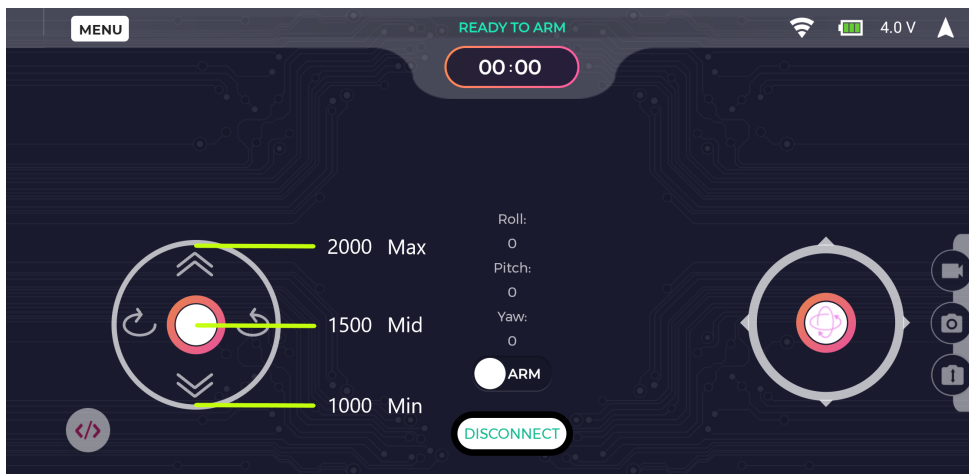
Description: This block sets the pitch value to the drone.
Range: 1000 to 2000

Set Roll `1000`

Description: This block sets the Roll value to the drone.
Range: 1000 to 2000

Set Yaw `1000`

Description: This block sets the Yaw value to the drone.
Range: 1000 to 2000

Set Throttle `1000`

Description: This block sets the Throttle value to the drone.
Range: 1000 to 2000

SENSOR

Primus X / Primus V4 contains four on-board sensors: Accelerometer, Rate gyro, Magnetometer and Barometer. Entire sensor data is accessible using the following blocks.

`Acceleration (cm/s2)` `X ▾`

Description: This block returns Proper Acceleration values
Units: cm/s^2
Axis: X, Y, Z, Strength (RMS)

`Gyroscope (deciDegree/s)` `X ▾`

Description: This block returns Angular Rate (rate of change of angle) values
Units: deciDegrees/s
Axis: X, Y, Z

`Magnetometer (microTesla)` `X ▾`

Description: This block returns Magnetic Field values
Units: microTesla
Axis: X, Y, Z

`Barometer` `pressure (100* millibar) ▾`

Description: This block returns Pressure and Temperature values.
Units: Pressure: 100*millibar
       Temperature: 100*degree centigrade

CURRENT STATE

The orientation of a flying system can be defined by the measures of three angles - Roll, Pitch, and Yaw. This category contains blocks that give the current orientation and current altitude of the drone.

Current Roll (degrees)

Description: This block returns the current value of Roll angle of the drone
Units: Degrees

Current Pitch (degrees)

Description: This block returns the current value of Pitch angle of the drone
Units: Degrees

Current Yaw (degrees)

Description: This block returns the current value of Yaw angle of the drone
Units: Degrees

Current Height (cm)

Description: This block returns the current value of Height of the drone. The measurement of height begins from the level where the drone is switched ON.
Units: cm

Get App Heading

Description: This function gives you current heading of your phone.
Units: Degree.
Ranges : 0 to 360 Degrees.

DESIRED STATE

This category contains blocks which enable the user to set the orientation (Roll, Pitch and Yaw) and the altitude of the drone to any desired value within the range. The execution of these blocks can be observed only while flying the drone.

desired roll (degrees) [0°

Description: This block enables the user to set a desired value of Roll Angle of the drone. This will make the drone tilt about the roll axis to the angle set by the user.
Range: -180 to +180 degrees.

desired pitch (degrees) [0°

Description: This block enables the user to set a desired value of Pitch Angle of the drone. This will make the drone tilt about the pitch axis to the angle set by the user.
Range: -90 to +90 degrees.

desired yaw (degrees) [0°

Description: This block enables the user to set a desired value of Yaw Angle of the drone. This will make the drone point at the angle set by the user.
(Please perform Mag Calibration for best results)
Range: 0 to 360 degrees.

desired height (cm) [0

Description: This block enables the user to set a desired value of Height of the drone. This will make the drone reach the height set by the user.
Note: The measurement of height begins from the level at which the drone is switched ON.

FLIGHT MODE

The Pluto Controller App enables the user to fly Pluto in different flight modes. This category contains blocks which help the user to check whether the preferred flight mode is active or not.

---

is headfree mode

Description: This block checks if the drone is in headfree mode or not. It returns *true* if the drone is in headfree mode and returns *false* if not.

is throttle mode

Description: This block checks if the drone is in throttle mode or not. It returns *true* if the drone is in throttle mode and returns *false* if not.

FLIGHT STATUS

This category contains blocks which help the user to check if the required flight status condition is satisfied or not.

`is armed`

Description: This block checks whether the drone is armed or not. It will return *true* if armed and *false* if not.

`ok to arm`

Description: This block checks whether the drone is ready to be armed or not. It will return *true* if it is ready and *false* if not.

`is Signal lost`

Description: This block checks whether the signal to the controller is lost or not. It will return *true* if the signal is lost and *false* if not.

`is crashed`

Description: This block checks whether the drone is crashed or not. It will return *true* if crashed and *false* if not.

`is inflight low battery`

Description: This block checks whether the battery is low during flight or not. It will return *true* if the battery is low during flight and *false* if not.

`is low battery`

Description: This block checks whether the drone battery is low under no load or not. It will return *true* if the battery is low and *false* if not.
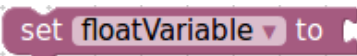
VARIABLES

This category allows the user to create their own variables to be used in the program. Use 'Create Integer' option to create and name an integer type variable. When using more than one integer type variables, the names will be available in the drop down menu. Similarly, user can create float and boolean variables.
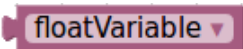
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set intVariable ▾ to
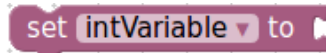
Description: This block allows the user to set the values to the selected integer type variable.
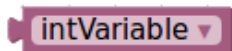
intVariable ▾

Description: This block returns the value of the selected integer type variable.

set floatVariable ▾ to

Description: This block allows the user to set the values to the selected float type variable.

floatVariable ▾

Description: This block returns the value of the selected float type variable.

set boolVariable ▾ to
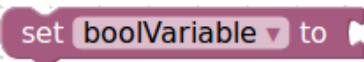
Description: This block allows the user to set the boolean values (*0/1*; *true/false*) to the selected boolean type variable.
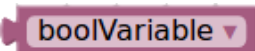
boolVariable ▾

Description: This block returns the boolean value (*0/1*; *true/false*) of the selected boolean type variable.

DRONA
AVIATION