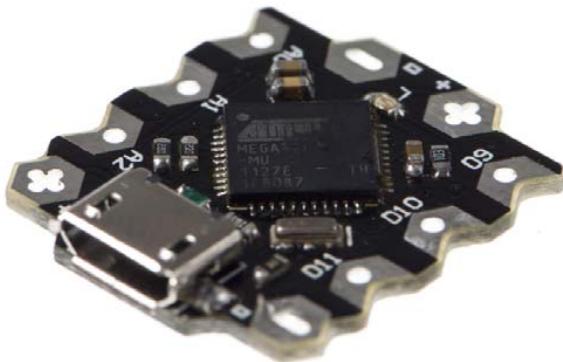




Beetle SKU:DFR0282

From Robot Wiki



Beetle

Contents

- [1 Introduction](#)
- [2 Specification](#)
- [3 PinOut](#)
- [4 Tutorial](#)
 - [4.1 Power](#)
 - [4.2 Programming](#)
 - [4.3 Example Code](#)
- [5 Trouble shooting](#)

Introduction

The “Beetle” is a minimized version of Arduino Leonardo, and has same powerful functionalities as Leonardo. It is ideal for DIY projects, wearable projects and etc. Its key features are :

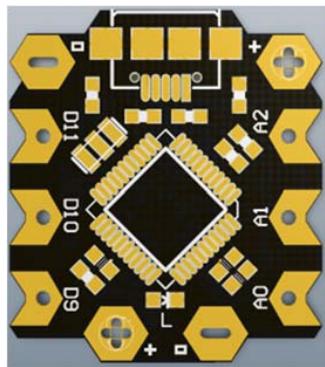
- 20mm X 22mm compact size
- Direct downloading and testing via Micro USB
- V-shaped large-size gold-plated IO ports make it convenient for the user to twist wires upon, and can also be directly sewn on clothes with conductive thread.
- Two honeycomb shape gold-plated power interface
- Magic light blue soft BLINK indicator

Beetle is fully compatible with Arduino, please select “Arduino Leonardo” when using.

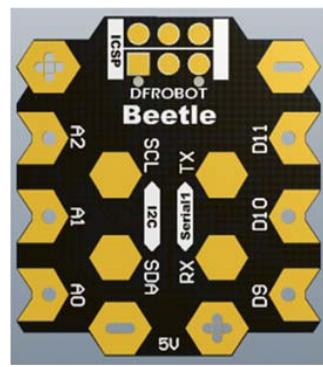
Specification

- Microcontroller: ATmega32u4
- Clock Speed: 16 MHz
- Operating Voltage: 5V DC
- Digital I/O Pins: 10
- PWM Channels: 4
- Analog Input Channels: 5
- UART: 1
- I2C: 1
- Micro USB: 1
- Power interfaces: 2
- Flash Memory: 32 KB of which 4KB used by bootloader
- SRAM: 2.5 KB
- EEPROM: 1 KB
- Physical Dimension: 20mm*22mm*3.8mm

PinOut



Beetle front look



Beetle back look

- IO Port Mapping in correspondence with Arduino Port:

Silkscreen	Digital Pin	PWM Channel	Analog Channel	UART	I2C
RX	0			Serial1	
TX	1				
SDA	2				SDA
SCL	3	3			SCL
9	9	9	A9		
10	10	10	A10		
11	11	11			
A0	A0		A0		
A1	A1		A1		
A2	A2		A2		

- Power interface description:

Silkscreen	Description
+	VCC
-	GND

Tutorial Power

Power supply via micro USB or power interface.

Programming

Beetle is fully compatible with Arduino Leonardo, see link for more details in connection : <http://arduino.cc/en/Guide/Windows#toc4>, the only difference is to select "Arduino Leonardo" ("tools > board > Arduino Leonardo" in Arduino IDE) .

Example Code

All codes for Arduino Leonardo can apply to Beetle.

Note:

#This product uses DC power supply with a working voltage of 5V. 6V will damage the product by overvoltage. This product works reliably between 4.5V-5V; it may work under 3V-4.5V, but the reliability is not guaranteed.
#For large load applications (such as motor control), you need to connect the loaded VCC and GND directly with power supply, and parallel with capacitor over 10uF, in order to prevent restart or malfunction caused by large load transient.
#In Arduino environment, Beetle has the same features as Leonardo with multiple serial ports, Serial used for USB virtual port; Serial1 used for RX/TX port.

Trouble shooting

Sometimes Leonardo Uart port will be locked by the sketch. It will lost its COM Port in Device Manager. There is a method to wake it up.

Step1 : There are 6 dots on the back of the module. This is ICSP interface. Please plug beetle to your usb cable. And watch your device manager. Using a cable to touch Pin 5 and Pin 6, then Beetle will reset. and Device manager should appear a COM port named "Arduino Leonardo bootloader (COM x)". After a few seconds, it will disappear. If you see this information you could go Step 2.

Step2: Open your arduino IDE, and open any sketch like "Blink", select the board to "Leonardo". There is no COM port now. Just click "Upload". After IDE has completed verifying, touch the Pin 5 and Pin 6 immediately. You need try several times, because the correct time is not easy to be caught.

Use has been normal, after loading a new program, the computer can not find the virtual serial Beetle?

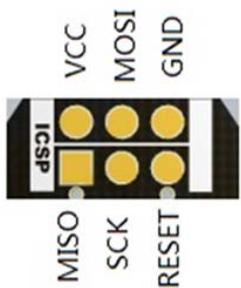
After eliminating the cable connection problems, then this question is that the new program is loaded affect the USB communication.

Beetle / Leonardo USB is implemented by the appropriate software (Arduino IDE implemented), it and the user program are on the ATMEGA32U4,

If the user program affects the USB-related operations will lead to see the USB virtual serial port. At this time we need to reload the

available user program(such as blink). If the Beetle / Leonardo has lost contact with computer, it can't automatically reset, it needs

to be loaded manually reset mode, Beetle resets through a short jumper RESET and GND of ICSP interface to achieve.



Beetle-ICSP interface

More question and cool idea, visit [DFRobot Forum](#)



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[Home](#) [Blog](#) [Arduino](#) [Introduction to Arduino Beetle](#)

Introduction to Arduino Beetle

In this post today, I'll walk you through the Introduction to Arduino Beetle. Arduino beetle is the smallest Arduino board that comes...

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> [pinMode\(\)](#)

> [digitalRead\(\)](#)

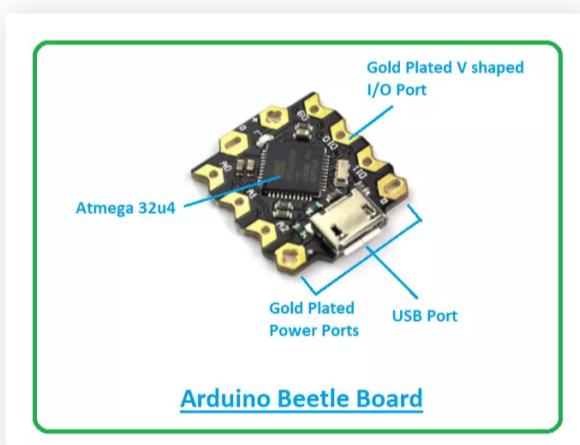
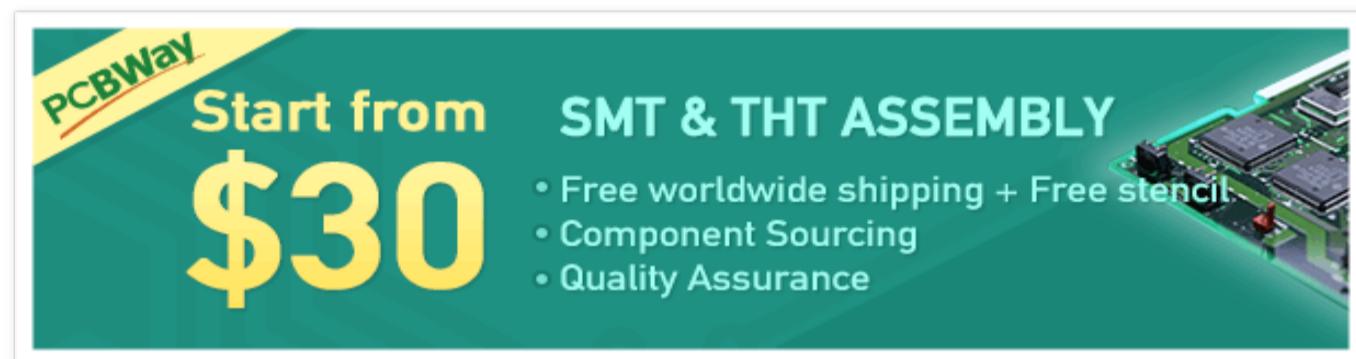
> [digitalWrite\(\)](#)

> [analogRead\(\)](#)

> [analogWrite\(\)](#)

> [Arduino Serial.Read\(\)](#)

> [Arduino Serial.Write\(\)](#)



Hi Friends! Hope you're well today. I welcome you on board. In this post today, I'll walk you through the Introduction to Arduino Beetle. Arduino beetle is the smallest Arduino board that comes with the functionality of Arduino Leonardo. This board is a remarkable addition to the minimalistic Arduino

technology. It is based on the microcontroller Atmel Atmega32u4. With the inception of innovations in modern technology, electronic devices are becoming light, more compact that happen to perform a lot of functions. These devices are economical and require little to no prior knowledge to get your hands dirty with them. All Arduino boards are microcontrollers but not all microcontrollers are Arduino board. While using the Arduino board, you don't need to attach extra peripherals with the board, as it comes with built-in functions that don't require the addition of external components. Earlier we have shared the articles on scores of Arduino boards including [Arduino Uno](#), [Arduino Leonardo](#), [Arduino Due](#), and [Arduino Mega](#). You can check these articles to find the basic information about them. I suggest you buckle up, as I'll walk you through the complete introduction to Arduino Beetle covering datasheet,

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> Arduino Software Serial

> Arduino Serial Communication

> Create PWM Pulse

> Arduino ADC Pins

 Arduino with Simple Modules

> LCD Arduino

> Scrolling Text on LCD

> Keypad Arduino

> Keypad LCD

> 2 Relay Module

> LED Matrix 8x8

> 7-Segment Display Library

> 7-Segment Arduino

> GLCD Graphical LCD

 Motors Control with Arduino

> DC Motor Speed control L298

> DC Motor Direction Control with L298

> DC Motor Direction Control

> DC Motor Speed Control

> Stepper Motor Direction Control

> Stepper Motor Speed Control

> Servo Motor Simulation

> Servo Motor Control

 Arduino with Embedded Sensors

> Ultrasonic Sensor

pinout, pin configuration, features, communication and programming and applications. Let's jump right in.

Introduction to Arduino Beetle

Introduced by Arduino.cc, Arduino Beetle is the smallest Arduino Leonardo board that is based on Atmel Atmega32u4.

The Atmega32u4 is an 8-bit CMOS low power microcontroller



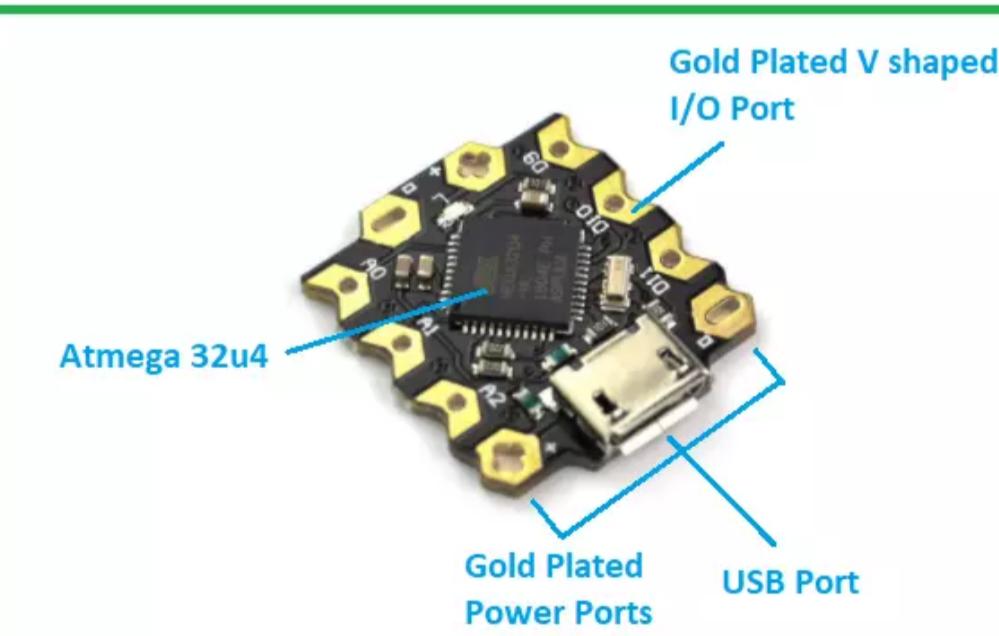
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Arduino.cc offers an open-source platform for everyone which means you can optimize the boards and software programs as you like better.

The IDE (integrated development environment) is a software used to program the Arduino board. You don't require prior knowledge and technical skills to start working with this board. The C and C++ are the languages used to program the Arduino beetle.

Though IDE software is compatible with MAC, Windows, or Linux Systems, Windows is a preferable operating system to use this board.



- > Multiple Ultrasonic Sensor

- > DS18B20 Temperature Sensor

- > DS18B20 LCD

- > Multiple DS18B20 Sensors

- > LM35 Sensor

- > PIR Sensor

- > PIR Sensor Simulation

- > Flame Sensor

- > Flame Sensor Simulation

- > Flame Sensor Hardware

- > ACS712 DC Current Sensor

- > DHT11 Sensor

- > Temp & Humidity Sensor

Arduino with Embedded Modules

- > NRF24L01 RF Module

- > NRU24L01+ Response Timed Out

- > RC522 RFID Module

- > HC-05 BT Module

- > HC-05 BT Module

- > DS1307 RTC Module

- > GPS Module

Arduino with Shift Registers

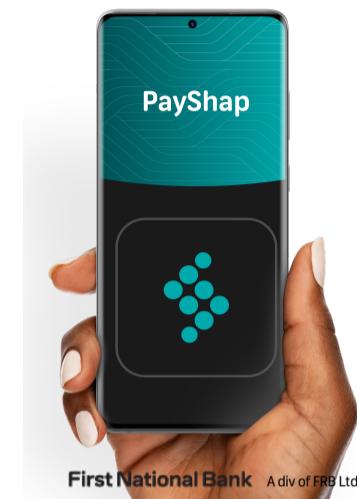
- > Arduino 74HC595 IC

- > Arduino 74HC165 IC

- > 74HC595 & 74HC165 ICs

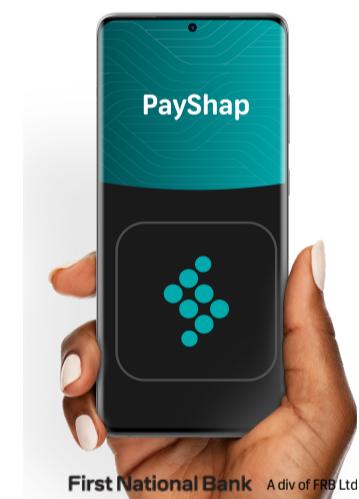
This tiny device comes with a micro USB port which means you can directly connect the device with the computer and program it based on your needs and requirements.

You don't need a separate burner to burn and run the program on the board as it comes with a pre-burned Bootloader that allows you to upload the code in the hex file of the board.



The beetle is mainly introduced to provide the solution for low-cost disposable projects including DIY, gift projects, student projects, and e-textile.

This device operates at 5V and it also functions at 3.7V. Make sure voltage doesn't exceed 5V else it can damage the device.



It comes with a clock time 16MHz. Several pins are incorporated on board out of which 10 are digital pins, 4 are PWM pins and 5 are analog pins.

This module comes with a crystal oscillator frequency up to 16 MHz that is mainly used to produce the clock pulses with decent speed. This oscillator is required for the synchronization of all the internal operations.

> XBee Arduino

 **Arduino with EasyVR Shield**

> EasyVR Basics

> EasyVR Commander

> EasyVR Arduino

> Training Error in EasyVR

 **Arduino with GSM**

> Send SMS with SIM900D

> Receive SMS with SIM900D

 **Arduino with Pixy Camera**

> Pixy Camera Basics

> Install PixyMon

> Update Firmware in PixyCAM

> Train Pixy Camera

 **Arduino WebServer**

> Arduino YUN Intro

> Access Linux Server
PUTTY

> Connect to WiFi

> Get Data from WebServer

> Interface with Android

 **Arduino Projects**

> Home Automation with XBee

> Home Security with PIR

> Smart Home Security System

> Home Security with GSM

> Security Control with



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This module supports different communication protocols including I2C and UART.

The flash memory is 32KB out of which 4KB is used by the Bootloader. It is the memory where the sketch (the program we create on IDE is called a sketch) is stored.

The SRAM memory is 2.5KB which is the memory where sketch manipulates and produces variables when it operates. And EEPROM memory is 1KB and it is the space used for storing long-term information.

The price of this board at the time of writing this article is around 8\$ which carries all powerful functions like Arduino Leonardo.

Arduino Beetle Datasheet

Before you incorporate this device into your electrical project, it's wise to go through the datasheet of the device that features the main characteristics of the board. Click the link below to download the datasheet of Arduino beetle.

Arduino Beetle Features and Specifications

The following are the main features and specifications of Arduino beetle.

Board size 20mm x 22mm.

- > Traffic Signal Control
- > Energy Saving System
- > LPG Gas Leak Detector
- > Line Following Robot
- > Smart Blind Stick
- > Heart Beat Monitor
- > Smoke Detector with MQ-2
- > Automatic Plant Watering System

- > Smart Coffee Vending Machine

- > Accident Detection System

- > Car Parking System

- > Simple 4-Way Traffic Light

- > Smart 4-Way Traffic Signal

- > Simple Arduino Calculator

- > Capacitance Measurement

- > Christmas Tree

- > Water Level Indicator

- > Up Down Counter with 7-Segment

-  > Arduino Misc Tutorials

- > Arduino Projects for Beginners

- > Arduino Tutorial for Beginners

- > Arduino Starter Kits

- > Arduino UNO PCB Design

Two power interfaces that are gold plated and are used to supply power to the board.

Blue Light blink indicator which indicates the operation of the board.

Incorporated with Atmel Atmega32u4 microcontroller.

The operating voltage is 5V and the clock speed is 16MHz.

There are 5 analog pins, 4 PWM pins, and 10 digital pins on board.

Micro USB = 1

UART = 1

I2C = 1

EEPROM = 1KB

SRAM = 2.5 KB

Flash Memory = 32KB out of which 4KB is used by the Bootloader.

Write/Erase Cycles: 10,000 Flash/100,000 EEPROM

Data retention: 20 years at 85°C/ 100 years at 25°C

Arduino Beetle Pin Configuration

Still, reading? Perfect. I hope you've got a clear idea about this board. In this section, we'll cover the pin description of the pins incorporated on the board.

Analog Pins

There are 5 analog pins incorporated on the board. These pins can receive any number of values in contrast to digital pins which receive only two values HIGH and LOW.

PWM Pins

This board doesn't incorporate DAC (digital to analog converter) but it does incorporate 4 PWM pins which are used to get some of the analog output's functions. During this PWM (pulse width modulation) process, the board generates analog results with digital means.

Digital Pins

> Arduino Uno Intro

getting 5V and when they are OFF they are in LOW voltage state getting 0V.

> Arduino Uno Rev3 Intro

> Arduino Nano Intro

> Arduino Pro Mini Intro

> Arduino Mega 2560 Intro

> Arduino Mega 2560 Rev3 Intro

> Arduino DUE Intro

> Arduino Lilypad Intro

> Arduino Micro Intro

> Arduino Leonardo Intro

> Arduino Duemilanove Intro

> Arduino Esplora Intro

> Arduino Beetle Intro

> Arduino Uno WiFi Rev2 Intro

> Arduino Nano Every Intro

> Arduino Pro Micro Intro

> Arduino Nano 33 BLE Intro

> Arduino Nano 33 IoT Intro

Vcc

> Arduino MKR NB 1500 Intro

It is a digital voltage supply pin.

> Arduino MKR Vidor 4000 Intro

GND

> Arduino MKR WAN 1310 Intro

This pin is connected to the ground.

> Arduino MKR WiFi 1010 Intro

Port B (PB7...PB0)

> Arduino MKR GSM 1400

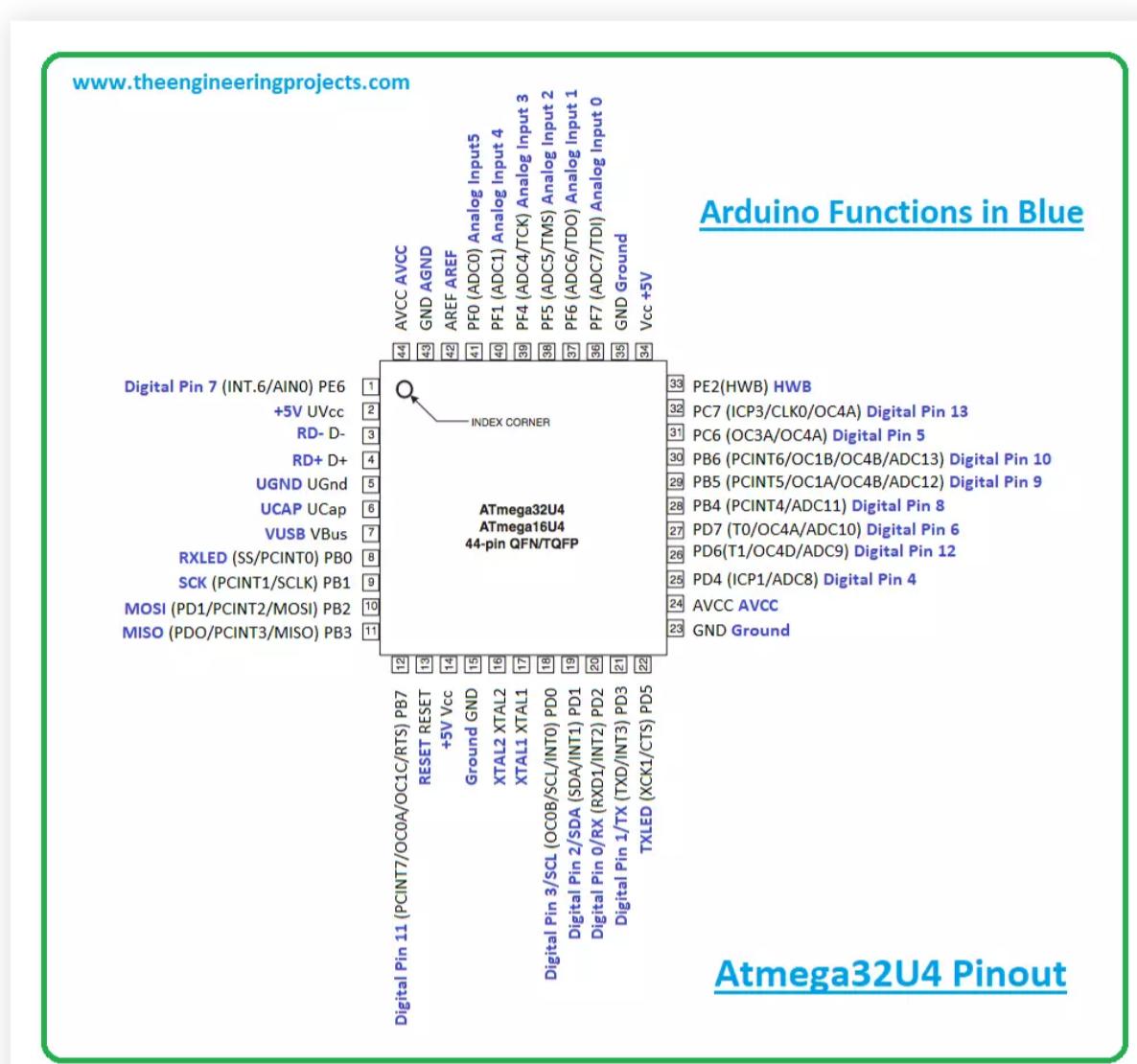
Port B is an 8-bit bidirectional I/O port that is incorporated with pull-up resistors. These resistors are used to limit the current and prevent it exceeding from a certain number.

> Arduino Sensor Shield Intro



Atmega32u4 Pinout

The following figure shows the pinout diagram of Atmega32u4.



Atmega32u4 Pin Description

In this section, we'll cover the pin description of each pin incorporated on Atmega32u4.

Vcc

It is a digital voltage supply pin.

GND

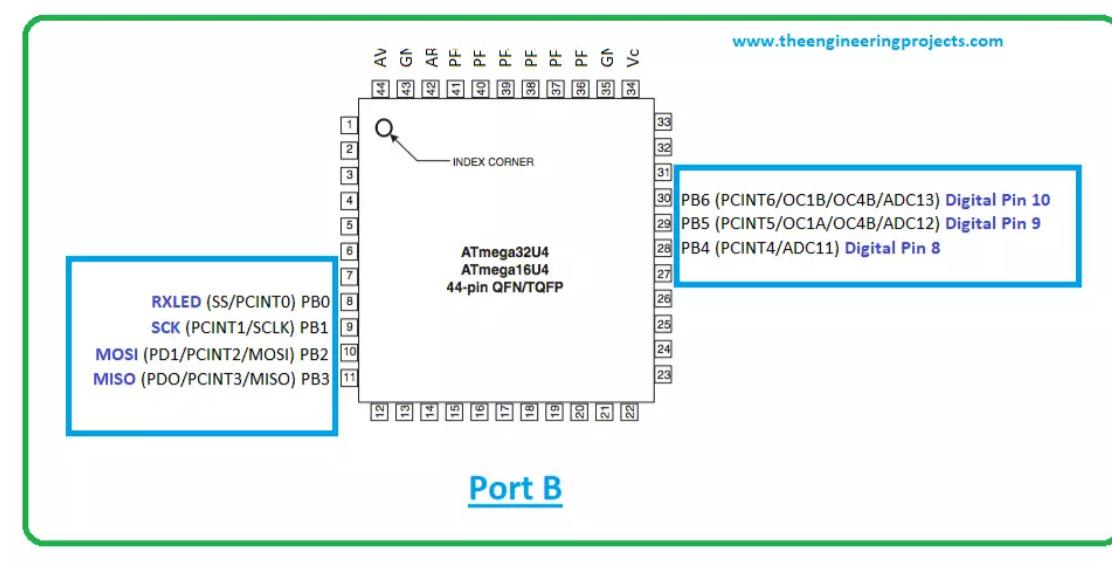
This pin is connected to the ground.

Port B (PB7...PB0)

Port B is an 8-bit bidirectional I/O port that is incorporated with pull-up resistors. These resistors are used to limit the current and prevent it exceeding from a certain number.

> Arduino Zero

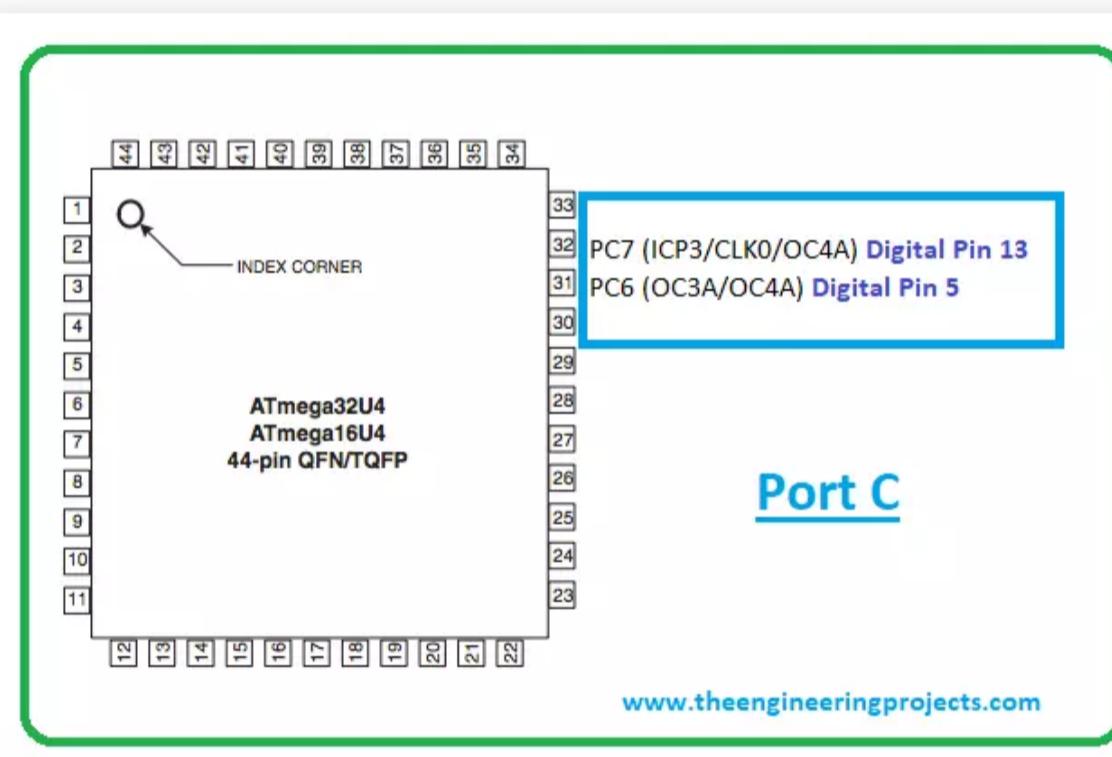
> Pixy Camera Intro

ARDUINO**Raspberry Pi****ESP32**

This port comes with efficient driving capabilities compared to other ports. When this port is used as an input, this will source current due to the port pins that are extremely pulled low. This happens when the pull-up resistors are activated.

Port C (PC6, PC7)

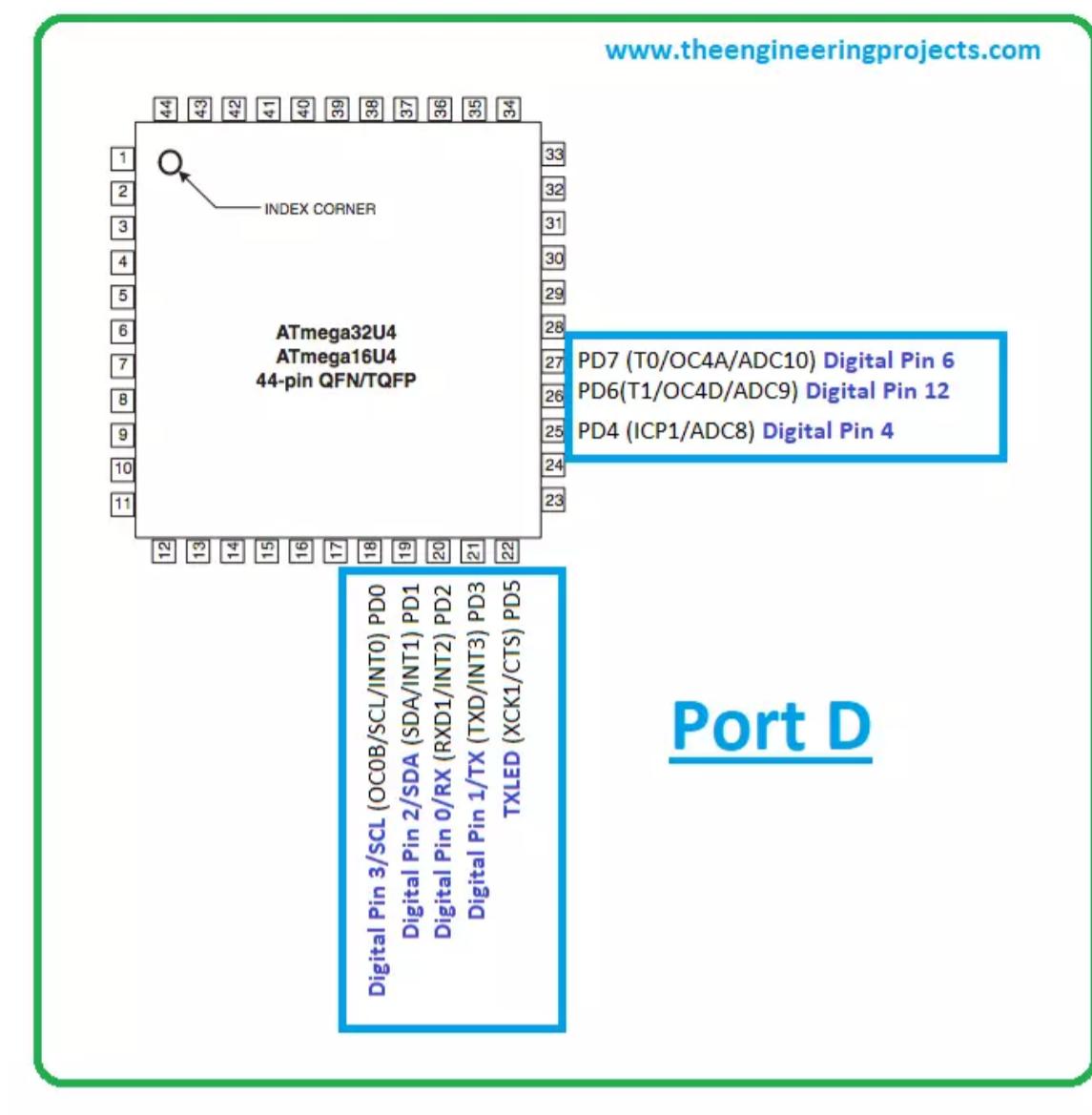
Port C is similar to Port B - an 8-bit bidirectional I/O port incorporated with pull-up resistors.



When the pull up resistors are activated, Port C will source current with port pins extremely pulled low.

Port D (PD7..PD0)

Port D is an 8-bit bidirectional I/O port that comes with pull-up resistors.



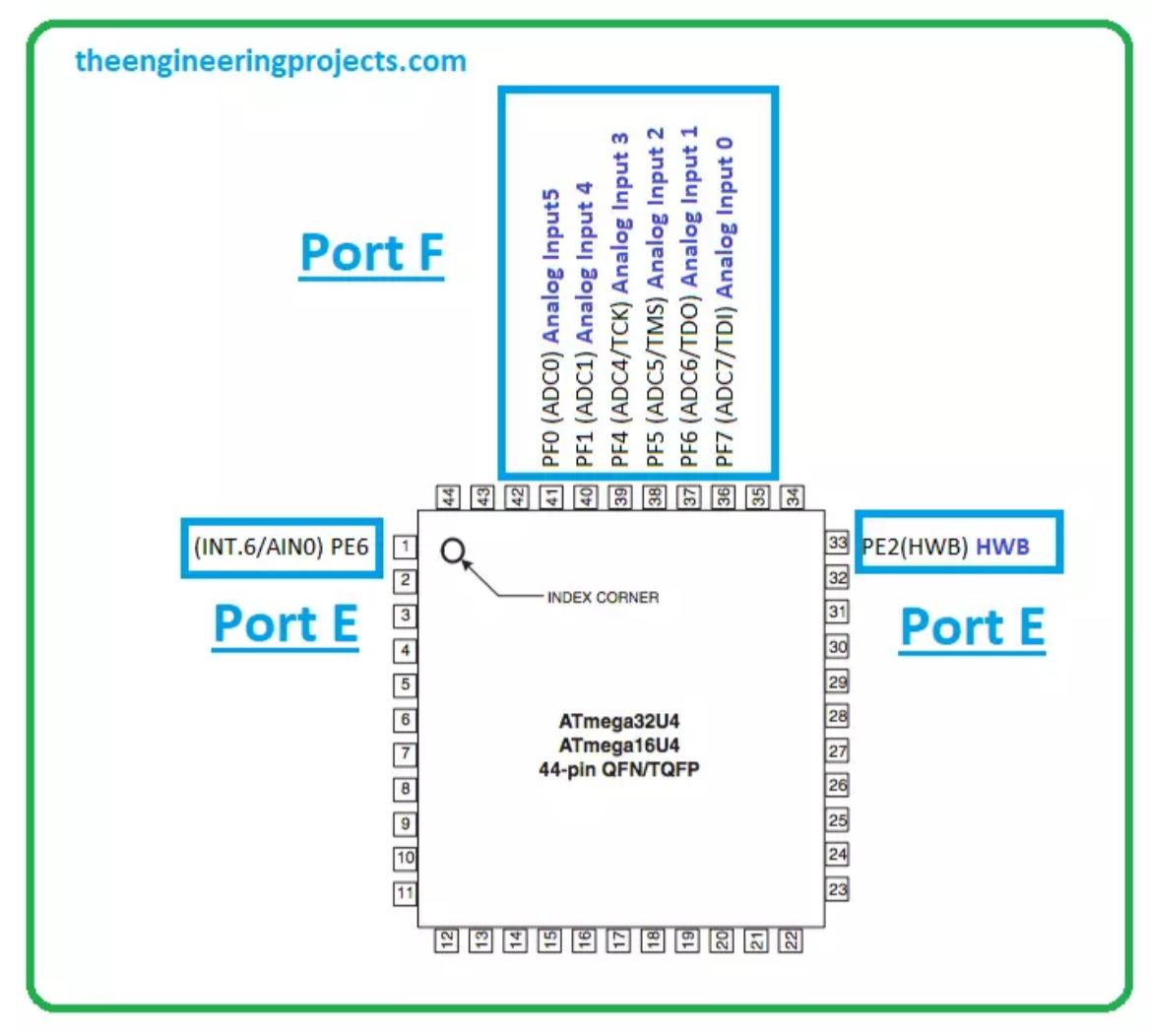
When the reset condition meets, the Port D pins are tri-stated.

Port E (PE6, PE2)

Only two bits... PE6 and PE2 are present on the device pinout. It is an 8-bit bidirectional port incorporated with internal pull-up resistors.

Port F (PF7..PF4, PF1, PF0)

Port F is a bidirectional port that acts like analog inputs to the A/D converter.



Two bits PF2 and PF3 are not present on the product pinout.

D-

USB Full speed / Low Speed Negative Data Upstream Port. It should be attached to the USB D- connector pin along with the serial resistor 22W.

D+

USB Full speed / Low Speed Positive Data Upstream Port. It is connected to the USB D+ connector pin along with the serial resistor 22W.

UGND

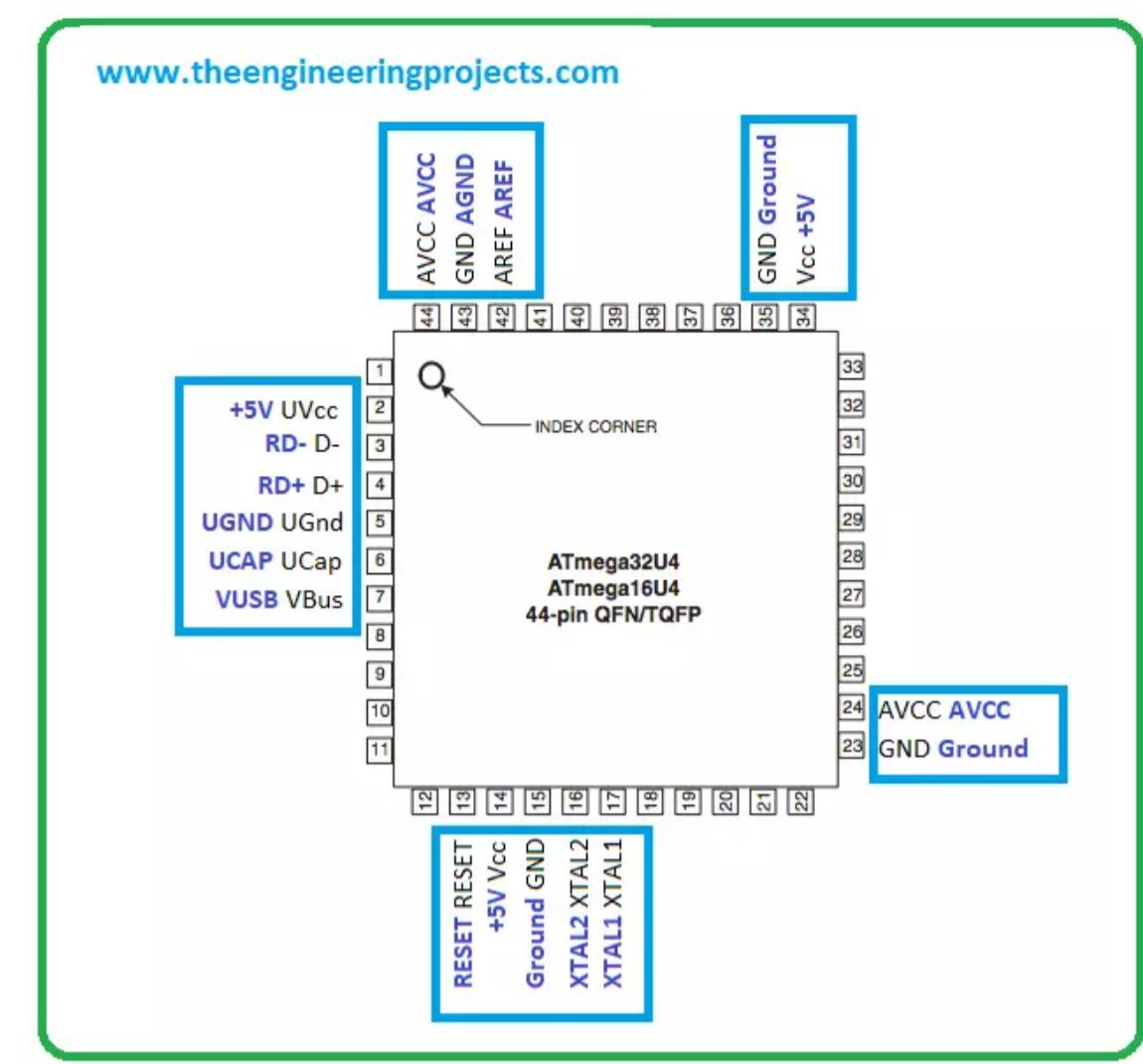
USB pads ground.

UVCC

Regulator Input supply voltage applied to USB pads.

UCAP

Internal Regulator Output supply voltage applied to USB pads.



VBUS

USB VBUS monitor input.

RESET

This is a reset pin. A low level applied to this pin for a longer time will produce a reset. Shorter pulses may not generate a reset.

XTAL1

Input to the internal clock operating circuit and Input to the inverting Oscillator amplifier.

XTAL2

Output from the inverting Oscillator amplifier.

AREF

This is used as the analog reference pin for the A/D Converter.

AVCC

AVCC is the supply voltage pin for all the A/D Converter channels.

Communication and Programming

Recall, this module supports different communication protocols i.e. I2C, and UART.

The I2C is a two-wire communication protocol that carries two main lines called SCL and SDA. The former is a serial clock line required for the synchronization of all data transfer over the I2C bus. While the latter is a serial data line mainly employed to carry the data.

And the UART is mainly used for serial communication and comes with two lines Tx and Rx where the former is used to transfer the serial data and the latter is used to receive the serial data.

Arduino IDE software is used to program all types of Arduino Boards. Attach micro USB to the Beetle and select Arduino Leonardo from your board type on the Arduino IDE software.

Arduino Beetle Applications

This tiny little beast is a full system in a small package as it incorporates almost all functions like Arduino Leonardo. The following are some applications of Arduino Beetle.

Health and security systems

Creating a wireless keyboard

Industrial automation

Embedded systems

Student projects