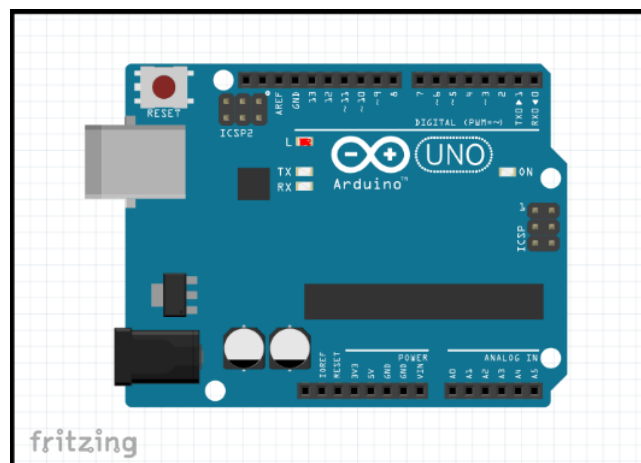


ROBOTICS 101: WORKSHOP 1.3 FLASH THE LED ON D13 ON THE ARDUINO CONTROLLER

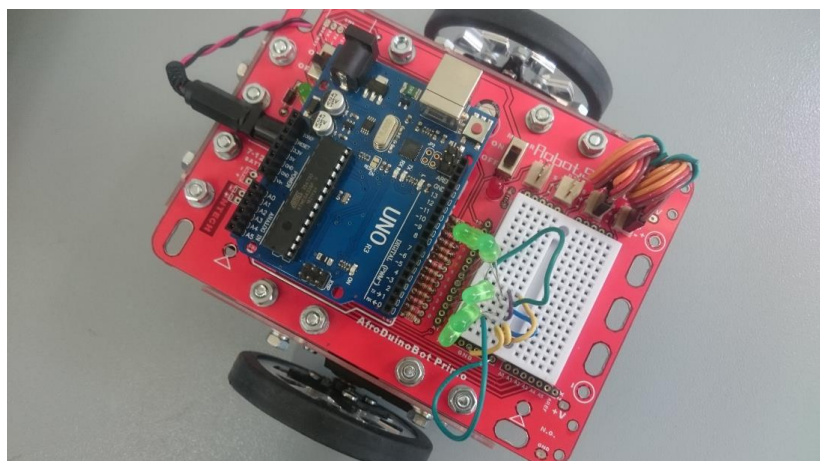
The brain of your robot is a microcontroller, in the case of an ARDUINO robot the microcontroller is an ATMEL ATMEGA 328P-PU which is a powerful microchip. The open source Arduino UNO is a useful microcontroller prototyping board that has been sold by the million to inventors and robot builders right around the world. One of the useful features of the Arduino UNO is the standard footprint that allows you to plug in a range of add-ons called “shields”. There is a whole range of shields like GPS, motor controllers, LCD displays and other exciting stuff you will explore as you start developing in ability. The Arduino shields plug in conveniently on top of the Arduino UNO. There are also lots of other Arduino controllers, besides the UNO, some of which were developed for specialised applications like the Pro Mini.

THE OPEN SOURCE ARDUINO UNO [WITH ATMEL ATMEGA 328P-PU MICROCONTROLLER CHIP]



If you look at the controller board of the PRIMO ROBOT – the latest version in a long line of world class robots from the RobotScience project – you will see an outline showing the ARDUINO UNO footprint where you can plug shields in or the UNO controller board on top depending on which way you have chosen to build out your robot.

ARDUINO PRIMO ROBOT SHOWING THE “TOP DECK” VERSION WITH UNO CONTROLLER ON TOP



The Arduino UNO has a huge community of users around the world which means that it is well supported with almost endless low cost accessories, and user groups right around the world who may already have figured out how to do something similar to what you have in mind to save you time and money.

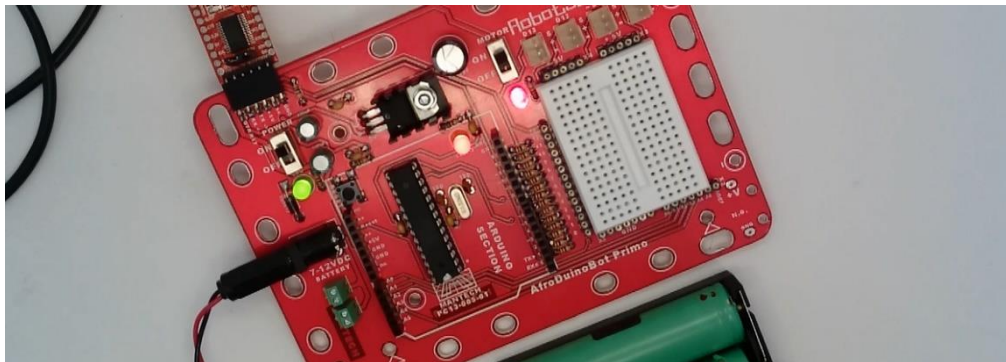
In these data sheets we learn about to program the PRIMO step-by-step. The skills you acquire with your PRIMO are equally applicable to the popular Arduino UNO which will help you to start inventing your own stuff.

Previously, you downloaded a simple program to the Arduino controller that displayed the message “HELLO WORLD” in the serial terminal window.

If you look carefully at the PRIMO robot you will see extra features that the Arduino UNO does not come with. The PRIMO has ON-OFF switches for power and motors, it has a breadboard where you can put electronic parts without having to permanently solder them in place, it has powered headers to connect servo motors, and the UNO footprint where you can mount Arduino Shields.

In the screenshot below we can see three LEDs on the robot’s printed circuit board – there is a green LED on the left and a red LED on the right. The middle LED is orange. Upload the program code below called <BLINK> from the <BASICS> sub-sub-menu under the <EXAMPLES> sub-menu which you will find under <FILE> menu to see what happens.

ON THE PRIMO ROBOT THE ORANGE LED NEAR THE MIDDLE IS CONNECTED TO D13



TYPE OUT AND UPLOAD this CODE TO YOUR ARDUINO to MAKE the LED CONNECTED to D13 FLASH

```
//  
// TEXT CODE TO FLASH LED ON D13  
//  
void setup() {  
  // initialize digital pin 13 as an output.  
  pinMode(13, OUTPUT);  
}  
  
void loop() {  
  digitalWrite(13, HIGH); // turn the LED on (HIGH is the voltage level)  
  delay(1000);           // wait for a second  
  digitalWrite(13, LOW); // turn the LED off by making the voltage LOW  
  delay(1000);          // wait for a second  
}
```

The above code is very similar to the examples code called “Blink”. Compare the above code with the examples code and see if you can find differences and similarities. Try changing the above code’s “delay” times (values are in milliseconds) and upload to the Arduino controller to see what happens...

Try cutting the above code out of the loop function, and pasting it between the curly brackets in the setup function, to see what happens.

www.robotscience.co.za
www.youtube.com/mikerobotscience
www.youtube.com/electronicAfrica