

Arduino Programming Cheat Sheet

Primary source: <http://arduino.cc/en/Reference/>

Structure & Flow

Basic Program Structure

```
void setup() {  
  // Runs once when sketch starts  
}  
  
void loop() {  
  // Runs repeatedly  
}
```

Control Structures

```
if (x < 5) { ... } else { ... }  
while (x < 5) { ... }  
for (int i = 0; i < 10; i++) { ... }  
break; // Exit a loop immediately  
continue; // Go to next iteration  
switch (var) {  
  case 1:  
    ...  
  break;  
  case 2:  
    ...  
  break;  
  default:  
    ...  
}  
return x; // x must match return type  
return; // For void return type
```

Function Definitions

```
void, type, name(parameters) { ... }  
e.g. int double(int x) {return x*2;}
```

Operators

General Operators

- assignment
- add + subtract -
- multiply * divide /
- modulo %
- == equal to != not equal to
- < less than > greater than
- <= less than or equal to
- >= greater than or equal to
- == || or
- ! not

Compound Operators

- ++ increment
- decrement
- + compound addition
- compound subtraction
- * compound multiplication
- / compound division
- % compound modulus and
- & compound bitwise and

Bitwise Operators

- & bitwise and
- | bitwise or
- ^ bitwise xor
- ~ bitwise not
- << shift left
- >> shift right

Pointer Access

- & reference: get a pointer
- * dereference: follow a pointer

Built-in Functions

Pin Input/Output

```
digital I/O - pins 0-13 A0-A5  
pinMode(pin,  
  [INPUT, OUTPUT, INPUT_PULLUP])  
int digitalWrite(pin,  
  digitalWrite(pin, HIGH, LOW))
```

Analog I/O - pins A0-A5

```
int analogRead(pin)  
analogReference(  
  [DEFAULT, INTERNAL, EXTERNAL])
```

Pulse-Width Modulation - pins 2-5 & 9-10

```
analogWrite(pin, value)
```

Advanced I/O

```
tone(pin, freq_hz)  
tone(pin, freq_hz, duration_ms)  
noTone(pin)  
shiftOut(dataPin, clockPin,  
  [MSB0, LSB0, MSBFIRST], value)  
unsigned long shiftIn(pin,  
  [MODE, MODE])
```

Time

```
unsigned long millis()  
// Overflows at 50 days  
unsigned long micros()  
// Overflows at 70 minutes  
delay(ms)  
delayMicroseconds(us)
```

Math

```
sin(x, y) sin(x, y) sin(x)  
sin(rad) cos(rad) tan(rad)  
exp(x) pow(base, exponent)  
constrain(x, lowest, highest)  
map(val, from1, from2, to1, to2)
```

Random Numbers

```
randomSeed(seed) // long or int  
long random(max) // 0 to max-1  
long random(min, max)
```

Bits and Bytes

```
lowByte(x) highByte(x)  
bitRead(x, bit)  
bitWrite(x, value, bit)  
bitSet(x, bit)  
bitClear(x, bit)  
bitWrite(x, bit, value)  
bitRead(x, bit)
```

Type Conversions

```
char(val) byte(val)  
int(val) word(val)  
long(val) float(val)
```

External Interrupts

```
attachInterrupt(interupt, func,  
  [LOW, CHANGE, RISING, FALLING])  
detachInterrupt(interupt)  
interrupts()  
noInterrupts()
```

Libraries

```
Serial - coms, with PC or via RS485  
begin(long speed) // up to 115200  
end()  
int available() // bytes available  
int read() // -1 if none available  
int peek() // Read w/o removing  
flush()  
print(data) println(data)  
write(byte) write(char * string)  
write(byte * data, size)  
SerialEvent() // Called if data rdy
```

```
SoftwareSerial.h - coms, on any pin  
SoftwareSerial(rxPin, txPin)  
begin(long speed) // up to 115200  
listen() // delay 0 sec listen  
isListening() // at a time  
read, peek, print, println, write  
// Inherited to Serial library
```

```
EEPROM.h - access non-volatile memory  
byte read(addr)  
write(addr, byte)  
EEPROM[addr] // Access as array
```

```
Servo.h - control servo motors  
attach(pin, [min_us, max_us])  
write(angle) // 0 to 180  
writeMicroseconds(us)  
// 1000-2000, 1500 is midpoint  
int read() // 0 to 180  
bool attached()  
detach()
```

```
Wire.h - I2C communication  
begin() // Join a master  
begin(addr) // Join a slave @ addr  
requestFrom(addr, count)  
beginTransmission(addr) // Step 1  
send(byte) // Step 2  
send(char * string)  
send(byte * data, size)  
endTransmission() // Step 3  
int available() // Bytes available  
byte receive() // Get next byte  
onReceive(handler)  
onRequest(handler)
```

 by Mark Liffiton

Adapted from:
- Original: Gavin Smith
- SVG version: Frederic Dufourg
- Arduino board drawing: Fritzing.org

Variables, Arrays, and Data

Data Types

Data Type	Value
boolean	true false
char	-128 - 127, 'a' 'b' etc.
unsigned char	0 - 255
byte	0 - 255
int	-32768 - 32767
unsigned int	0 - 65535
word	0 - 65535
long	-2147483648 - 2147483647
unsigned long	0 - 4294967295
float	-3.4028235e+38 - 3.4028235e+38
double	currently same as float
void	1.e.g. no return value

Strings

```
char str[8] =  
  {'A', 'r', 'd', 'u', 'i', 'n', 'o', '\0'};  
// Includes null terminator  
char str[8] =  
  {'A', 'r', 'd', 'u', 'i', 'n', 'o', '\0'};  
// Compiler adds null terminator  
char str[] = "Arduino"  
char str[8] = "Arduino"
```

Numeric Constants

Constant	Value
128	decimal
0x01158B1	hexary
0x71	octal - base 8
0x7F	hexadecimal - base 16
128L	force unsigned
128LL	force long
128LL	force unsigned long
128.f	force floating point
1.234	1.2375E+0 - 1234000

Qualifiers

Qualifier	Location
static	globals between calls
volatile	in RAM (value for I/O)
const	read-only
mutable	in flash

Arrays

```
int myData[] = {0, 4, 8, 3, 4};  
int myData[5]; // Array of 5 ints  
myData[0] = 40; // Assigning first  
// Index of myData  
myData[4] = 10; // 00000 Indexes  
// are 0 through 4
```



Arduino Coding Guide

Daniel Bell



Arduino Coding Guide:

Arduino Programming Damon Parker, Are you new to Arduino programming Would you like to expand your knowledge base about Arduino programming Do you desire to enjoy the fantastic features of Arduino technology If you said YES to any or all of the questions above this book is all you need Starting Arduino programming allows you to rapidly and intuitively develop your programming abilities through sketching in code This book provides you with an understanding of the standard structure for developing Arduino code including the functions syntax structure and libraries needed to produce future tasks It is specifically written to help you get the understanding required to master the fundamental aspects of writing code on the Arduino platform and will have you all set to take the next step to explore new project ideas new kinds of hardware and contribute back to the open source community and even take on more programming projects With this book you can go from an Arduino beginner to an Arduino pro in a much shorter time This is a resource book to get started with if you want to find out about the world of Arduino and how it changes the world we live in This book will help you comprehend the basic principles of Arduino its advantages benefits and applications in numerous markets and platforms Completely simplified for easy understanding this bestselling guide explains how to compose well crafted sketches using Arduino s modified C language You will discover how to configure software and hardware develop your own sketches deal with built in and custom made Arduino libraries and check out the Internet of Things all with no prior programming experience required It teaches you everything you require to become proficient in Arduino from scratch Learn the variants in Arduino find out how to select Arduino boards and their technical specs learn how to install Arduino IDE That s what you ll find What Is Arduino Programming Introduction to Arduino Programming Language How to Configure Arduino Why Arduino The Arduino KIT Arduino Board Description Arduino Program Structure Arduino Variables and Constants String Arrays Character Manipulating String Arrays Functions to Manipulate String Arrays Arduino String Object Stating Arrays Pins Configured as INPUT Benefits and Disadvantages of Identical Communication And a lot more You will also find out how to configure your Arduino interface board to pick up the physical world control light movement and sound and create objects with interesting features This ultimate guide gets you up to speed quickly teaching all the concepts and syntax through simple language and clear guidelines developed for outright beginners It contains lots of top quality illustrations and easy to follow examples Are you ready to explore the amazing benefits of this book Grab your copy now

Arduino Programming Ryan

Turner,2020-04-12 Are you looking for a simple programming language that will allow you to develop your computer skills Have you heard about Arduino and think it could be right for you Do you need a straight talking book that will help you get started quickly For anyone who wants to enter the world of computer programming a decent programming language that is easy to understand is usually a good place to start Arduino Programming delivers a step by step lesson on a simple platform that is perfect for anyone who wants to become skilled in this language and put it to good use Inside the pages of Arduino

Programming The Ultimate Expert Guide to Learn Arduino Programming Step by Step you will find clear explanations on the subject through chapters that will help you with Understanding the basic principles behind Arduino How you can develop your skills quickly and efficiently Step by step programming advice Using Arduino to enhance your projects Where Arduino fits in to the Internet of Things And a whole lot more Filled with clear and concise explanations that are easy to follow for beginners visualizations to help you gain a quicker understanding of the processes and examples of where Arduino will fit in with your needs Arduino Programming is the ultimate expert guide that will deliver exactly what you want Scroll up and click Add to Cart for your copy now

Arduino Programming Rama Nolan, 2025-02-02 Master Arduino Programming A Hands On Guide to Electronics and Coding Have you ever wanted to control switches LEDs sensors and more with just a few lines of code without the hassle of replacing an entire circuit when something goes wrong Arduino is the ultimate platform for building electronic projects trusted by beginners and experts alike for its simplicity flexibility and affordability With its microcontroller based board you can create modify and experiment with ease Whether you re designing interactive gadgets automating tasks or learning to code hardware Arduino makes it accessible But here s the challenge many beginners struggle because they lack clear step by step guidance They either try to figure it out alone and get frustrated or follow confusing tutorials that don t explain the fundamentals properly That s where this book comes in Designed for complete beginners this hands on guide breaks down Arduino programming in a simple practical way You ll learn How to set up your Arduino board and understand its components The basics of coding with Arduino and writing your first program How to control LEDs sensors motors and other components effortlessly Troubleshooting techniques so you can fix issues without replacing your board How to bring your own creative electronics projects to life Don t let confusion or lack of experience stop you from mastering Arduino Whether you re a hobbyist student or aspiring engineer this book will equip you with the knowledge and confidence to start coding and building right away Unlock the power of Arduino and turn your ideas into reality get started today

[Arduino: A Quick-Start Guide](#) Maik Schmidt, 2015-01-20 Arduino is an open source platform that makes DIY electronics projects easier than ever Gone are the days when you had to learn electronics theory and arcane programming languages before you could even get an LED to blink Now with this new edition of the bestselling Arduino A Quick Start Guide readers with no electronics experience can create their first gadgets quickly This book is up to date for the new Arduino Zero board with step by step instructions for building a universal remote a motion sensing game controller and many other fun useful projects This Quick Start Guide is packed with fun useful devices to create with step by step instructions and photos throughout You ll learn how to connect your Arduino to the Internet and program both client and server applications You ll build projects such as your own motion sensing game controller with a three axis accelerometer create a universal remote with an Arduino and a few cheap parts build your own burglar alarm that emails you whenever someone s moving in your living room build binary dice and learn how to solder In one of several new projects in this edition you ll create your own

video game console that you can connect to your TV set This book is completely updated for the new Arduino Zero board and the latest advances in supporting software and tools for the Arduino Sidebars throughout the book point you to exciting real world projects using the Arduino exercises extend your skills and What If It Doesn't Work sections help you troubleshoot common problems With this book beginners can quickly join the worldwide community of hobbyists and professionals who use the Arduino to prototype and develop fun useful inventions What You Need This is the full list of all parts you'd need for all projects in the book some of these are provided as part of various kits that are available on the web or you can purchase individually Sources include adafruit.com makershed.com radioshack.com sparkfun.com and mouser.com Please note we do not support or endorse any of these vendors but we list them here as a convenience for you Arduino Zero or Uno or Duemilanove or Diecimila board USB cable Half size breadboard Pack of LEDs at least 3 10 or more is a good idea Pack of 100 ohm 10k ohm and 1k ohm resistors Four pushbuttons Breadboard jumper wire connector wire Parallax Ping sensor Passive Infrared sensor An infrared LED A 5V servo motor Analog Devices TMP36 temperature sensor ADXL335 accelerometer breakout board 6 pin 0 1 standard header might be included with the ADXL335 Nintendo Nunchuk Controller Arduino Ethernet shield Arduino Proto shield and a tiny breadboard optional but recommended Piezo speaker buzzer optional Tilt sensor optional A 25 30 Watts soldering iron with a tip preferably 1 16 A soldering stand and a sponge A standard 60 40 solder rosin core spool for electronics work

The Arduino Inventor's Guide Brian Huang, Derek Runberg, 2017-05-15

With Arduino you can build any hardware project you can imagine This open source platform is designed to help total beginners explore electronics and with its easy to learn programming language you can collect data about the world around you to make something truly interactive The Arduino Inventor's Guide opens with an electronics primer filled with essential background knowledge for your DIY journey From there you'll learn your way around the Arduino through a classic hardware entry point blinking LEDs Over the course of the book 11 hands on projects will teach you how to Build a stop light with LEDs Display the volume in a room on a warning dial Design and build a desktop fan Create a robot that draws with a motor and pens Create a servo controlled balance beam Build your own playable mini piano Make a drag race timer to race toy cars against your friends Each project focuses on a new set of skills including breadboarding circuits reading digital and analog inputs reading magnetic temperature and other sensors controlling servos and motors and talking to your computer and the Web with an Arduino At the end of every project you'll also find tips on how to use it and how to mod it with additional hardware or code What are you waiting for Start making and learn the skills you need to own your technology Uses the Arduino Uno board or SparkFun RedBoard

Arduino Daniel Bell, 2019-12-16 Arduino is the largest open source hardware platform in the world Arduino provides unlimited possibilities that can be achieved using microcontroller based products This short and easy read book is a perfect way to dive into electronics and programming as you get all the basics that are required to start working with Arduino Download your copy NOW Book Objectives This book is about Arduino programming The

following are the objectives of the author To help you know the various parts of the Arduino board To help you understand the uses of the various parts of the Arduino board To help you know how to program the Arduino board To help you understand how to create various projects by programming the Arduino board Who this Book is for This book is written with the following groups of people in mind Anyone who needs to understand the basics of the Arduino board Anyone who needs to be equipped with Arduino programming skills Anyone who needs to advance their Arduino programming skills Anyone who needs to learn how to develop hardware projects by programming the Arduino board Requirements You are required to have an Arduino board The author also expects you to have a computer The author will guide you on how to download the Arduino IDE and begin to use it on your computer for writing codes and uploading them to the Arduino board What is inside the book ARDUINO BASICS ARDUINO DATA TYPES VARIABLES AND CONSTANTS ARDUINO OPERATORS CONTROL STATEMENTS ARDUINO LOOPS ARDUINO FUNCTIONS ARDUINO ARRAYS ARDUINO STRINGS TIME IN ARDUINO I O FUNCTIONS IN ARDUINO From the back cover In this excellent guide the author introduces you to the basics of the Arduino board The goal is to help you understand what Arduino is where the board is used and familiarize you with the various parts of the board Then the author discusses the foundations of Arduino programming You will know what you need so as to begin programming the Arduino board The process of downloading and setting up the Arduino IDE has been discussed The various features that you can enjoy when programming Arduino has been discussed in depth including data types variables loops decision making functions operators etc The author has organized the book into chapters with each chapter having many sub chapters Codes have been added accompanied by thorough explanations of the code This book is recommended for absolute beginners

Arduino Programming Daniel Géron, 2021-03-09 Are you looking for an easy way to learn programming one that can help you to really work on some strong programs and applications but will be easy enough for a beginner to understand Have you looked at some of the other options out there and feel like they are too in depth or hard to use for some of the basics that you want to know Have you been able to look at some of the circuit boards out there but they are not powerful enough or will not work with the operating system that you like to use There are a lot of people who want to work with coding and programming but they are stopped for one reason or another It is too hard they don't have the experience it doesn't work with the coding they want to do and so on This is where the Arduino technology can come into play and help us to finally learn some of the coding that we want This technology was actually designed for the beginner for those who have no technical experience at all to help them get a good grasp on the basics of coding This guidebook is going to explore more about this Arduino technology and how we are able to use it for our own needs Some of the topics that we are going to explore will include What the Arduino technology is all about and how even beginners are able to learn with it in no time Some of the benefits of working with this technology What types of boards are available for us to purchase and use based on the programming needs that we have How to get started with this language by learning some of the common terms that will

help guide us through this process How to hook up the board to your computer so you can get started How to turn this board into a machine that is able to work on various projects Understanding how to work with a sketch and even some examples of how you can create some of your own sketches as well The basics of creating a basic user based function for your coding A look at the different functions that we are able to use in the Arduino language and what they all mean How to work with the Arduino API and some of the functions that help bring more power to this And so much more There are a lot of options out there when you are looking to get started with coding But if you are brand new to the process you may worry that they are going to be too hard and too difficult to focus on and get the results that you would like When you are ready to learn how to work with Arduino a system that was designed with the beginner and non technical person in mind make sure to check out this guidebook to help you get started

Arduino Programming Daniel Geron Geron,2019-11-13 Are you looking for an easy way to learn programming one that can help you to really work on some strong programs and applications but will be easy enough for a beginner to understand Have you looked at some of the other options out there and feel like they are too in depth or hard to use for some of the basics that you want to know Have you been able to look at some of the circuit boards out there but they are not powerful enough or will not work with the operating system that you like to use There are a lot of people who want to work with coding and programming but they are stopped for one reason or another It is too hard they don t have the experience it doesn t work with the coding they want to do and so on This is where the Arduino technology can come into play and help us to finally learn some of the coding that we want This technology was actually designed for the beginner for those who have no technical experience at all to help them get a good grasp on the basics of coding This guidebook is going to explore more about this Arduino technology and how we are able to use it for our own needs Some of the topics that we are going to explore will include What the Arduino technology is all about and how even beginners are able to learn with it in no time Some of the benefits of working with this technology What types of boards are available for us to purchase and use based on the programming needs that we have How to get started with this language by learning some of the common terms that will help guide us through this process How to hook up the board to your computer so you can get started How to turn this board into a machine that is able to work on various projects Understanding how to work with a sketch and even some examples of how you can create some of your own sketches as well The basics of creating a basic user based function for your coding A look at the different functions that we are able to use in the Arduino language and what they all mean How to work with the Arduino API and some of the functions that help bring more power to this And so much more There are a lot of options out there when you are looking to get started with coding But if you are brand new to the process you may worry that they are going to be too hard and too difficult to focus on and get the results that you would like When you are ready to learn how to work with Arduino a system that was designed with the beginner and non technical person in mind make sure to check out this guidebook to help you get started Would you like to know more Scroll to the top

of the page and select the BUY NOW button *Arduino Programming* Ryan Turner,2020-04-18 Are you ready to take your programming to the next level Are you already using Arduino and like the way it works Do you want to be able to build more powerful projects and applications Arduino is one of those programming languages that offers you much more than you expected at every stage you reach It provides effective tools that really work and can have you doing complex tasks quickly with its hands on approach Now with *Arduino Programming The Ultimate Intermediate Guide to Learn Arduino Programming Step by Step* you can take the next step on your Arduino journey and increase your knowledge and skills further with chapters on Getting the most from Arduino Functions calculations and tables Linking the physical to the virtual Coupling and multiplexing How to digitalize sound Advanced techniques Networking And more With its combination of theory and practical advice *Arduino Programming* is the stand out book when it comes to building on your basic understanding of this fantastic programming resource Get a copy today and enhance your knowledge while building ever more complex applications for your computer *Arduino Programming* Ryan Turner,2020-04-18 Are you ready to take your programming to the next level If you are unfamiliar with programming and are looking for an open source electronic interface then Arduino could be just the place to start With a range of Arduinos to choose from and an increasing variety of projects online or in person that are built on Arduino technologies the flexibility they offer and the ease of building gadgets with Arduino has attracted many people who are both novices and seasoned professionals Now with this new and informative guide *Arduino Programming 3 books in 1 The Ultimate Beginners Intermediate Expert Guide to Learn Arduino Programming Step by Step* you can learn all you need to get you started with this impressive resource with chapters that delve into Book 1 The history of Arduino 6 advantages of Arduino Anatomy and other terms of Arduino Understanding the choices that are on offer Setting up Arduino Data types Inputs outputs and sensors Book 2 Getting the most from Arduino Functions calculations and tables Linking the physical to the virtual Coupling and multiplexing How to digitalize sound Advanced techniques Networking Book 3 Understanding the basic principles behind Arduino How you can develop your skills quickly and efficiently Step by step programming advice Using Arduino to enhance your projects Where Arduino fits in to the Internet of Things And much more With its combination of theory and practical advice *Arduino Programming 3 books in 1* is the stand out book when it comes to building on your basic understanding of this fantastic programming resource Don t wait any longer and get your copy today Arduino is the answer you ve been looking for and *Arduino Programming 3 books in 1* is the book that will provide the platform for your success

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