SparkBot

SparkBot: The IoT robotics kit for everyone

SparkBot is an intelligent, interactive, wifi enabled robotics kit that allows anyone to program their own useful robot. SparkBot uses the Photon by Particle as its brain, and it can be programmed directly from Particle's web IDE, or Particle DEV.

SparkBot runs user-written firmware on its Real time micro operating system. It can be flashed with one firmware of up to one megabyte. This is quite a lot of storage, considering that firmware is just C++ written for the Photon.

Websites and more Info:

http://SparkBot.co
- Main SparkBot website

http://github.com/nrobinson2000/sparkbot
- Github Repository

http://github.com/nrobinson/sparkbot-default
- C++ Library Repository

http://particle.io/
- Main Particle website

http://docs.particle.io/photon/
- Photon Documentation

https://www.reddit.com/r/sparkbot/
- SparkBot Subreddit

Functions()

startup() - Initializes the SparkBot

switchLights() - Cycle the light colors
moodlights() - Make the lights a specific RGB color
red() - Turn the lights red
blue() - Turn the lights blue
green() - Turn the lights green

syncLights() - Sync master lights with slave
syncServos() - Sync master servos with slave

moveNeck() - Move the neck servo to an int
moveRight() - Move the right servo to an int
moveLeft() - Move the left servo to an int

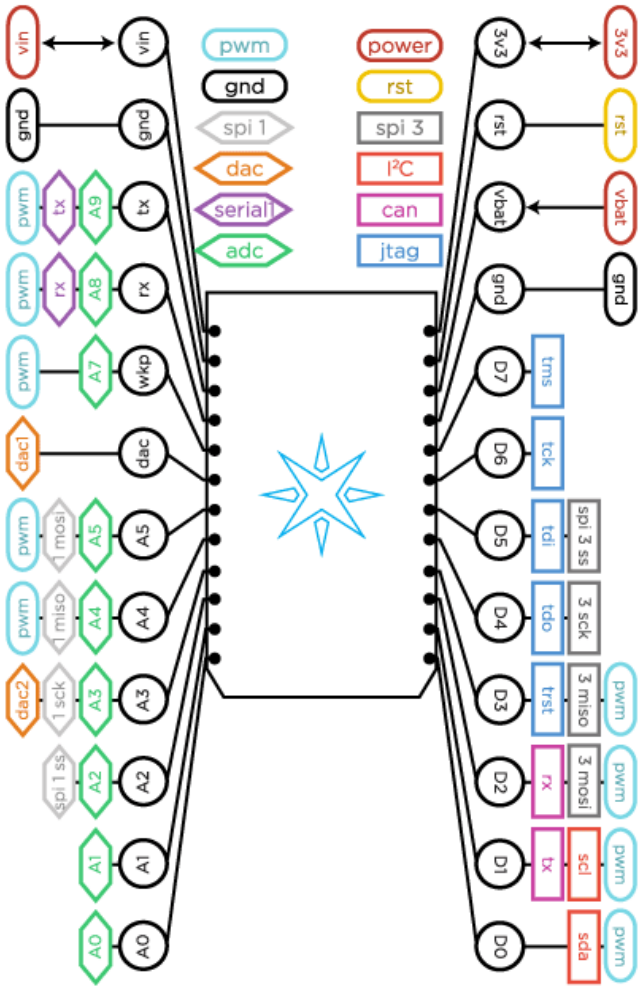
playBuzzer() - Play the buzzer at a certain tone
stopBuzzer() - Stop the buzzer (writes 0)

syncServosSlave() - Slave-side of syncServos

RGBSlave() - Slave-side of syncLights
initiateSlave() - Initiate slave-side functions
getTempC() - Read a temperature sensor in Celsius
sync() - Call the master functions
startLeftButton() - Initiate the Left Button
startRightButton() - Initiate the Right Button

moveNeckCloud() - Move neck through API
moveRightCloud() - Move right arm through API
moveLeftCloud() - Move left arm through API

sparkbotsOnline() - Gets the number of online SparkBots



Structure

`void setup(){ ... }`
Initialization function.

`void loop(){ ... }`
Main program loop.

Control Structures

`if(x<5){ ... } [else { ... }]`
Run a block of code only if a condition is true. If an else statement is present, run this block if condition is false.

`for(int i=0; i<255; i++){ ... }`
Loop for a set count.

`while(x<5){ ... }`
Loop while a condition is true.

`break`
Escape from a loop control structure,

`continue`
Escape from the current iteration of a control structure

General Operators

`=`
Assignment.

`+, -, *, /, %`
Plus, minus, multiply, divide, modulo.

`==, !=`
Equal to, not equal to.

`<, <=, >, >=`
Less than, less than or equal to, greater than, greater than or equal to.

Bitwise Operators

`&, |, ^, ~`
Bitwise AND, OR, XOR, NOT.

`<<, >>`
Bitwise left shift, bitwise right shift.

Compound Operators

`++, --, +=, -=, *=, /=, &=, !=`
Increment, decrement, compound addition, compound subtraction, compound multiplication, compound division, compound bitwise AND, compound bitwise OR.

Pointer Access

`&, *`
Reference operator, dereference operator.

Constants

`HIGH, LOW`
Pin value constants.

`OUTPUT, INPUT, INPUT_PULLUP, INPUT_PULLDOWN`
Pin mode constants.

`true, false`
Boolean constants.

Data Types

`void`
Function type declaration for functions that return no information.

`boolean`
eg, true or false

`char`
8-bit (1-byte) number from -128 to 127.

`byte`
8-bit (1-byte) unsigned number from 0 to 255.

`int`
32-bit (4-byte) value from -2,147,483,648 to 2,147,483,647.

`unsigned int`
32-bit (4-byte) value from 0 to 4,294,967,295.

`long`
32-bit (4-byte) value from -2,147,483,648 to 2,147,483,647.

`unsigned long`
32-bit (4-byte) value from 0 to 4,294,967,295.

`short`
16-bit (2-byte) value from 32,768 to 32,767.

`float`
32-bit (4-byte) floating point number.

`double`
64-bit (8-byte) floating point number.

Arrays

`int myArray[6];`
An unpopulated integer array with 6 slots.

`int myArray[] = {1,2,3,4,5,6};`
A populated integer array with 6 slots.

`int myArray[6] = {1,2,3,4};`
A partially populated integer array with explicitly 6 slots.

Strings

Basic strings are represented as char arrays, however the spark core also has a String class with many more helper methods.

```
char s1[15];
char s2[6] = {'s','p','a','r','k'};
char s3[6] = {'s','p','a','r','k','\0'};
char s4[] = "spark";
char s5[6] = "spark";
char s6[15] = "spark";
```

Math

`min(x, y);`
Calculates the minimum of two numbers.

`max(x, y);`
Calculates the maximum of two numbers.

`abs(x);`
Computes the absolute value of a number.

`constrain(x, min, max);`
Constrains a number to be within a range.

`map(x, fromMin, fromMmax, toMin, toMax);`
Re-maps a number from one range to another.

`pow(base, exponent);`
Calculates the value of a number raised to a power.

`sqrt(x);`
Calculates the square root of a number.

Time

The spark core comes with basic timing methods, but also has a Time class with many more helper methods.

`millis();`
Returns the number of milliseconds since the Spark Core began running the current program.

`micros();`
Returns the number of microseconds since the Spark Core began running the current program.

`delay(ms);`
Pauses the program for the amount of time (in miliseconds) specified.

`delayMicroseconds(ms);`
Pauses the program for the amount of time (in microseconds) specified.

I/O

`pinMode(pin, mode);`
Configures the specified pin to behave either as an input or output.

`digitalWrite(pin, value);`
Write a HIGH or a LOW value to a digital pin.

`digitalRead(pin);`
Reads the value from a specified digital pin, either HIGH or LOW.

`analogWrite(pin, value);`
Writes an analog value (PWM wave) to a pin.

`analogRead(pin);`
Reads the value from the specified analog pin. Values range between 0 and 4095.

Interrupts

`attachInterrupt(pin, function, mode);`
Specifies a function to call when an external interrupt occur

`detachInterrupt(pin);`
Turns off the given interrupt.

`noInterrupts();`
Disabled interrupts.

`interrupts();`
Re-enabled interrupts.

Tone

`tone(pin, frequency, duration);`
Generates a square tone on the given pin.

`noTone(pin);`
Stops the current tone playing on the given pin

RGB

`RGB.control(bool);`
Takes and gives back user control of the built in RGB LED.

`RGB.color(red, green, blue);`
Set the color of the RGB with three values, 0 to 255.

`RGB.brightness(val);`
Scale the brightness value of all three RGB colors with one value, 0 to 255.

Servo

`servo.attach(pin);`
Setup a servo on a particular pin.

`servo.detach();`
Detach the servo variable from its pin.

`servo.write(angle);`
Set the angle of the servo.

`servo.read();`
Reads the current angle of the servo.

Cloud Functions

`Spark.variable(name, var, type);`
Expose a variable through the Spark Cloud.

`Spark.function(name, function);`
Expose a function through the Spark Cloud.

`Spark.publish(name, data);`
Publish an event through the Spark Cloud.

`Spark.subscribe(name, function);`
Subscribe to events published by Cores.

Cloud API

`HEADER Bearer {ACCESS_TOKEN},`
`?access_token={ACCESS_TOKEN}`
Authenticates the request with the given access token.

`GET /v1/devices/{DEVICE_ID}/{VARIABLE}`
Read a variables exposed through the Spark Cloud from the given device.

`POST /v1/devices/{DEVICE_ID}/{FUNCTION}`
Call a method exposed through the Spark Cloud on the given device.

`GET /v1/devices/{DEVICE_ID}/events/[/{EVENT}]`
Open an SSE connection to the given devices event stream. .

Misc

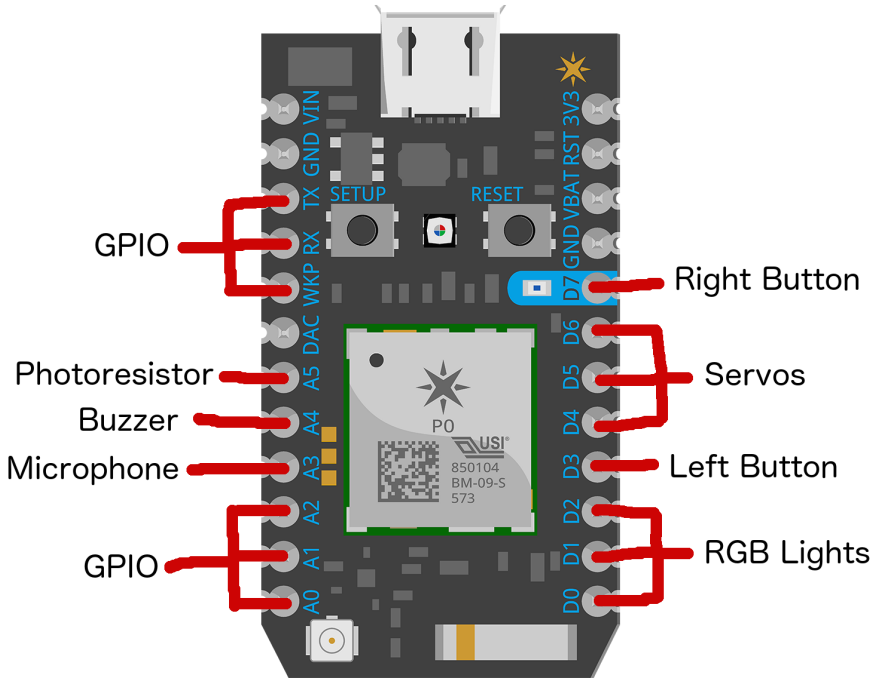
`// ...`
Single line comment.

`/* ... */`
Multi-line comment.

`#define ANSWER 42`
Constant variable declaration.

`#include <myLib.h>`
Includes a third party library.

Particle



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