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How To Configure and Pair Two HC-05 Bluetooth Modules as Master and Slave | AT Commands

  Dejan Nedelkovski (http://howtomechatronics.com/author/howtom12_wp/) ⊙ April 15, 2016

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256

In this Arduino Tutorial we will learn how to configure and pair two HC-05 Bluetooth Modules as Master and Slave
devices.You can watch the following video or read the written tutorial below.

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How To Configure and Pair Two HC-05 Bluetooth Module as Master and Sla...

▶

Overview

In my previous two tutorials we already learned how to connect the HC-05 Bluetooth Module to the Arduino (http://howtomechatronics.com/tutorials/arduino/arduino-and-hc-05-bluetooth-module-tutorial/) and make a communication between an Android smartphone and the Arduino (http://howtomechatronics.com/tutorials/arduino/how-to-build-custom-android-app-for-your-arduino-project-using-mit-app-inventor/). In those tutorials we used the HC-05 Bluetooth module with its default configuration, as a slave device.

Configuring the HC-05 Bluetooth Module - AT Commands

For this tutorial we need to configure both modules. In order to do that we need to switch to AT Command Mode and here's how we will do that. First we need connect the Bluetooth module to the Arduino as the circuit schematics explained in the previous tutorials. What we need to do additionally is to connect the "EN" pin of the Bluetooth module to 5 volts and also switch the TX and RX pins at the Arduino Board.

So the RX pin of the Arduino needs to be connected to the RX pin of the Bluetooth module, through the voltage
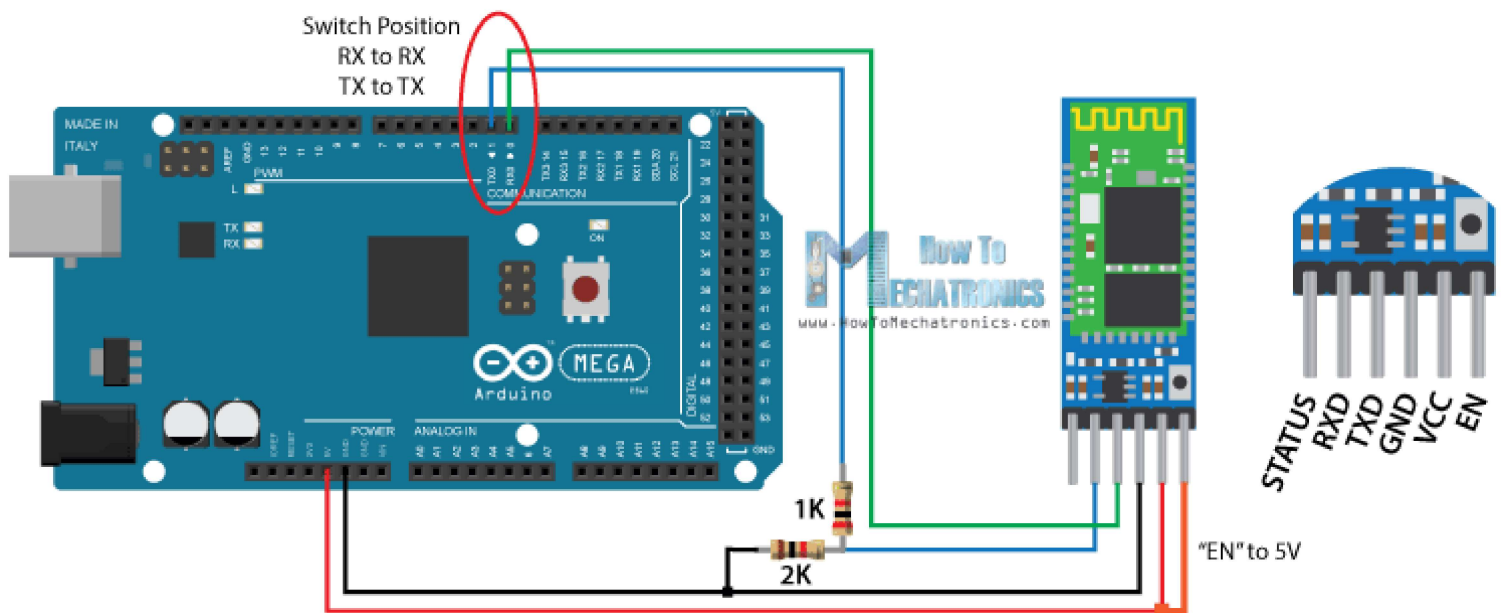
divider, and the TX pin of the Arduino to the TX pin of the Bluetooth module. Now while holding the small button over the "EN" pin we need to power the module and that's how we will enter the command mode. If the Bluetooth module led is flashing every 2 seconds that means that we have successfully entered in the AT command mode.

After this we need to upload an empty sketch to the Arduino but don't forget to disconnect the RX and TX lines while uploading. Then we need to run the Serial Monitor and there select "Both NL and CR", as well as, "38400 baud" rate which is the default baud rate of the Bluetooth module. Now we are ready to send commands and their format is as following.
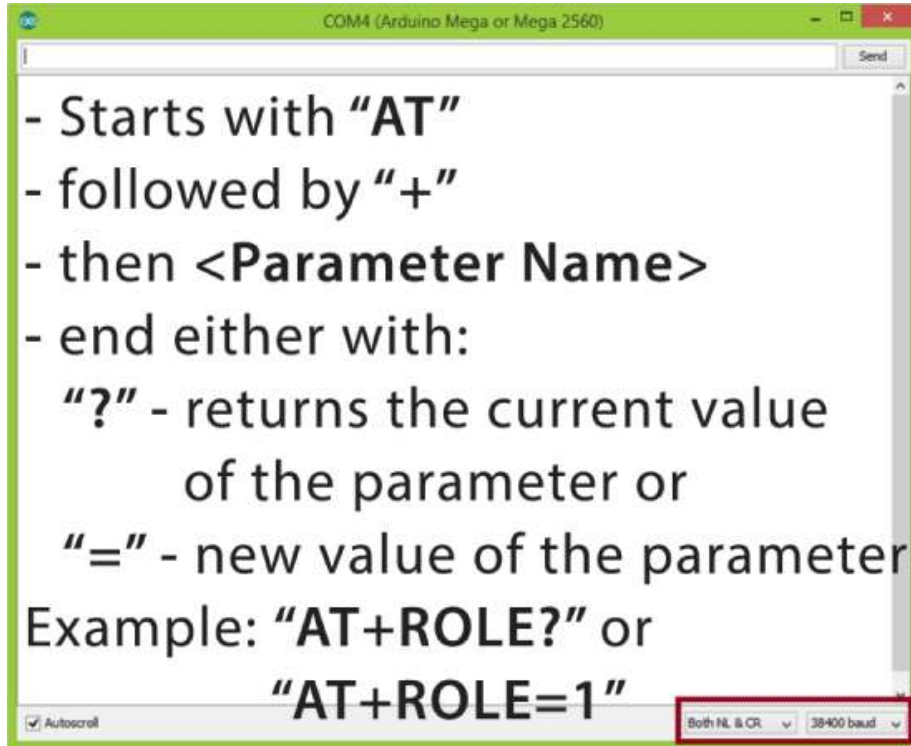
All commands start with "AT", followed by the "+" sign, then a <Parameter Name> and they end either with the "?" sign which returns the current value of the parameter or the "=" sign when we want to enter a new value for that parameter.

Slave Configuration

So for example, if we type just "AT" which is a test command we should get back the message "OK". Then if we type "AT+UART?" we should get back the massage that shows the default baud rate which is 38400. Then if we type "AT+ROLE?" we will get back a massage "+ROLE=0" which means that the Bluetooth device is in slave mode. If we type "AT+ADDR?" we will get back the address of the Bluetooth module and it should looks something like this: **98d3:34:905d3f.**

```
ERROR: (0)
OK  ◄─────────────────────  "AT"
+UART:38400,0,0  ◄──────── "AT+UART?"
OK
+ROLE:0  ◄──────────────── "AT+ROLE?"
OK
+ADDR:98d3:31:3069b0 ◄──── "AT+ADDR?"
OK
```
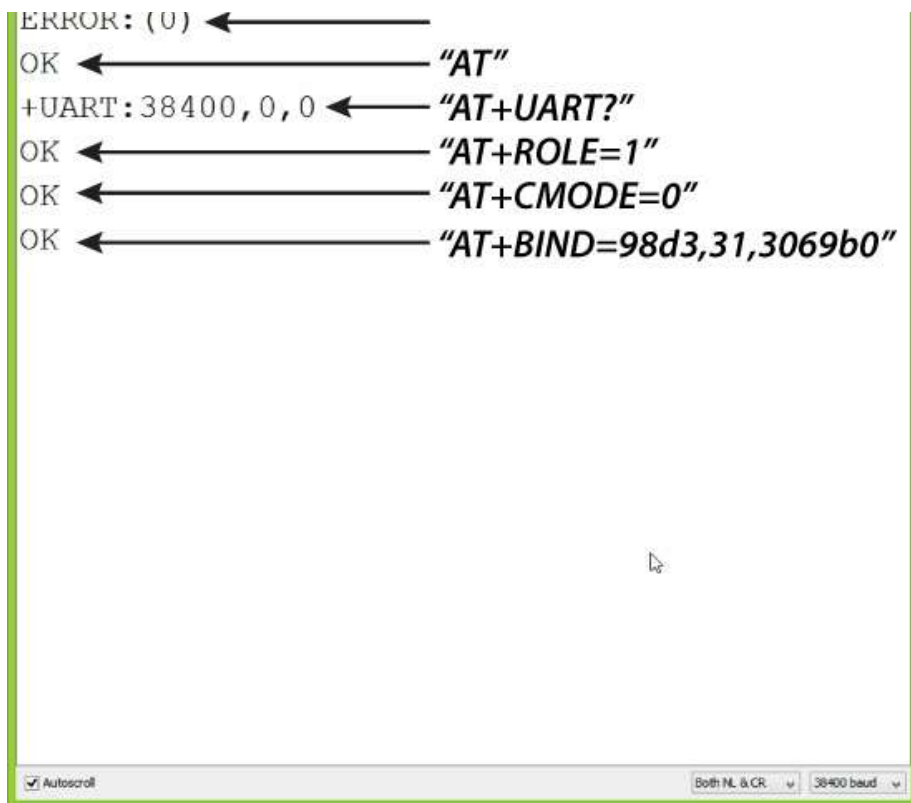
☑ Autoscroll   Both NL & CR ▼ 38400 baud ▼

Now we need to write down this address as we will need it when configuring the master device. Actually that's all we need when configuring the slave device, to get its address, although we can change many different parameters like its name, baud rate, pairing password and so on, but we won't do that for this example.

Master Configuration

Ok now let's move on and configure the other Bluetooth module as a master device. First we will check the baud rate to make sure it's the same 38400 as the slave device. Then by typing "AT+ROLE=1" we will set the Bluetooth module as a master device. After this using the "AT+CMODE=0" we will set the connect mode to "fixed address" and using the "AT+BIND=" command we will set the address of the slave device that we previously wrote down.

```
[⊕]          COM4 (Arduino Mega or Mega 2560)      – □ ✕
AT+BIND=98D3,31,3069B0|                              Send
```

```
ERROR: (0) ◄────────────
OK ◄─────────────── "AT"
+UART:38400,0,0 ◄─── "AT+UART?"
OK ◄─────────────── "AT+ROLE=1"
OK ◄─────────────── "AT+CMODE=0"
OK ◄─────────────── "AT+BIND=98d3,31,3069b0"


                              ▷




☑ Autoscroll                        Both NL & CR  ∨   38400 baud  ∨
```

Note here that when writing the address we need to use commas instead of colons. Also note that we could have skipped the previous step if we entered "1" instead of "0" at the "AT+CMODE" command, which makes the master to connect to any device in its transmission range but that's less secure configuration. Here you can find a complete list of commands and parameters: HC-05 AT Commands List (http://elecfreaks.com/estore/download/EF03080-HC-0305%20serail%20module%20AT%20commamd%20set%2020201104%20revised.pdf)

Nevertheless, that's all we need for a basic configuration of the Bluetooth modules to work as a master and slave devices and now if we reconnect them in normal, data mode, and re-power the modules, in a matter of seconds the master will connect to the slave. Both modules will start flashing every 2 seconds indicating a successful connection.

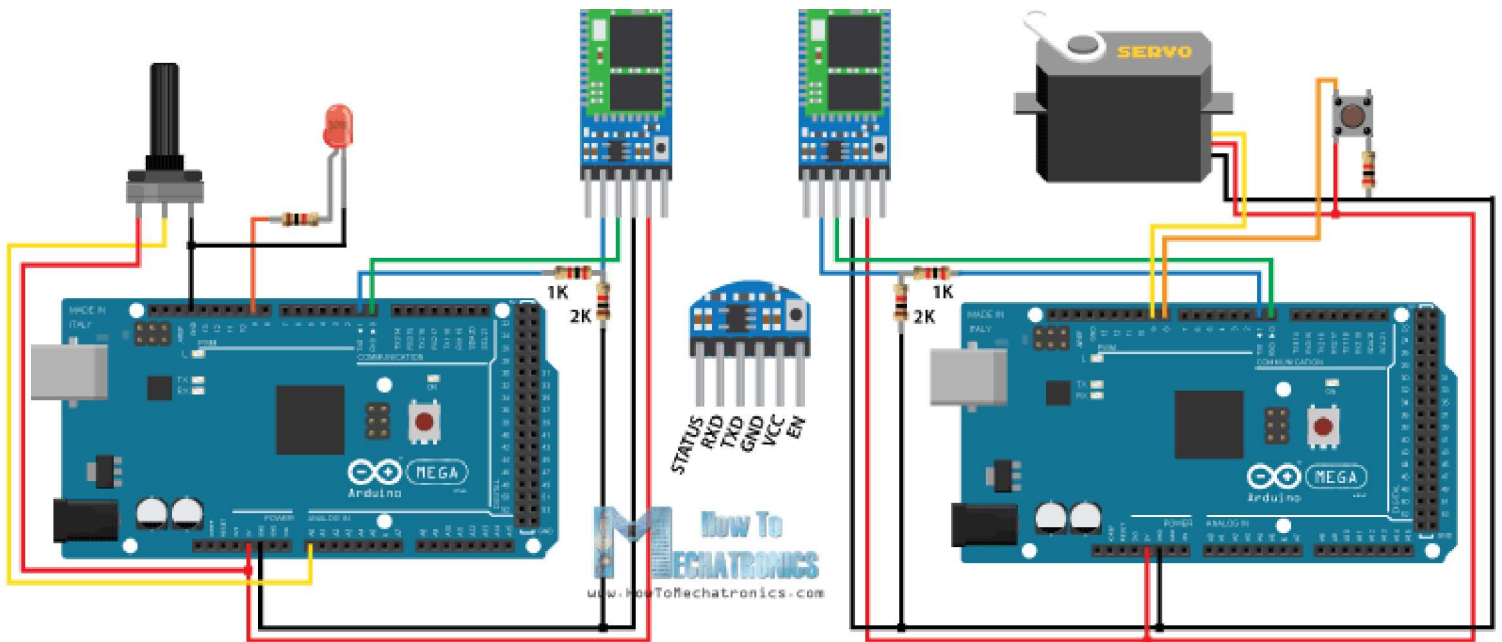## Communcation Between Two HC-05 Bluetooth Module Example

Ok so now we are ready make the practical example for this tutorial. Here's the circuit schematics. We will use a potentiometer, at the master, to control a servo motor at the slave. And vice versa, we will use a push button, at the slave, to control a LED at the master.

Master   Slave

You can get the components needed for this Arduino tutorial from any of the sites below:

- HC-05 Bluetooth Module .... Amazon (http://howtomechatronics.com/recommends/hc-05-bluetooth-module-amazon/) / Banggood (http://howtomechatronics.com/recommends/hc-05-bluetooth-module-bg/) / GearBest (http://howtomechatronics.com/recommends/hc-05-bluetooth-module-gearbest/) / DealExtreme (http://howtomechatronics.com/recommends/hc-05-bluetooth-module-dealextreme/) / ICStation (http://howtomechatronics.com/recommends/hc-05-bluetooth-module-icstation/)

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- Potentiometer............................. Amazon (http://howtomechatronics.com/recommends/potentiometer-amazon/) / Banggood (http://howtomechatronics.com/recommends/b10k-ohm-linear-taper-rotary-potentiometer-bg/) / GearBest (http://howtomechatronics.com/recommends/potentiometer-gearbest/) / DealExtreme (http://howtomechatronics.com/recommends/potentiometer-dealextreme/) / ICStation (http://howtomechatronics.com/recommends/potentiometer-icstation/)

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(http://howtomechatronics.com/recommends/resistors-icstation/)

- Breadboard and Jump Wires …. Amazon (http://howtomechatronics.com/recommends/breadboard-jumper-wires-kit-amazon/) / Banggood (http://howtomechatronics.com/recommends/solderless-pcb-breadboard-jump-wires-bg/) / GearBest (http://howtomechatronics.com/recommends/breadboard-jump-wires-gearbest/) / DealExtreme (http://howtomechatronics.com/recommends/breadboard-kit-dealextreme/) / ICStation (http://howtomechatronics.com/recommends/breadboard-jump-wires-ic/)

Please note: These are affiliate links. I may make a commission if you buy the components through these links. I would appreciate your support in this way!

Arduino Source Codes

Description: So first we need to define the pins and some variables needed for the program. In the setup section, at the master, we set the LED pin as output and set it low right away, as well as, start the serial communication at 38400 baud rate. Similar, at the slave, we set the button pin as input, define the servo to which pin is connected and start the serial communication with the same baud rate.

In the loop section, in both code, with the Serial.available() function we will check whether there is available data in the serial port to be read and using the Serial.read() function we will read and store the data into the "state" variable. So if the master receive the character '1' which is sent from the slave when the button state is high, or the button is pressed, the LED will be on. Else if the character is '0' the LED will be off.

As for the servo motor control, first at the master, we read the potentiometer value and map it into a suitable range for the servo from 0 to 255. This value is sent to the slave which use it to rotate the servo motor accordingly. That's all we need and here's the demonstration of the example.

Master Code:

```
1.   /*
2.    * How to configure and pair two HC-05 Bluetooth Modules
3.    * by Dejan Nedelkovski, www.HowToMechatronics.com
4.    *
5.    *              == MASTER CODE ==
6.    */
7.
8.   #define ledPin 9
9.
10.  int state = 0;
11.  int potValue = 0;
12.
13.  void setup() {
14.    pinMode(ledPin, OUTPUT);
15.    digitalWrite(ledPin, LOW);
16.    Serial.begin(38400); // Default communication rate of the Bluetooth module
17.  }
18.
19.  void loop() {
20.    if(Serial.available() > 0){ // Checks whether data is comming from the serial port
21.      state = Serial.read(); // Reads the data from the serial port
22.    }
23.    // Controlling the LED
```

```
24.   if (state == '1') {
25.     digitalWrite(ledPin, HIGH); // LED ON
26.     state = 0;
27.   }
28.   else if (state == '0') {
29.     digitalWrite(ledPin, LOW); // LED ON
30.     state = 0;
31.   }
32.   // Reading the potentiometer
33.   potValue = analogRead(A0);
34.   int potValueMapped = map(potValue, 0, 1023, 0, 255);
35.   Serial.write(potValueMapped); // Sends potValue to servo motor
36.   delay(10);
37.   }
```

Slave Code:

```
1.   /*
2.    * How to configure and pair two HC-05 Bluetooth Modules
3.    * by Dejan Nedelkovski, www.HowToMechatronics.com
4.    *
5.    *                  == SLAVE CODE ==
6.    */
7.
8.   #include <Servo.h>
9.   #define button 8
10.
11.  Servo myServo;
12.  int state = 20;
13.  int buttonState = 0;
14.
15.  void setup() {
16.    pinMode(button, INPUT);
17.    myServo.attach(9);
18.    Serial.begin(38400); // Default communication rate of the Bluetooth module
19.  }
20.
21.  void loop() {
22.   if(Serial.available() > 0){ // Checks whether data is comming from the serial port
23.      state = Serial.read(); // Reads the data from the serial port
24.   }
25.   // Controlling the servo motor
26.   myServo.write(state);
27.   delay(10);
28.
29.   // Reading the button
30.   buttonState = digitalRead(button);
31.   if (buttonState == HIGH) {
32.     Serial.write('1'); // Sends '1' to the master to turn on LED
33.   }
34.   else {
35.     Serial.write('0');
36.   }
37.   }
```

That's all and if you have any problems, feel free to ask for help in the comments section below.

We highly recommend **EasyEDA** for circuit design and **low cost PCB order (https://easyeda.com/order)**

Free Circuit Simulation Software - EasyEDA (https://easyeda.com/)

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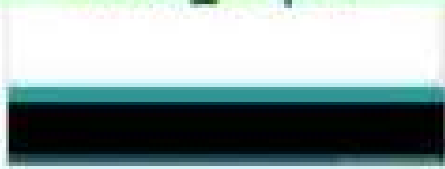
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12 RESPONSES

Stephen

April 15, 2016 (http://howtomechatronics.com/tutorials/arduino/how-to-configure-pair-two-hc-05-

Hi I was wondering if you could help me, I am trying to do something really simple with HC-05 but it has become very difficult. I want to send AT commands to the HC-05 from a running Uno sketch. I have HC-05 pins #32 & #34 connected to the Uno so I can control the HC-05 power and AT-state by the Uno. Now I use the Uno to change the state of the HC-05 to AT Command mode, and then send a command by serial.print to the HC-05. But, the HC-05 does not react or respond. I am not sure if not responding, or if I can't read the response. I am reading the response (debugging) by passing it to the serial monitor. Could you possibly look at my code to help me make this work? Thanks.

REPLY

Dejan Nedelkovski (http://howtomechatronics.com)

Sorry but cannot say anything about this because I have't tried making such a communication and I don't have such a code. And sorry but I cannot look or do custom codes when someone ask that from me because it takes quite a time and have a lot other work to do.

REPLY

Stephen

Ok, how about any information as how to set up a sleep mode on the hc-05, I think there is the Sniff command but I havent found any documentation for it.

Thanks

Dejan Nedelkovski (http://howtomechatronics.com)

Try to find that information from its datasheet.

Justin Straver

Tnx Dejan, Great tutorial! For me it worked without the voltage dividers and at a baudrate of 9600.

REPLY

Dejan Nedelkovski (http://howtomechatronics.com)

Thanks, nice to hear that!

REPLY

James

Hello,

GREAT job on this write up!! Fantastic!

I wanted to know, can a bluetooth phone connect to the master if the master HC-05 is already paired with the other HC-05?

REPLY

Dejan Nedelkovski (http://howtomechatronics.com)

Hi there and thanks!
Well I haven't tried it but I don't think it would work as the Master would be already busy.

REPLY

John Tan Chin Yen

June 17, 2016 (http://howtomechatronics.com/tutorials/arduino/how-to-configure-pair-two-hc-05-bluetooth-module-master-slave-commands/#comment-1008)

How about if I use a HC-05 master and control a HC-6 slave?

REPLY

Dejan Nedelkovski (http://howtomechatronics.com)

June 24, 2016 (http://howtomechatronics.com/tutorials/arduino/how-to-configure-pair-two-hc-05-bluetooth-module-master-slave-commands/#comment-1022)

It should work the same way.

REPLY

Tehzib Sadaf

July 8, 2016 (http://howtomechatronics.com/tutorials/arduino/how-to-configure-pair-two-hc-05-bluetooth-module-master-slave-commands/#comment-1050)

can you tell me the Bluetooth range of this project? i mean from how far away i will be able to command the servo with the POT?

REPLY

Dejan Nedelkovski (http://howtomechatronics.com)

July 13, 2016 (http://howtomechatronics.com/tutorials/arduino/how-to-configure-pair-two-hc-05-bluetooth-module-master-slave-commands/#comment-1060)

Approximately 10 meters (30 feet).

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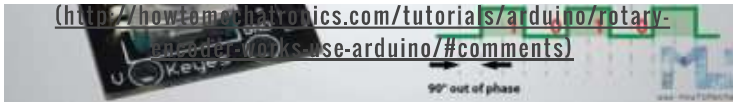
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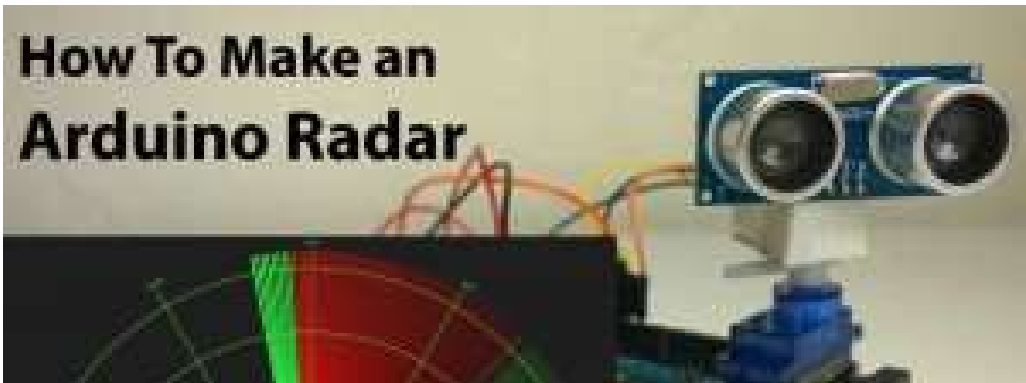
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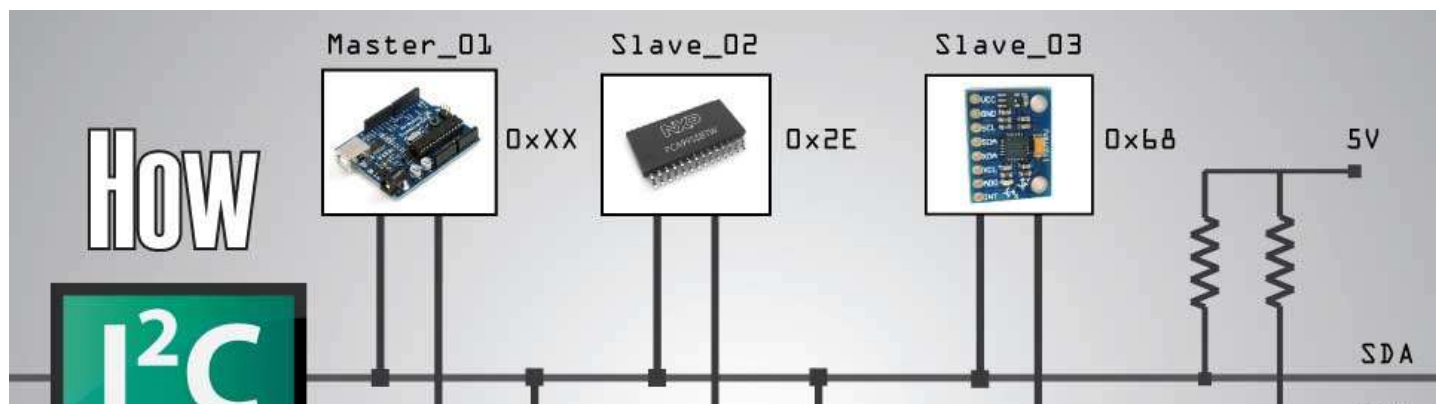
👤 Dejan Nedelkovski (http://howtomechatro

🕓 July 26, 2015

💬 52 (http://howtomechatro sensor-hc-sr04/#comm

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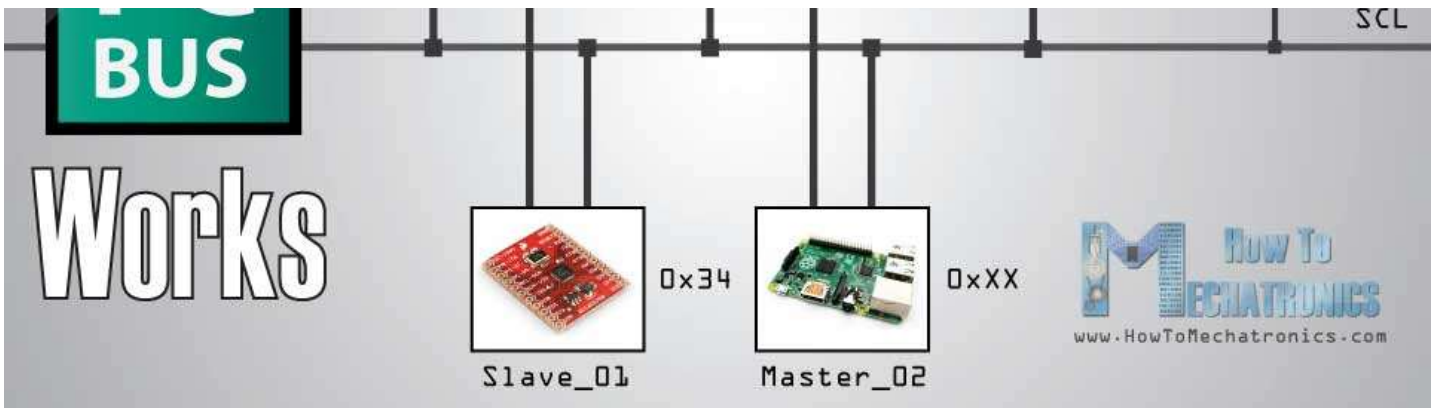
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