



Cheap Wireless Motion Sensor Device

by [feyo123](#) on June 2, 2012

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Intro: Cheap Wireless Motion Sensor Device

I think we all have the dream to become a super spy, so if you are in a secret mission, you are doing something in your house and you don't want to get caught, or you are just eating all the cookies in the kitchen and you want to know if your mother is coming, the wireless motion sensor devices are for you.

I see a lot of wireless in the web and in movies, but I want to figure out the way to make it cheap for everyone so I use an attiny85, a pir sensor (motion sensor) and a rf link to make the project work.



Image Notes

1. pir sensor , used to detect movement

Step 1: Material

I order my material from a sparkfun distribution in México because is where I live but if you live in USA you can order barely all the material from sparkfun.

1 pir sensor

<http://www.sparkfun.com/products/8630>

9.95 dolar

1 rf receiver 315mhz

<http://www.sparkfun.com/products/10533>

4.95 dolar

1 rf transmitter 315mhz

<http://www.sparkfun.com/products/10535>

3.95 dolar

1 attiny85

<http://www.sparkfun.com/products/9378>

2.84 dolar

1 arduino uno

1 switch

4 resistance 180ohm

1 resistance 10k ohm

normally open button (optional)

1 8 ohm speaker (optional)

1 ic 8 pin base

1pnp transistor (you can use the 2n2222, just check out the collector and emitter pins are in the right place)

1 lm7805 (5v regulator)

3 electrolytic capacitors 10uf 50v

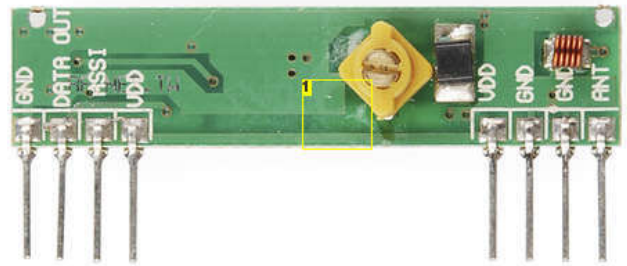


Image Notes

1. rf receiver. its really easy to use because of the indicators in each pin

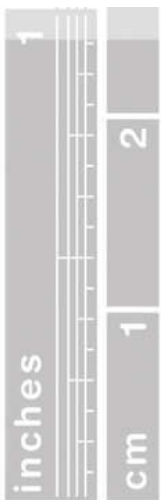


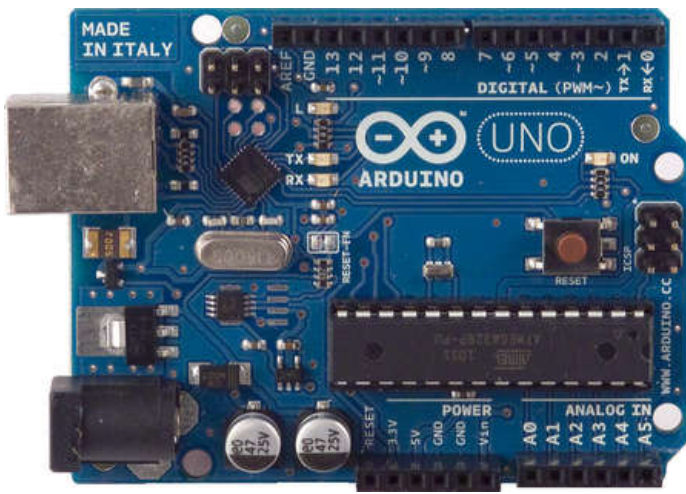
Image Notes

1. this is the transmitter



Image Notes

1. be carefull. red: 9 to 12 volts. brown: ground. black: 5V signal, get low when activated



Step 2: Hardware

As you can see in the image everything in the circuits works with 5Volts but the pir sensor works with 9 to 12 volts. To fix this and save the work and spend of connecting the circuits to 2 different kind of voltage i use a lm7805, that is a 5Volts regulator, and connect everything to a 9V(square) battery.

If you want to make a pcb to have all the connections in a cleaner way I will put a pdf file below so you can print it and transfer with the method you want.

2 connection do not fit in the design so y place them with wires. (the two connections are the yellow ones in the second image)

For the receiver I was going to do also a attiny85 device, but I was short in time so I end up making an arduino shield with a speaker. (If somebody want the pcb for the attiny85 receiver I'm in half production and I will upload it later. thanks for the comprehension).

If you print the arduino receiver shield you got to be careful, the bottom copper side ends up in the top, also the pins are place in the bottom and solder though the holes in the pcb, but all the other component are solder from the upper part directly bending the legs. you can have a better look in the 5 to 8 images.

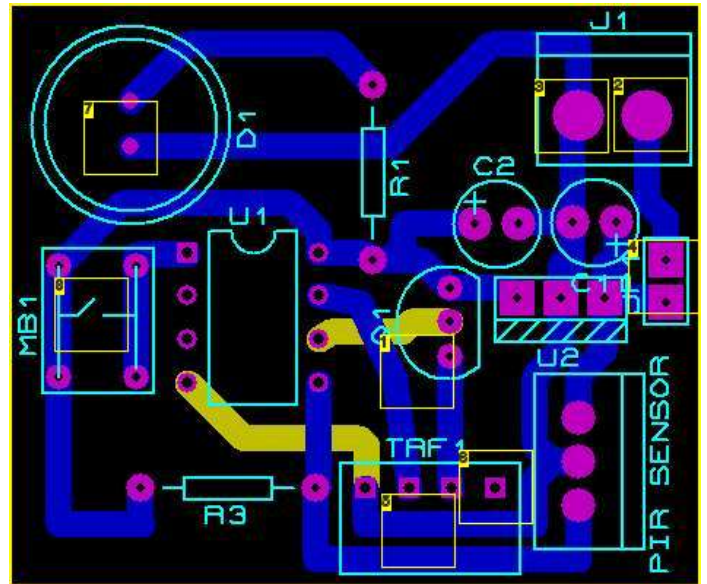
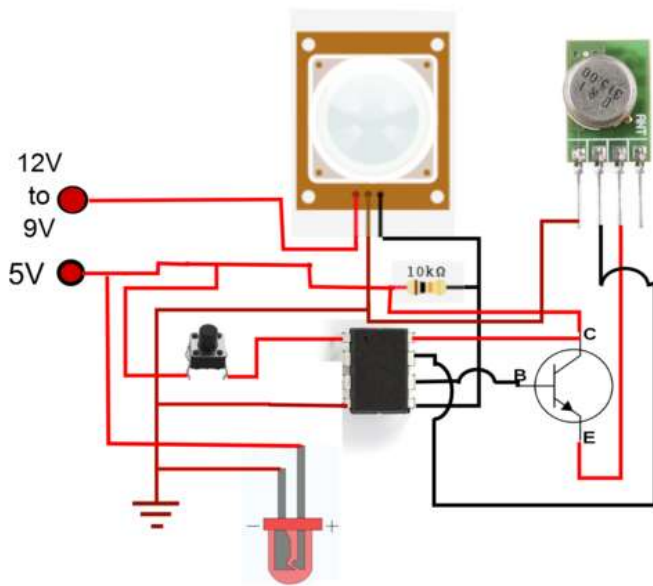


Image Notes

1. place this yellow connections with cables
2. positive 9V
3. Ground
4. switch
5. transmitter
6. transmitter antenna
7. led
8. normally open button optional, just to reset the system

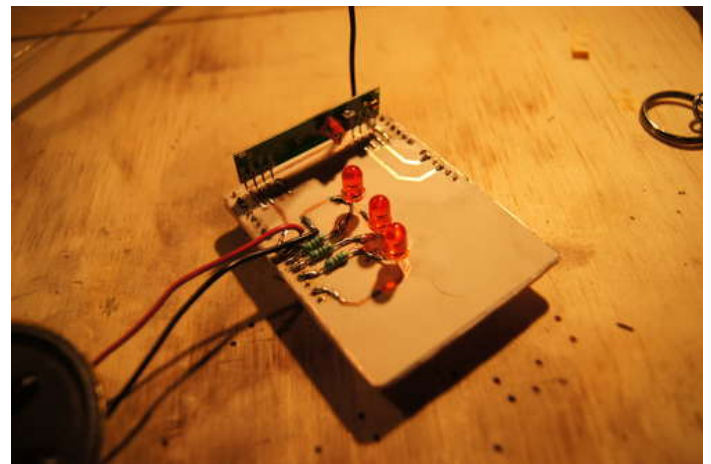
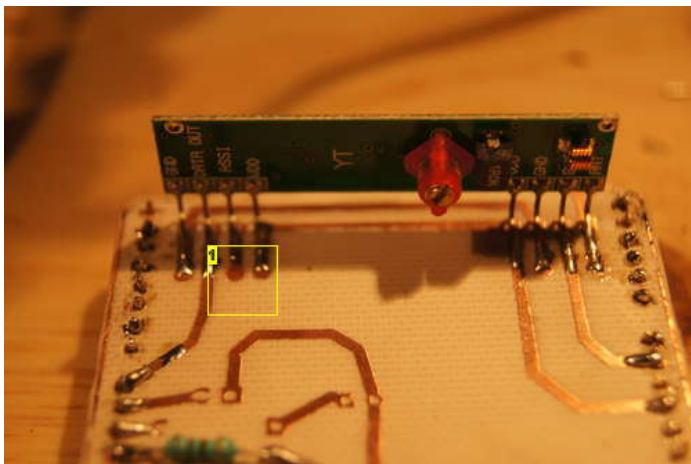
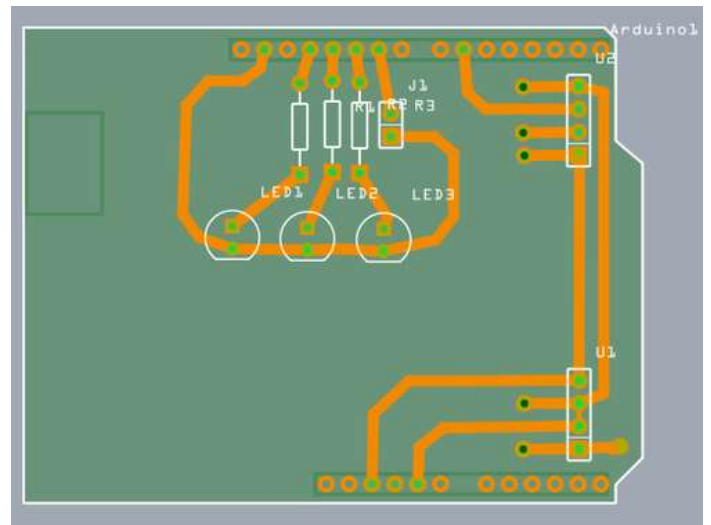
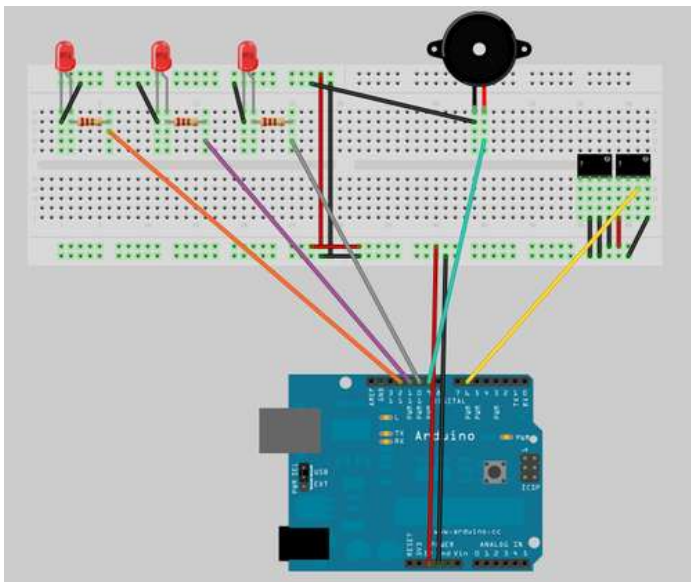


Image Notes

1. here you can see how i bend the legs and solder from the upper side

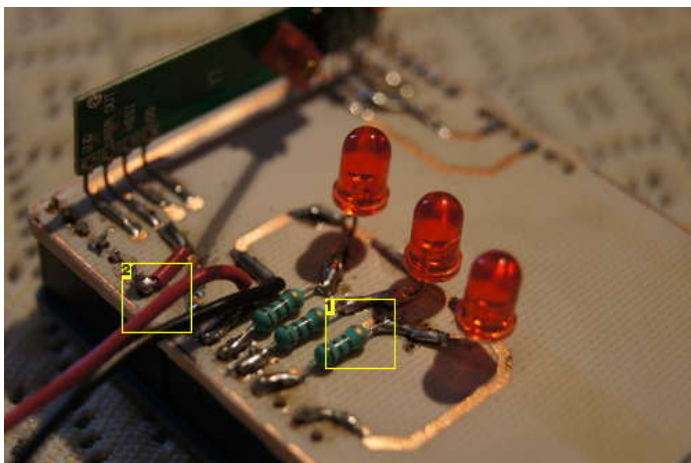


Image Notes

1. also with the leds, resistance, and speaker i solder frm the upper side
2. the pins go through the holes in the pcb to make contact from the bottom to the arduino

File Downloads



arduino receiver shield.pdf (4 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'arduino receiver shield.pdf']



transmitter pcb.pdf (44 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'transmitter pcb.pdf']

Step 3: Software

To program the attiny85 you can use the arduino uno as isp programmer. You can look this link (<http://hlt.media.mit.edu/?p=1706>) for more information about this process, but you don't need to because I'm gonna explain everything in detail.

I use an attiny because it's cheaper than using an arduino. you can buy a attiny85 for 2.84USD, compare to an arduino for about 38 dollars. Using an attiny to communicate through a rf link represents a challenge because the attiny doesn't have a rx or tx serial communication by default. I want to thank this blog (<http://mchr3k-arduino.blogspot.mx/>) for making the program that makes possible to communicate with an attiny.

ok. so let's go to step by step programming.

1. go to the arduino official site and download the arduino-0022 software. (don't use the arduino 1.0, it doesn't work). Unzip the file. you should see a folder name arduino-0022.

2. go to this link.

<http://mchr3k-arduino.blogspot.mx/2012/01/wireless-sensor-node-part-2.html?showComment=1338749638806#c853067277980266192>

download the **attiny45_85.zip** and the **manchester.zip** files.

3. Unzip the attiny45_85.zip file. copy the folder. open the arduino-0022 folder. Open **hardware** and paste the attiny45_85 folder there.

4. Unzip the manchester.zip file. open that manchester folder and you should see two other folders. core and MANCHESTER. copy the MANCHESTER folder. open again the arduino-0022 folder. but this time open the **libraries** folder. paste the MANCHESTER folder there.

Now you have the software ready to program.

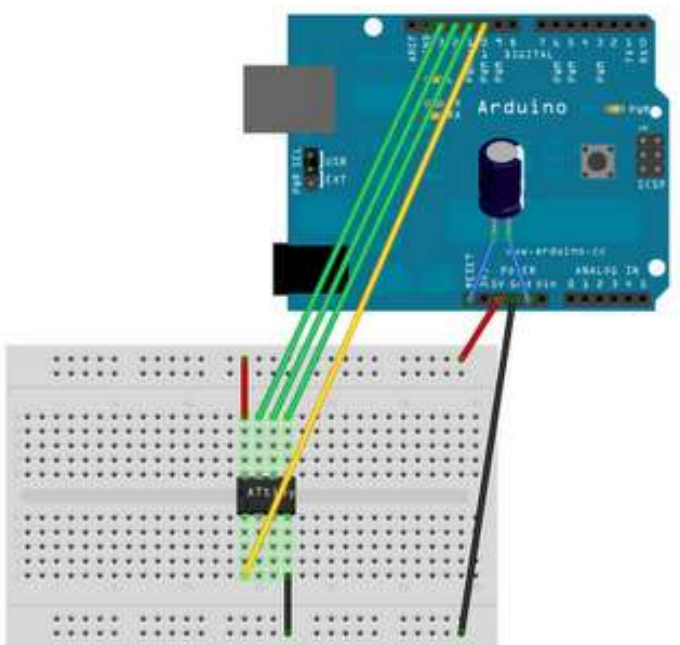
5. launch the arduino-0022 program. click in the arrow pointing up (open) and open the ArduinoISP example. click in tools>board>arduino uno. (look you now have all the attiny in there).

Upload the program.

6. Place the attiny85 in a protoboard (breadboard), and connect everything to the arduino as the image. Be sure you place the attiny in the correct way or you are going to burn it. (happened to me :P).

7. On the arduino program go to tools>board>attiny85 (w/ Arduino as ISP). click again tools>burn bootloader>w/ Arduino as ISP. (you may see an error but that's ok).

ok, So let's make the program for the transmitter.



Step 4: Transmitter

here is the program for the transmitter. if you make the last step in order now you just have to place the code in the arduino program and upload it.

```
#include <MANCHESTER.h> //include the library to communicate
#define TxPin 2 //the pin that is used to send data

unsigned int Tdata = 0; //begin the data in 0

int TRANSISTOR_PIN = 1; //pin that turn ON and OFF the transistor
int PIR_SENSOR_PIN = 0; //the motion sensor pin

void setup()
{
  MANCHESTER.SetTxPin (TxPin); //set the pin of communication
  pinMode(TRANSISTOR_PIN, OUTPUT);
  pinMode(PIR_SENSOR_PIN, INPUT);
}

void loop()
{
  int pirVal=digitalRead(PIR_SENSOR_PIN); //read the state of the motion sensor
  if(pirVal == LOW)//if pir sensor detect movement then

  /*action, in this case turn ON the transistor to power
  the transmitter then send the message,
  the turn OFF the transistor*/

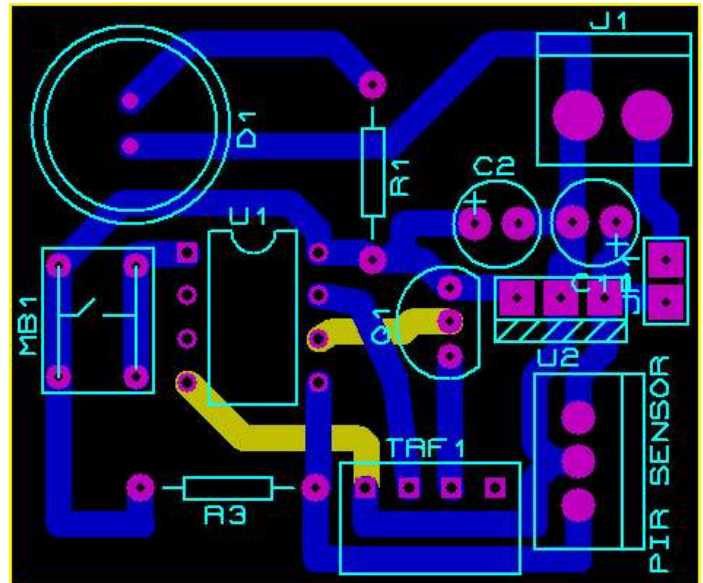
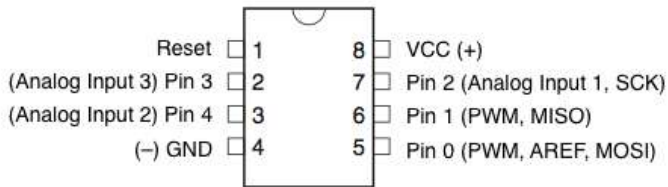
  digitalWrite(TRANSISTOR_PIN, HIGH);//transistor ON
  delay(1000);

  Tdata = 50; //I use 50 as sensor1alarm number but you can use the number that you want
  //be sure you use the same number in transmitter and receiver

  MANCHESTER.Transmit(Tdata); //transmit the signal
  delay(100);

  digitalWrite(TRANSISTOR_PIN, LOW);//turn OFF transistor to save battery
}
delay(2000);
}
```

ATtiny45 / ATtiny85



change the number 50 to the number in the other transmitter.* /

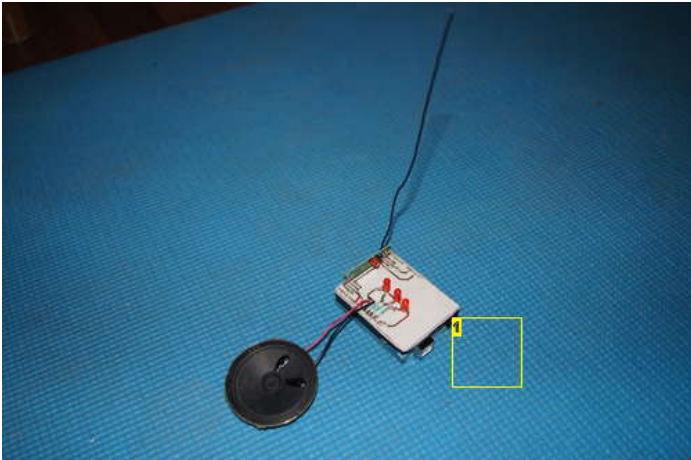


Image Notes

1. arduino shield place in the arduino

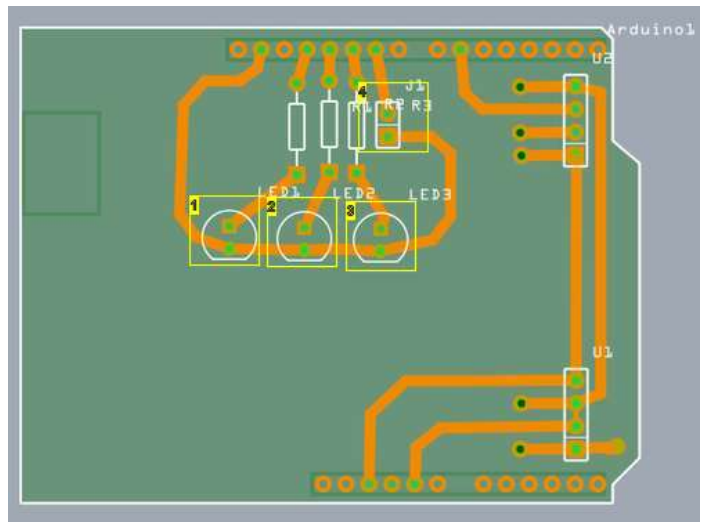
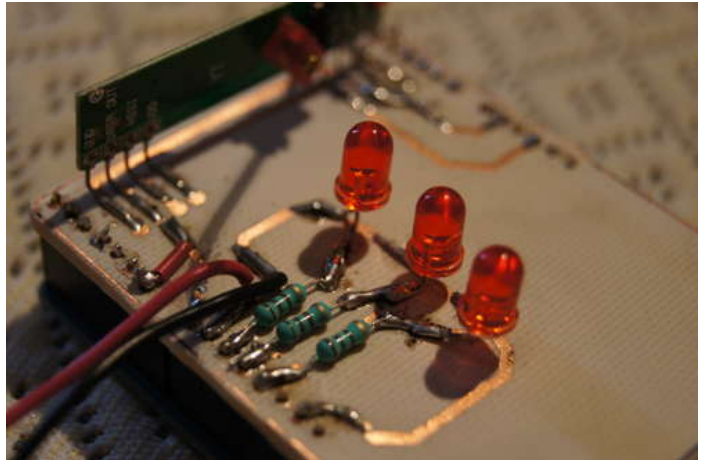


Image Notes

1. alarm1
2. alarm2
3. alarm3
4. speaker

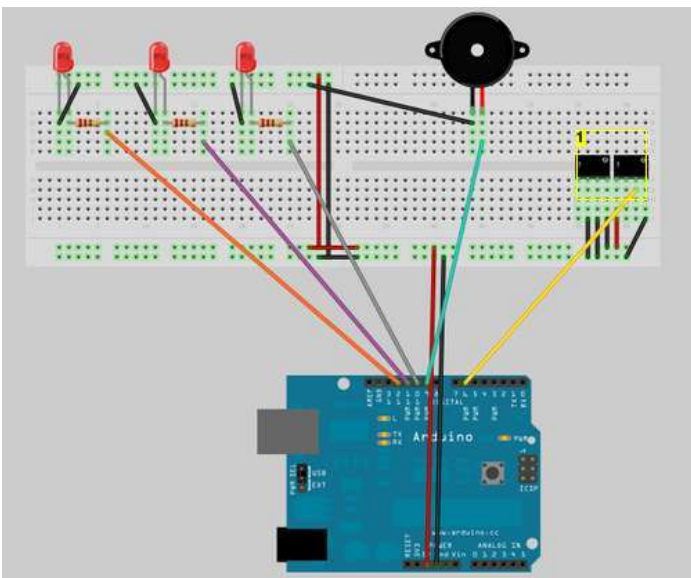


Image Notes

1. this represents the receiver

File Downloads



arduino receiver shield.pdf (4 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'arduino receiver shield.pdf']

Step 6: Conclusion

You can place your sensor in every case you want. I place mine in soda cans because I think no one is going to check if there is something wrong with a can. and you can place everywhere and doesn't seem weird. So enjoy been a secret spy or just protect your house from strangers in the night. the uses are endless, you just have to put your creativity to work a little.

p.d. (you can change the motion sensor, for a lot of other sensors with a little changes in the design and you can have temperature sensors, sound sensors, ultrasonic sensors, gas sensors, infrared sensors, and a lot of other sensors for a cheap price that can sense things from a safe distance).

I hope you enjoy this instructable :), sorry if my english is not the best.



Image Notes

1. cut the bottom part with the dremel or a knife

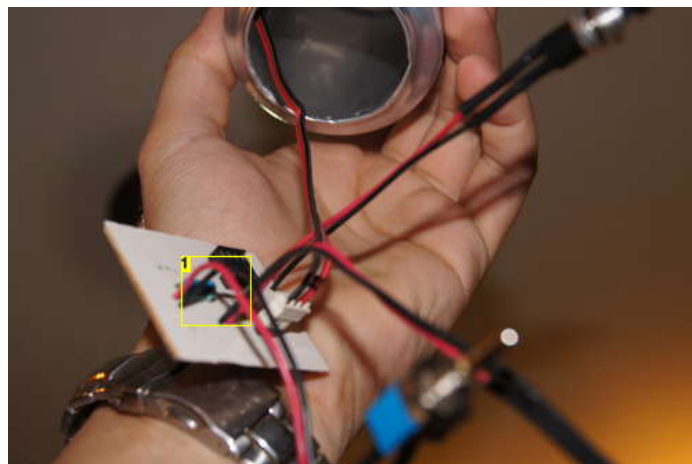


Image Notes

1. this is an incomplete pcb :P just for the picture

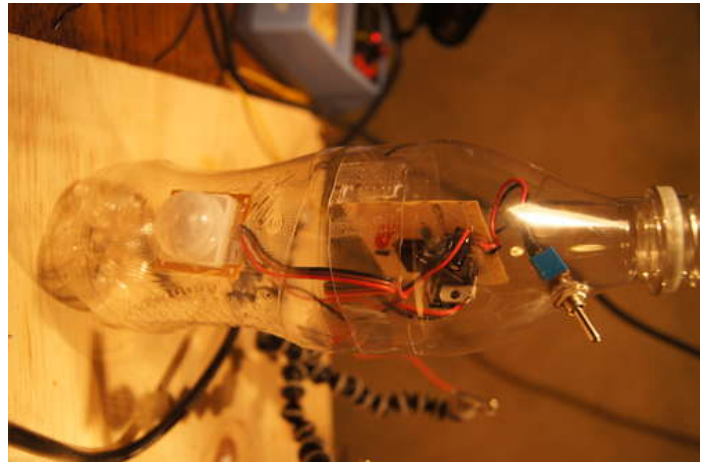
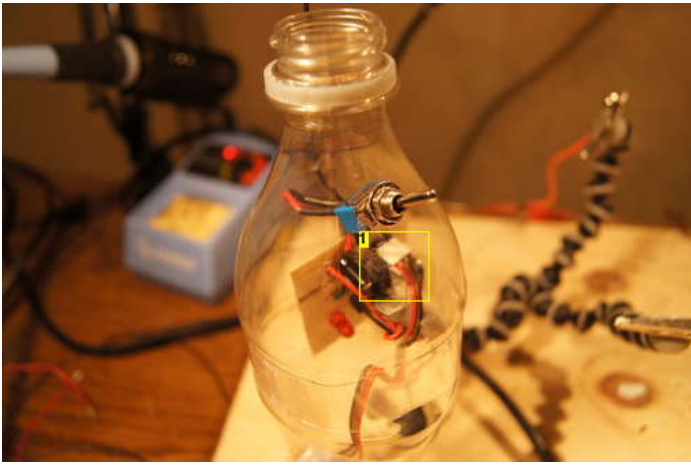


Image Notes

1. other sensor, i will paint the interior black and place the label back in place

Related Instructables



Anti-Halloween House by randofo



How to make a motion activated doorbell by p07gbar



Wireless Accelerometer Controlled rgb-LED's by Andlier



Arduino Controlled Motion Sensor by LemonSlice



Arduino Basics: PIR Sensors by frenzy



PIR Motion Sensor Tutorial by adafruit

Comments

1 comments [Add Comment](#)



rimar2000 says:
I don't know electronics, but this seems a very useful project.

Jun 3, 2012. 5:42 PM [REPLY](#)