RGBike POV - Open project

by **Hazard** on June 6, 2009

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Intro: RGBike POV - Open project

RGBike POV also known as **RGB POV for beginners to make at home**

This i'ble is in constant update. If you're planning on doing something don't be afraid to drop a question.

I've always wanted a POV for my bicycle, specially a full colour POV capable of displaying text, images and small animations!

There are some cool POVs commercially available.
- SpokePOV from adafruit industries (and its i'ble)
- Monkeylectric's m132s
- Monkeylectric's recentely announced m464q

Unfortunately, the SpokePOV is only one colour, and the m132s, as I understand, doesn't have the ability to display images. Besides, I think these are a little too expensive for something that I will not use often.

So I though I would try to make my own with components I already had around. This way I don't have to spend any more money to try and play with a bicycle POV.

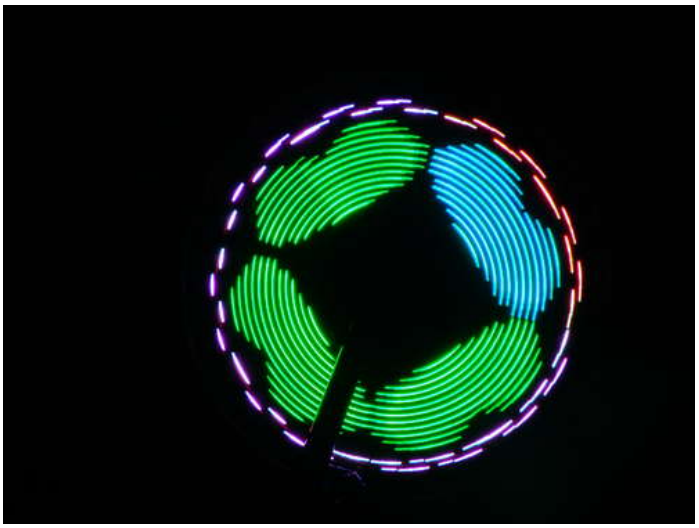
This project **features** :

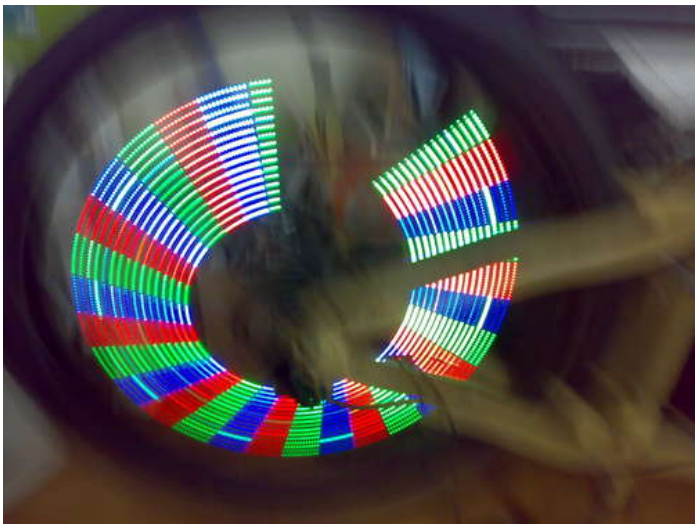
- 16 RGB (Red+Green+Blue) Light Emitting Diodes;
- Arduino compatibility (Suposedely, I'll have to check that later);
- Single layer printed circuit board, suitable for home fab;
- All through hole componentes, suitable for beginners;
- Hall effect sensor, for image synchronization;
- Least number of componentes possible;
- Unfortunately, only one side of the wheel is illuminated (check update).
- Fits 26" wheels, I haven't had opportunity to try it in 20" and 24" wheels.

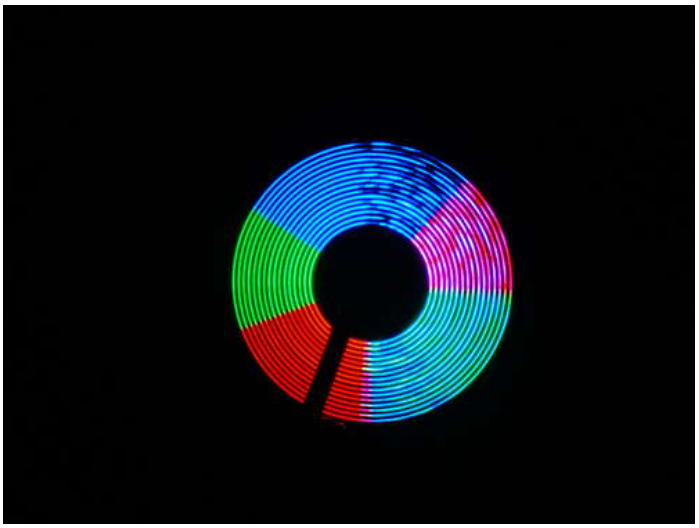
This project is also a open project. Anyone who wishes to participate is welcome. The contributions will be added to this instructable and published.

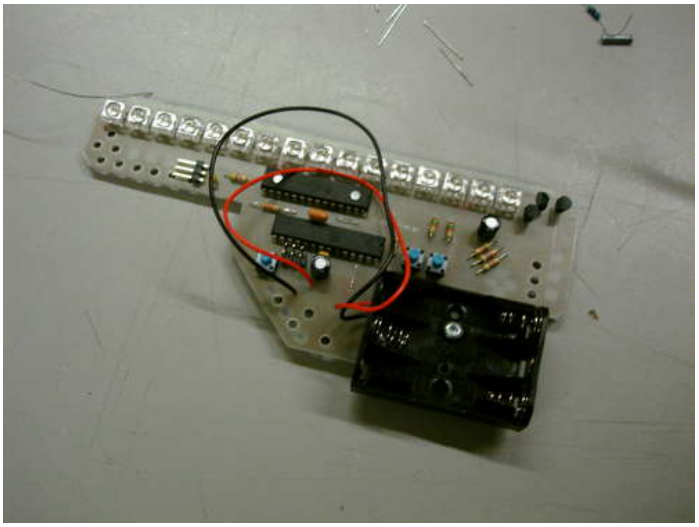
Update : I updated the board, so you can use only one board for lighting both sides of the wheel! But it won't work correctly in both sides for text...

CLICK TO PLAY VIDEO









Step 1: Before starting

To follow this instructable you must already know how to:

- Solder electronics
- Make printed circuits boards
- Understand basic principles of electronics
- Know a little about microcontrollers

If you don't know any, or all, of the above, this instructable can a motivation for learning.

Tools
You'll need the basic tools to:

- Make PCB
- Work with and solder electronics
- Hardware and software to program the microcontroller

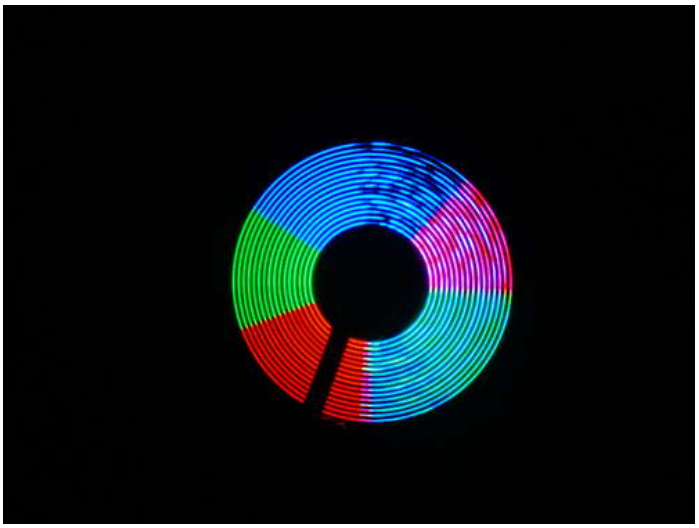
Electronic Components

- 1x ATMega328p / ATMega168 microcontroller - ~4.3$
- 1x TLC5940 / TLC5941, 16 PWM Ouput LED driver - ~4.29$
- 16x Superflux common cathode RGB LEDs - ~13$
- 1x A3213 - 1.5$
- 3x PN2222, NPN transistors - cents
- Assorted resistors, capacitors, tact switches and connectors (check schematic and board layout) - another few cents

Rough estimate of the cost, since I'm building the circuit boards at home: ~35$

Download all the resources
Don't forget to download the schematic and board layout for Eagle CAD, and the source code for the firmware.

attention : TobyTetzi noticed that he download '.tmp' files instead of the .brd and .sch files. It also happened to me. I don't understand why.
I changed back to the original name and it seems to solve it.



File Downloads

rgb_pov_double_leds.brd (40 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'rgb_pov_double_leds.brd']

rgb_pov_final.brd (36 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'rgb_pov_final.brd']

rgb_pov_double_leds.sch (278 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'rgb_pov_double_leds.sch']

rgb_pov_final.sch (275 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'rgb_pov_final.sch']

bike_pov.zip (28 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'bike_pov.zip']

POV_eagle_files.zip (146 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'POV_eagle_files.zip']

Step 2: Working principle

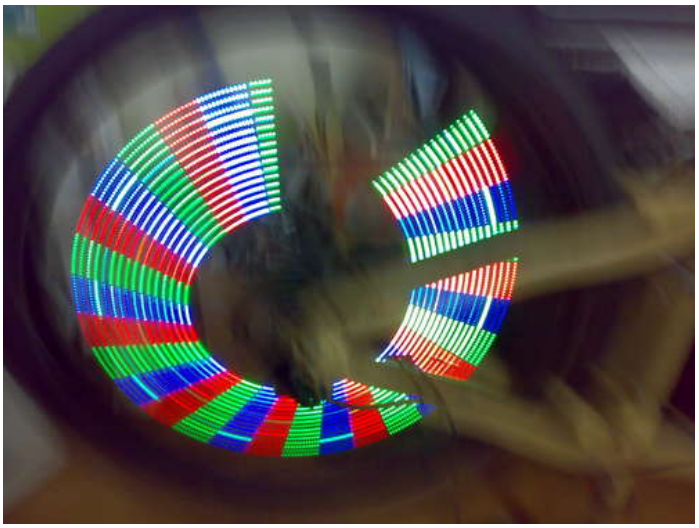
So... You may ask. How do I plan to control the 48 LEDs? The 16 red, 16 green and 16 blue, with only a LED driver IC with 16 outputs?
Well... I'm going to light one colour at a time.

Imagine one line of the image in the wheel. This line is composed by red, green and blue points. These points will light up, in the same instant, one colour at a time. This alternation between the three colours is so fast, that you seem to see only one line.

If you alternate between all these colours, you won't see three lines of different colours, you'll see white.

To control the width of this line in the wheel, we only need to control how many times this line is repeated.

Since the driver IC sinks the LEDs, this method requires common cathod RGB LEDs.
I used cheap 'Piranha'/'Superflux' RGB LEDs from China.



Step 3: Make the printed circuit board

First, you'll have to make the Printed Circuit Board.

If you don't know how to make a PCB, you can follow the ton of i'bles that are available.
There are a few methods of making PCBs, and many make it a little different within the same method.
I know at least:

- Photoresist - The method that I use. I can achieve great level of detail;
- Tonner transfer - You'll have to use a laser printer;
- Blue thingy transfer (don't remember the name) - I really don't like the process and the detail I achieve.

What all the methods have in common, is that the copper must be etched! Cool etchant instructable

Resuming all the steps I took:
1 - Print the board layout in a transparency. In eagle go to: ULP -> CAMtoPrint;
2 - Prepare the copper and apply photoresist, like Positiv 20;
3 - Expose the copper with photoresist through the transparency;
4 - Develop the photoresist;
5 - Check for errors;
6 - Etch the board;
7 - Cut the board;
8 - Drill.

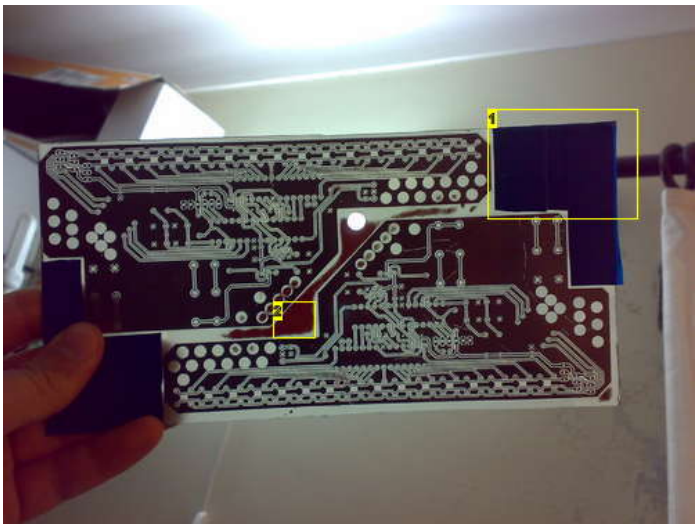


Image Notes
1. I use adhesive tape to protect wide areas of copper I do not need removed. This way the etching is faster.
2. Copper still on the board. since the boards are already nicely etched I don't need to remove this copper.

Image Notes
1. Developed board

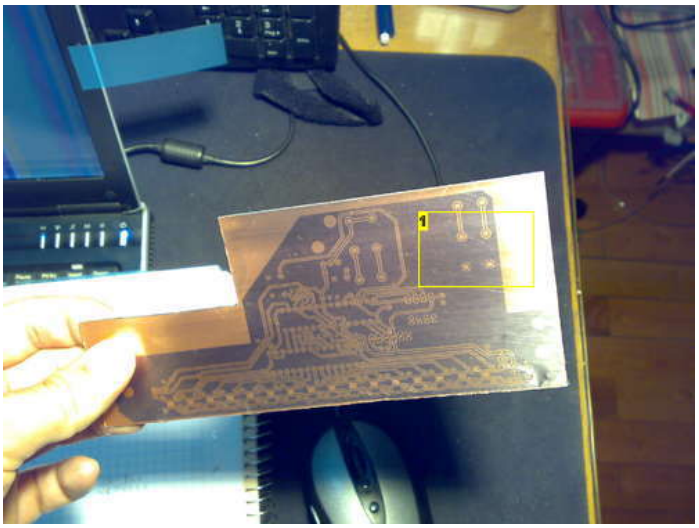


Image Notes
1. Check for errors.

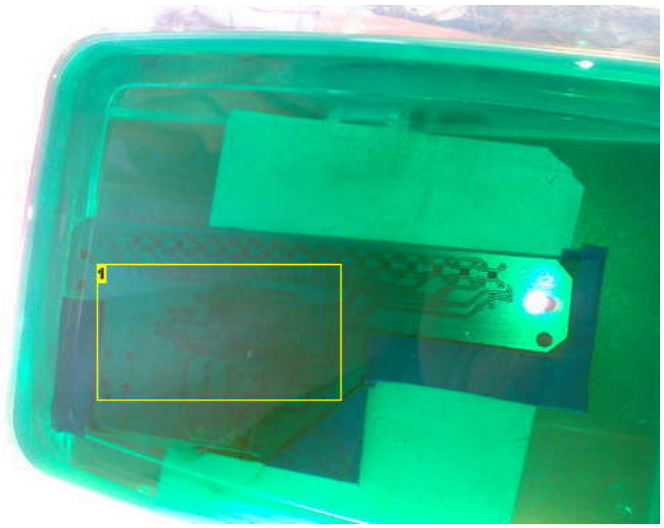


Image Notes
1. Etching!

Image Notes
1. Drilling....

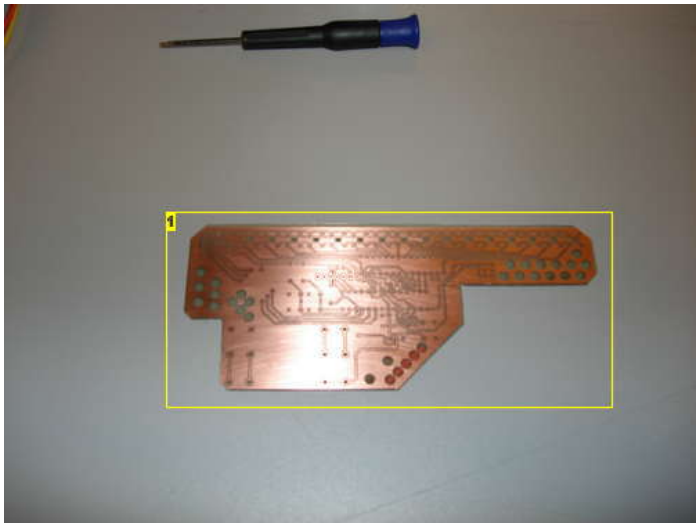


Image Notes
1. Board ready

Step 4: Solder the components

After making the PCB, you'll solder the components.

Follow the schematic and board layout to populate the board.
I suggest you to start with the microcontroller related stuff, and test it first.
Don't forget to solder the jumper wires!

Then solder all the LEDs and TLC5940 and all the remaining components.

Properly secure the batteries, otherwise it'll fly away! (check the video)
Since I didn't have the battery holders that I placed in the board layout, I had to use another kind of holder.

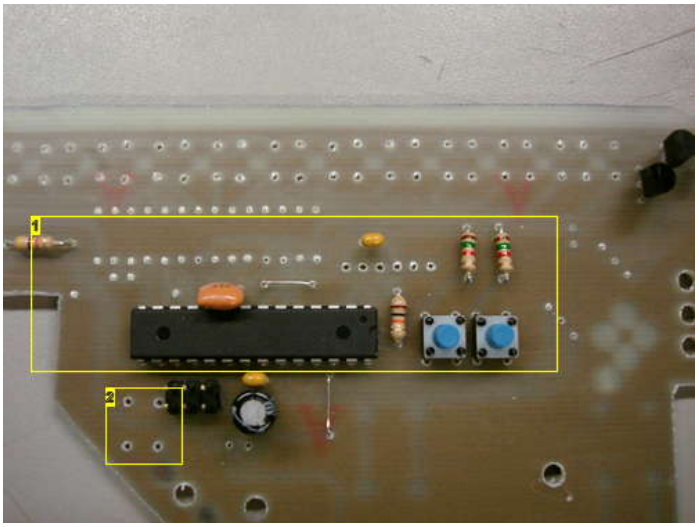


Image Notes
1. First solder the microcontroller and related stuff.
2. Don't forget the reset button!

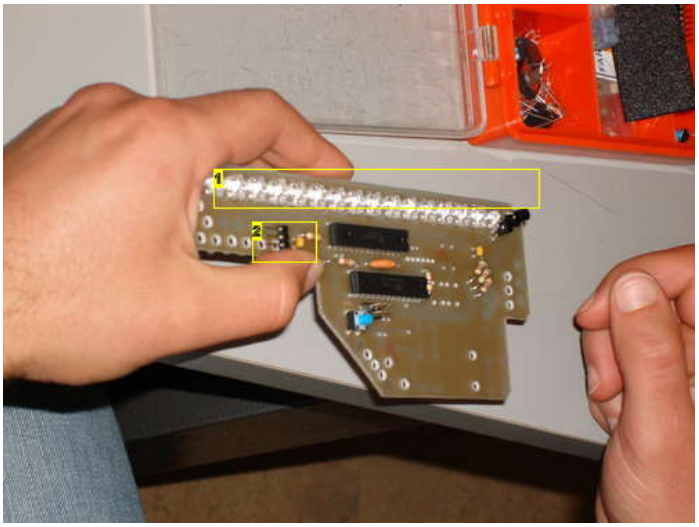


Image Notes
1. Then solder the LEDs and the TLC5940
2. I used a connector for plugging the hall connector.

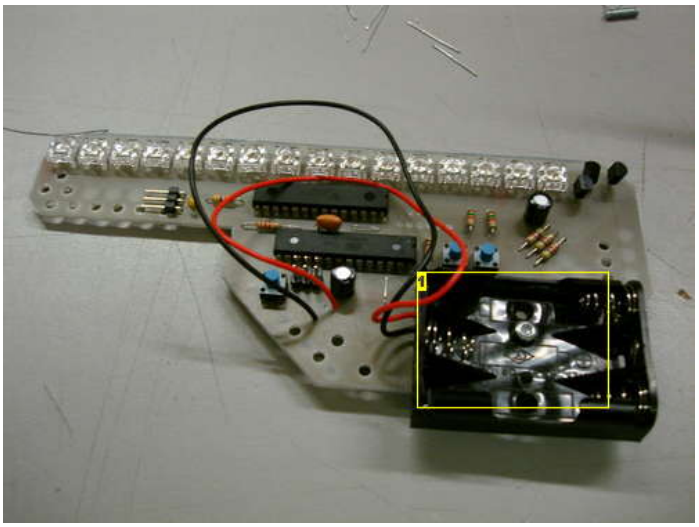


Image Notes
1. It is very important to secure the batteries!

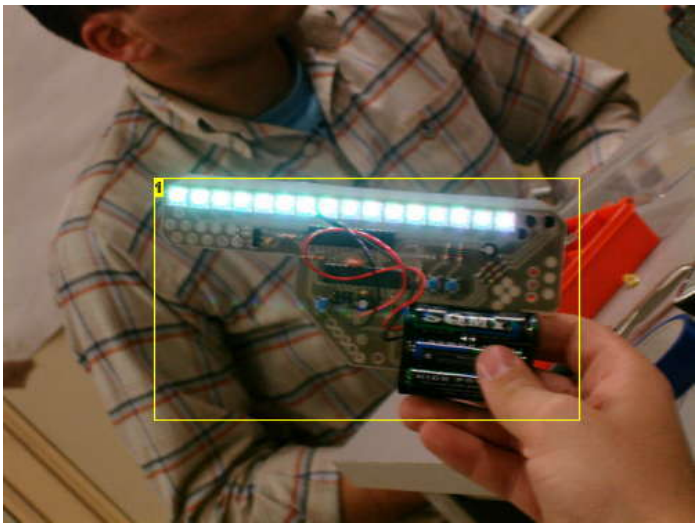


Image Notes
1. The LEDs light up. First test is sucessful.

Step 5: The TLC5940 driver

The TLC5940 is a cool IC that controls the supply of 16 LEDs. It has 4096 levels of grey.
Cool projects that use this integrated circuit:

- The Dawm
- Skyline RGB led lamp
- Controllable RGB LED system

I will explain how this IC works and how to interface with it. Later... someday I hope.

Maximum LED current
You can limit the current that flows through the LEDs by specifying the value of a single resistor.to c
To calculate the resistor value, you need to decide the maximum value for the current on the LEDs (I_max).

R_iref = 39 / I_max

I used a 2.2k Ohm resistor, which limits the current to 17,7mA.

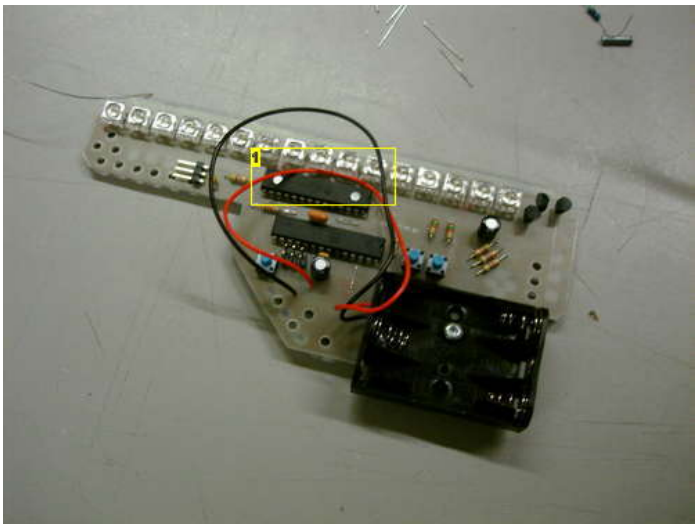


Image Notes
1. The TLC5940 16 LED driver

Step 6: Program the microcontroller with the firmware

You can now program the firmware into the microcontroller.
I use the USBtinyISP by ladyada.

I also designed this POV to be compatible with the Arduino. You just have to use the FTDI USB-TTL232 cable. But don't take my word for it, test it! (because I didn't).
There is also a TLC5940 library for the arduino by Alex Leone

Currently in this version of firmware you can only display one image, but you can easily tweak it. Also, the image data is read from program memory.
In the future I plan to try a SPI EEPROM connected to the serial port. This way I am able to store tons of images and animations!

In this version there is also a small section of feedback control loop, to synchronize the image to the velocity of the wheel.

How much space do I need for my image?
Depends on the level of detail you desire. With level of detail, I mean the number of divisions of your wheel.
If want to use 100 divisions, you'll divide the circle in lines with 3.6 deg. The greater the number of divisions, the narrower the lines.

For one image of 100 lines:
192 bits for each colour * 3 colours for line = 576 bits / 72 bytes for each line
72 bytes/line * 100 lines = 7200 bytes/image, ~7kBytes/image

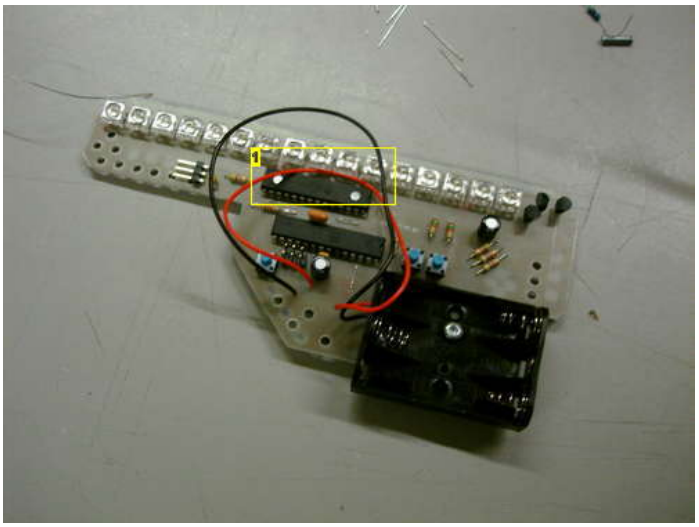


Image Notes
1. The TLC5940 16 LED driver

Step 7: Install it on the wheel

POV

Now we will install the POV in the wheel.
I wish this POV could be installed in any kind of wheel. Specialy in 20", 24" and 26" wheels. Unfortunately, while I designing the board I didn't have access to any other wheel other than 26".
If you happen to try this POV in any other size, please tell me.

To install the POV you'll need:

- Pieces of foam or rubber;
- Zip-ties or any kind of string
- Magnets;
- Any other stuff you may find useful.

Make holes in the pieces of foam/rubber to pass the ties.
Secure it to the spokes, making sure the LEDs are perpendicular in the wheel.

Hall effect sensor

If you use a cable extension for the sensor as I did, you can place the sensor and the magnet in any place you seem fit.

Make sure that the magnet is in range of the sensor. It is important if you want to display an image.

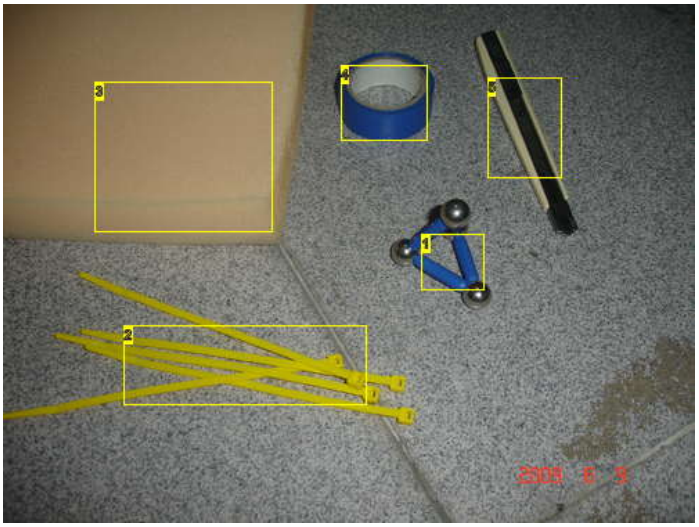


Image Notes
1. Magnets
2. Cable tie
3. Foam
4. Adhesive tape
5. X-Acto

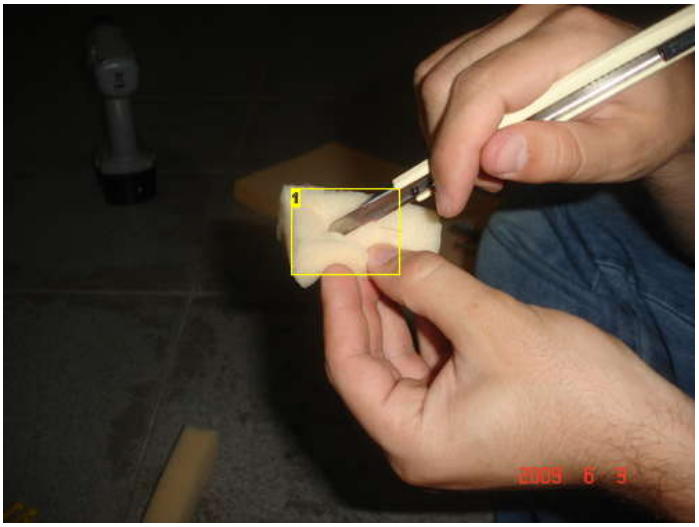
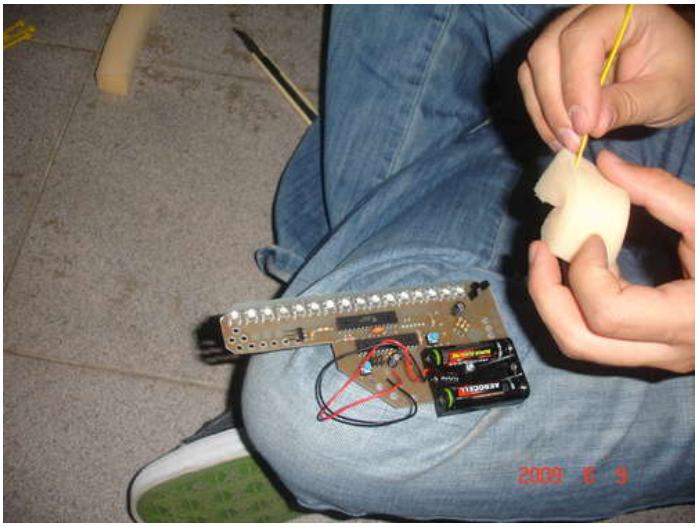
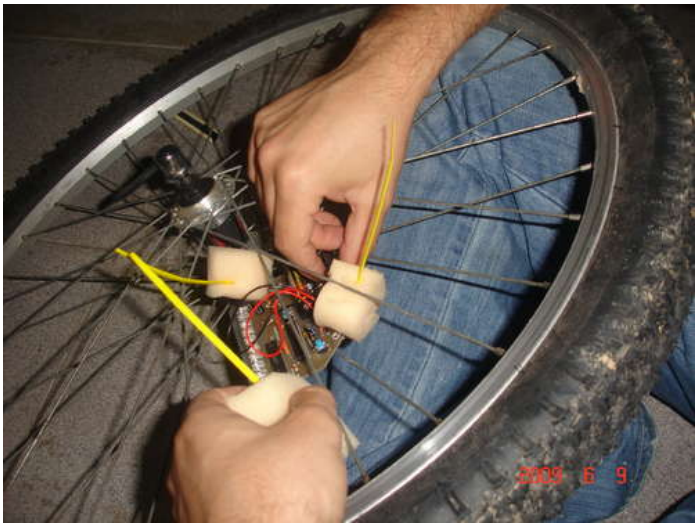


Image Notes
1. Cut holes for the zip ties





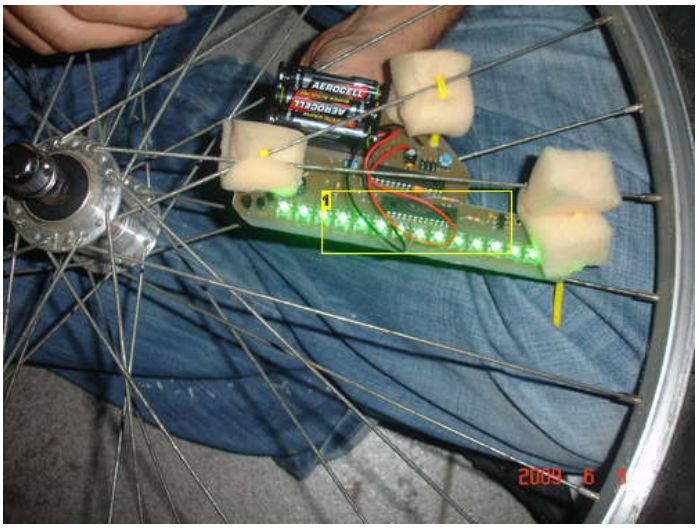


Image Notes
1. Quick test to see if everything is operational

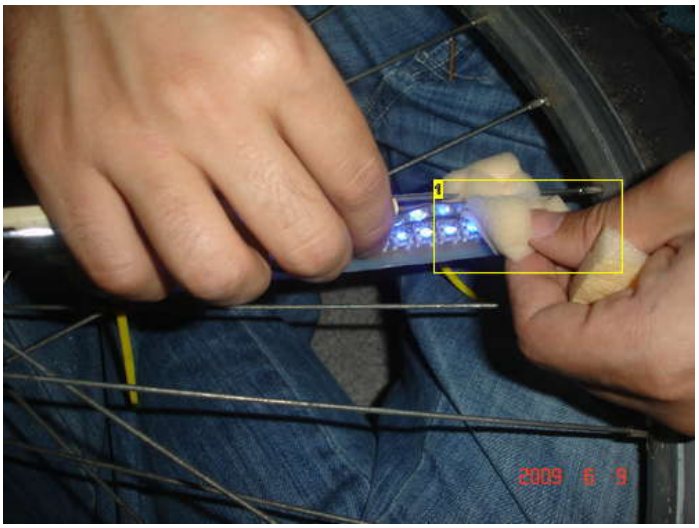


Image Notes
1. Cut the foam excess

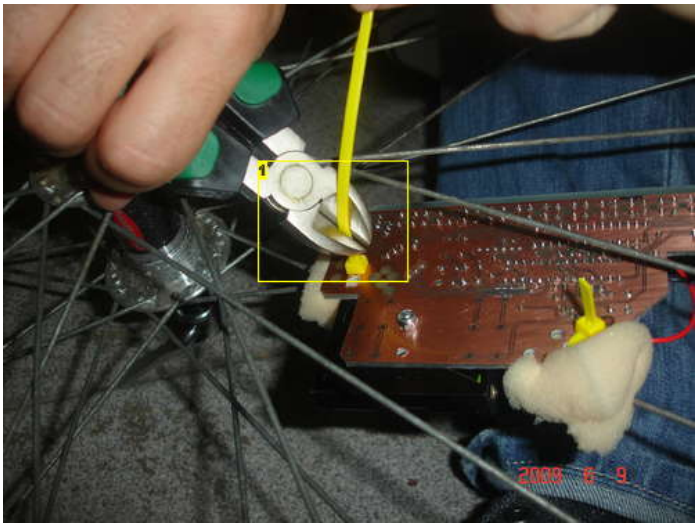


Image Notes
1. Cut the zip ties

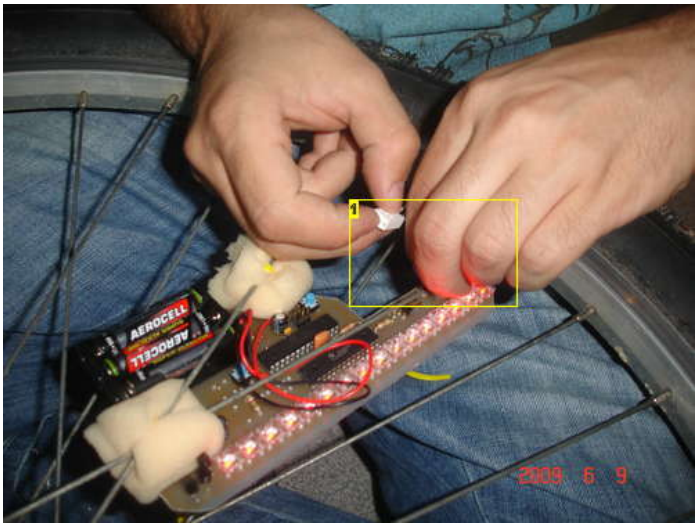


Image Notes
1. Connecting the cable for the sensor

Image Notes
1. Installing the magnet

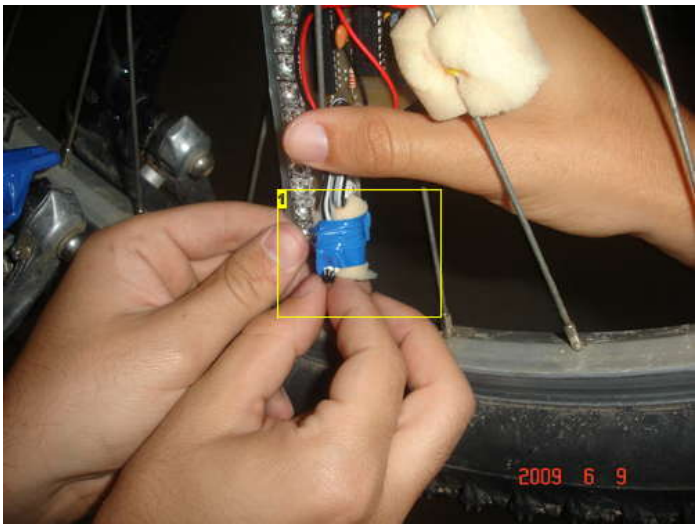


Image Notes
1. Installing the sensor

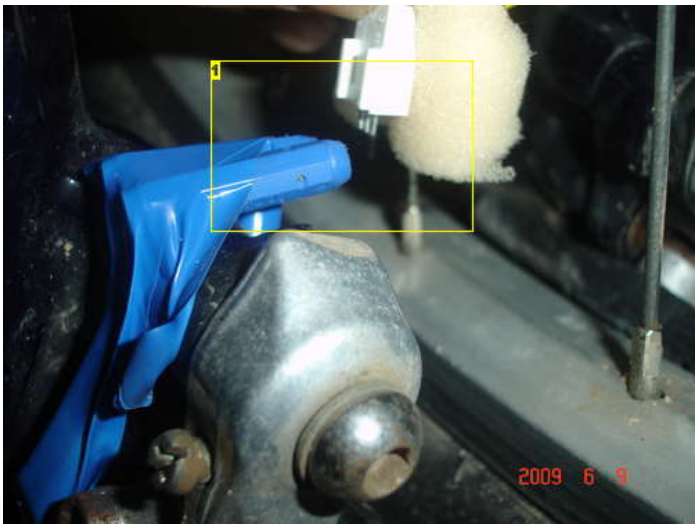


Image Notes
1. Make sure the magnet is in the sensor's range.

Step 8: A colourful wheel!

Yay!
I can now draw images in my wheels, small animations and cool effects.

In the future I hope to make some piece of software that transforms an image into the data matrix that I use in the firmware. Also further develop some kind of interface to the computer and add some kind of memory to store the images and animations.

Update : I now duplicated the LEDs, thus making it visible in both sides of the wheel! This only works when you can mirror the image, i.e. not suitable for text.

Remember, if you feel like to tweak, contribute or develop for this project, you can do it! As long as you distribute it in the same conditions.

Soon... Some videos and some more photos.

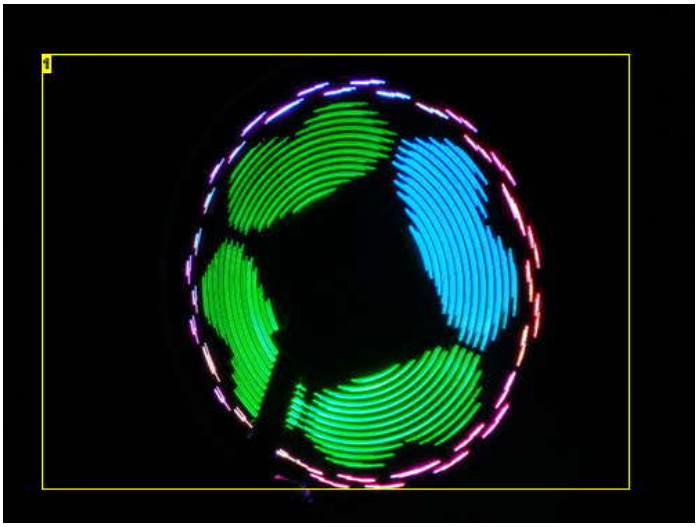


Image Notes
1. It was supposed to be a clover, but I didn't make the drawing right.

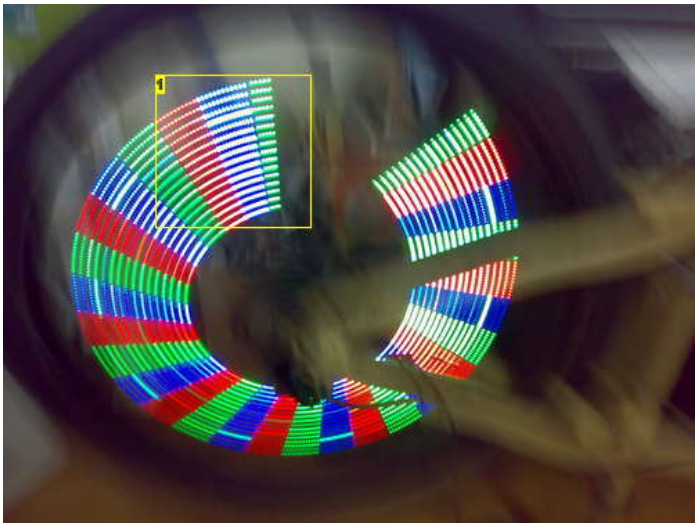
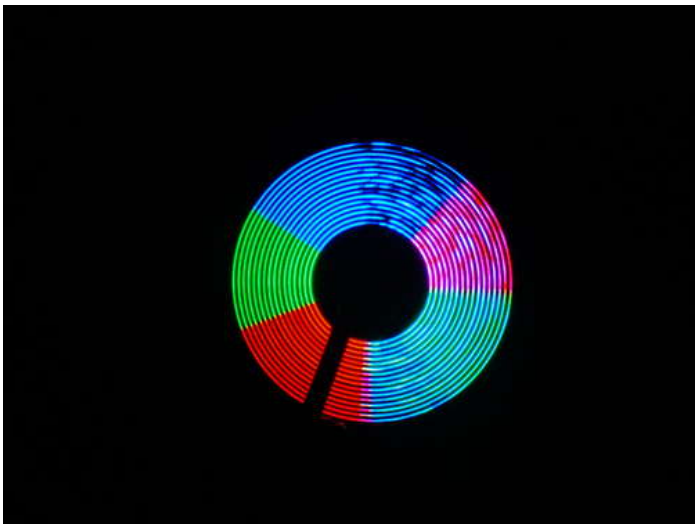


Image Notes
1. One of the first tests



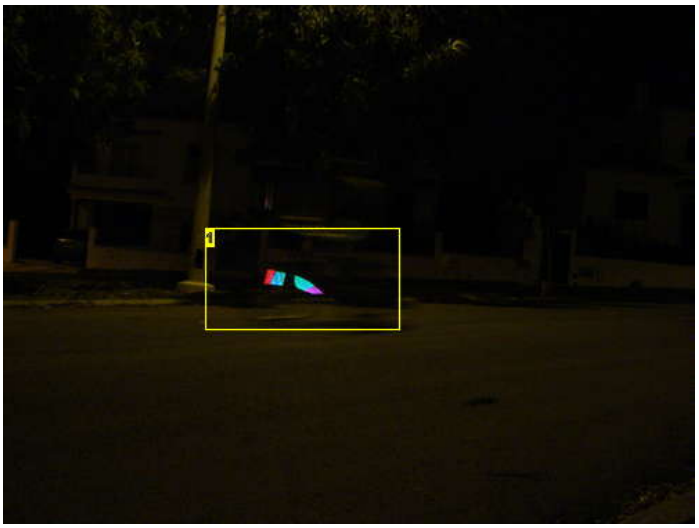
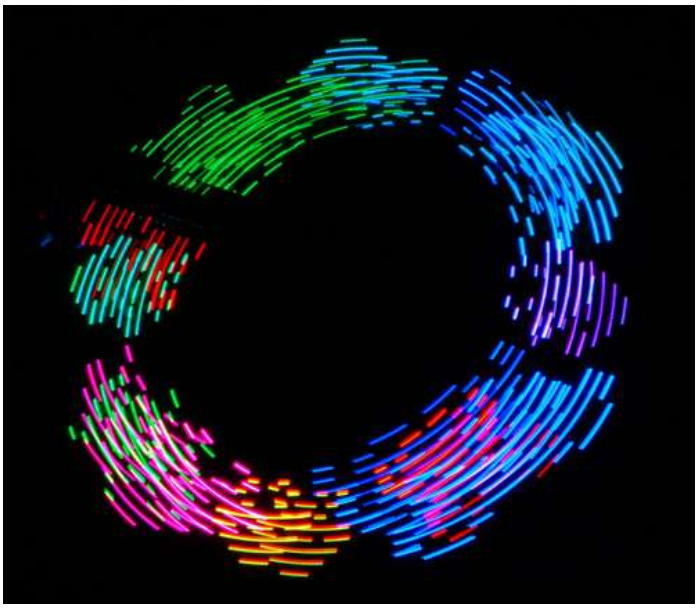


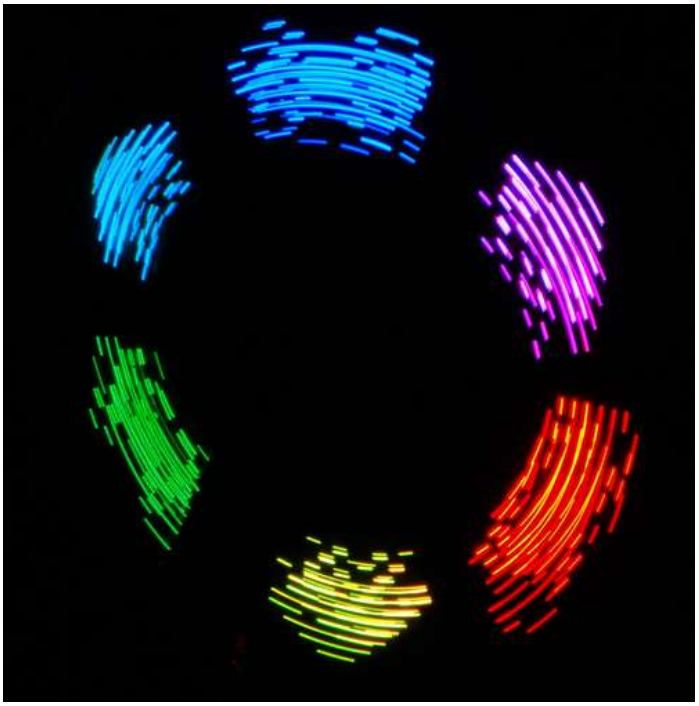
Image Notes
1. I couldn't photograph the effect while riding a bicycle

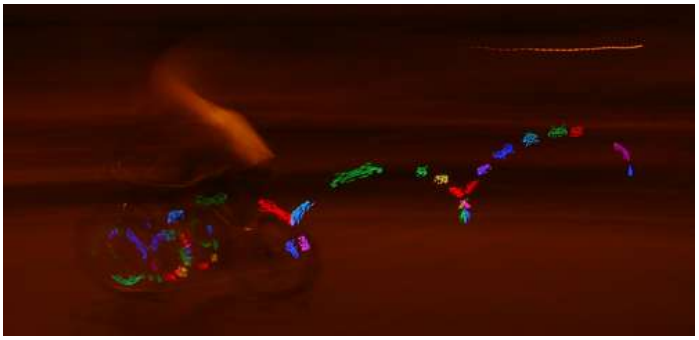
Image Notes
1. The very first prototype
2. HardDrive magnet

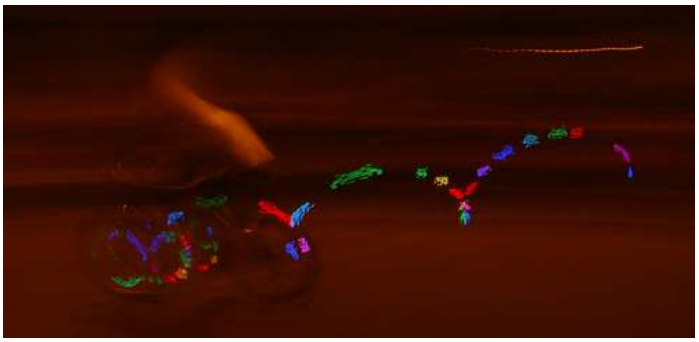
Step 9: Space invaders!

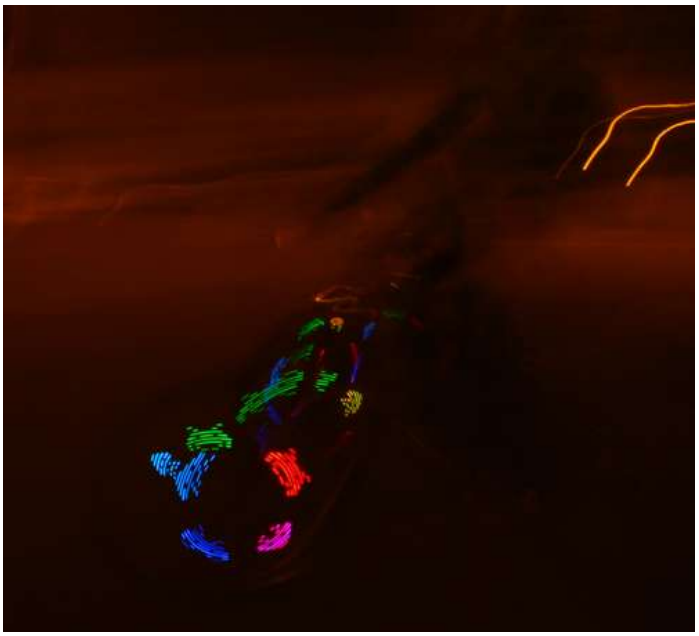
My latest animation! Some aliens walking in my wheel!

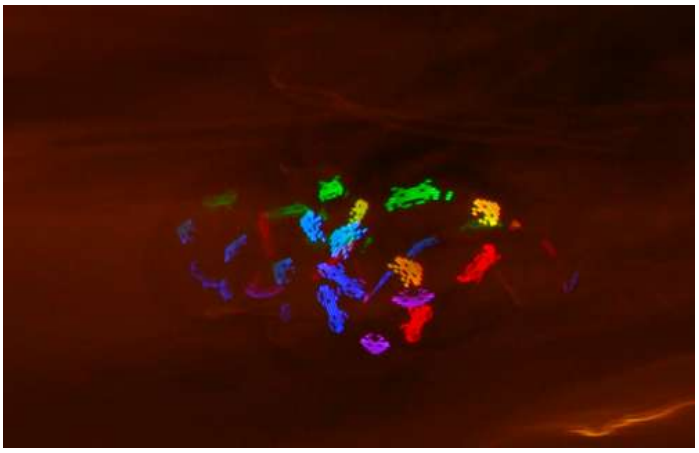


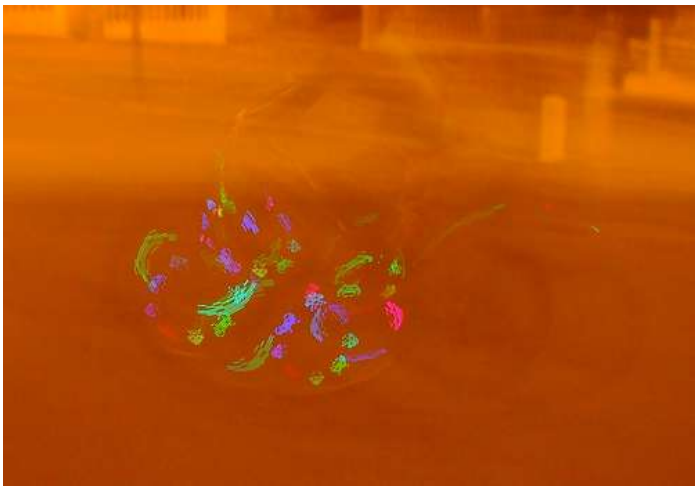


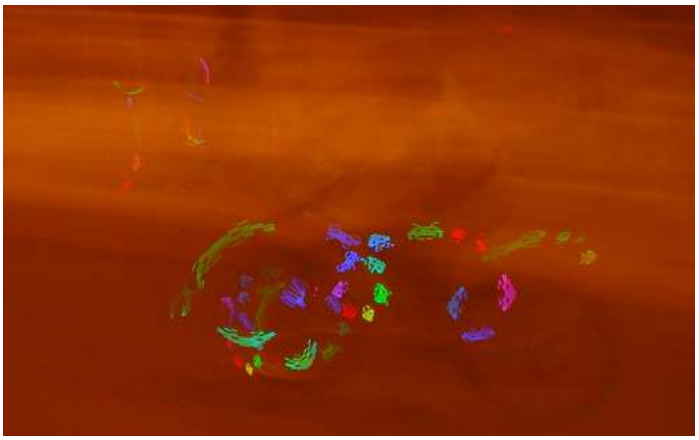












Related Instructables

Skyline RGB LED Lamp (video) by earthshine

The Dawm by ZrvZ

Build an Arduino-powered talking robot head! by xtremd

Quick, Temporary, and Cheap LED Diffuser by Coffeebot

Ghetto Spoke POV Lights by lordofthedonuts

How to make fist pumping with LED animation by MichelleMin

Comments

50 comments **Add Comment** **view all 122 comments**

shifty says: Mar 5, 2011. 12:19 PM **REPLY**

Heya I think this project is great. Would you mind uploading the eagle library that contains the TLC5094? I've tried searching around the web and can't find one. Or is there some way to extract the eagle part from the .brd and .sch files? Thank you!!!

-Noah

Hazard says: Mar 6, 2011. 12:36 PM **REPLY**

Hey! Thanks!
There is a way to extract from the files! weee
use the exp-project-lbr.ulp

02JanDal says: Feb 7, 2011. 6:17 AM **REPLY**

Two questions:

1. What are the values for R5-R7?
2. Can you use 2N2222 instead of PN2222?

JanD

Hazard says: Feb 8, 2011. 4:05 PM **REPLY**

1. Anything in the range 5k - 15k Ohms works fine.
2. You can, if the pinout is the same.

Sladex says: Dec 28, 2010. 7:32 AM **REPLY**

How to define R5-R7?

rkt88edmo says: Dec 20, 2010. 3:14 PM **REPLY**

Has anyone successfully built the 2-sided version yet? Going to start the project but if only the single side has been successfully assembled I'd rather go that route and try building a 2-sided version later.

bruce323 says: Sep 17, 2010. 7:30 PM **REPLY**

Hi Hazard & others -- When I wrote my long Aug 29 comment, I had formatted it to be much friendlier. But apparently the Instructables editor removes white-spaces etc, so now it looks like a jumbled mess. Let me know if you would like me to write it out more clearly in some way. I'm looking forward to hearing from you about any one or more of the topics I raised. -- Bruce P.

Hazard says: Sep 18, 2010. 9:47 AM **REPLY**

Sorry, I've been busy..
Yes, try to edit it in the rich editor, and see if it does work better

bruce323 says: Sep 21, 2010. 11:09 PM **REPLY**

Hello Hazard,

I agree with the others, good project! It's clear that your experience extends well beyond this work, so whatever time you can spare here, I'm hoping to get your valuable input. If it's easier, bruce323g@gmail.com, USA 541-231-1101.

My niece and her boyfriend are doing this to learn some electronics, and I'm helping. This isn't 100% up-to-date but close: http://home.comcast.net/~bruce323/spokes/ . To keep costs low and to get low-level experience, they actually hand-wired onto a 100mil plated proto board that I had available. Lots of work, may turn out to have been a mistake, maybe next time we'll learn to do some etching at home, but anyway they're near hardware completion.

I'm sorry this is so long but I have the following ....(drum roll) ...

"TOP TEN LIST OF QUESTIONS ABOUT RGBIKE":

#10. Can we eliminate the JP3 RXD/TXD connector. Or if you used it productively, how; and is there any issue with it loading RST# at the wrong time and causing debugwire to fail.

#9. Briefly, what's the purpose for switches U$17 and U$24.

#8. For T1-3 we went with P-channel FETs, so we'll modify the code to invert drive polarity. But do you know, when the 328P comes out of reset, are its IO's (hopefully) still tri-state, or are they driven (I hope not low) until programmed otherwise.

#7. We're using 32 LEDs and two cascaded TLC drivers but we haven't analyzed processor bandwidth .... do you know whether your 16 LED design has much bandwidth to spare, or are we almost certainly hosed? We're running ATMega328 also at 20MHz.

#6. For U$18 we went with a crystal, and the external caps as shown on the schematic, but I'm nervous about mechanical, and from the .brd file it looks like you went with a resonator. Is the resonator tolerance adequate and are you inclined to think we should change to the resonator?

#5. When we bought the TLC parts, 5940's weren't available so we're using 5941's. Two differences I remember about 5941's: a) lower current drive, we'll deal with it; b) they don't have EEPROM for dot correction. Did you use the 5940 EEPROM for dot correction and would you expect we MIGHT see problems if we don't? Or maybe we'll make it happen with the 328P's EEPROM somehow.

#4. Do you have experience w/ how low a supply voltage your design can typically handle? (We're using 4 series NiMH's and we have more current load with our 32 LEDs).

#3. Your 16 LEDs are on 350 mil centers; our 32 LEDs (co-linear, same side of the board) are on 300 mil centers to fit the 100 mil proto board. How did you decide on the image's "aspect ratio", so to speak -- (1) distance between the LEDs, vs (2) rotational angle for updating the array. This may not be a clear question but if you have comments (are we hosed?), pls let us know.

#2. If we decided to go with your design as it is, would you ever consider supplying bare boards to folks like us for $$?

AND ..... (drum roll....) ..... the **#1** question on the TOP TEN LIST ..... Yow, should we be paying you a consulting fee for all this?

Thanks for some or all answers!!!!

Hazard says: Sep 24, 2010. 6:17 AM **REPLY**

Hi! Sorry for the late reply. Here it goes

10 - Supposedly JP3 is pin compatible with FTDI usb-rs232 cable for using with the Arduino and bootloader. Never tried it myself.
I have never used debugwire. Check the datasheet for more information and typical schematic for using debugwire.

9 - Future expansions, like alternating between patterns and such.

8 - Detailed information can be found in the datasheet. Can't remember for sure from the top of my head.

7 - From my calculations when I did this project, I think we can connect 2 TLCs. But not much more :D

6 - I don't know if the crystal can be damaged. Other than that, you can use whatever :) Drift in frequency doesn't really matter in this application

5 - I did not use dot correction.

4 - How low? Depends on the TLC, the LEDs, and the voltage for the micro's running frequency. See the datasheets for the TLC and 328.
I bet it must be over 4V for the 328 to run at 20Mhz. (sometimes it can work with lower voltage than what they say)

3 - I am trying to understand the question..
I took no considerations on that matter :P But I think it worked just fine :D

2 - Sorry, but no. This project is a good exercise and works fine for a toy/hobby. But is not reliable for a final product.

1 - Yes please. Come buy me a beer or two, whenever you come to Portugal

bruce323 says: Oct 4, 2010. 2:09 AM **REPLY**

Thanks very much!

About answer#2: I understand. We're sure not thinking of a product, we're just making one for our own use. I was only talking about 2 or 3 bare boards, so then we could make that many, but nothing like a product.

About answer#1: None of us in my family have ever been to Portugal, but it just so happens that my wife and son are going to Lisbon in a few weeks. If you wanted, you could send me your contact info in a Private Message, & they might treat you!

Hazard says: Oct 4, 2010. 5:35 AM **REPLY**
He he, thanks for the invitation :D But maybe another time

niwrad says: Sep 30, 2010. 11:19 AM **REPLY**
I'm freaking out! This is awesome!

herpelcano says: Sep 23, 2010. 2:34 PM **REPLY**
I'm having some problems with your eagle files. It seems that several components arntt connected to ground and your board pictured board looks a little different. Can you check your files please. Thanks.

herpelcano says: Sep 23, 2010. 11:53 PM **REPLY**
I think I figured it out. did you use the rats nest button to make the rest of the board a ground plane. sorry im new to eagle and pcb's.

cryptoni says: Aug 4, 2009. 7:53 PM **REPLY**
what kind of connector is that for plugging the hall connector

Hazard says: Aug 5, 2009. 3:58 PM **REPLY**
I don't know what it is called. Just go to your favorite electronics store and provide some kind of description or show the photo.

herpelcano says: Sep 23, 2010. 10:21 PM **REPLY**
90degree male header.

ildefonso says: Sep 10, 2010. 10:51 AM **REPLY**
Blue thingy transfer (don't remember the name) : Press-n-peel? it is basically the same as the toner transfer....

bruce323 says: Aug 29, 2010. 2:25 PM **REPLY**
Hello Hazard, I agree with the others, good project! It's clear that your experience extends well beyond this work, so whatever time you can spare here, I'm hoping to get your valuable input. If it's easier, bruce323g@gmail.com, USA 541-231-1101. My niece and her boyfriend are doing this to learn some electronics, and I'm helping. This isn't 100% up-to-date but close: http://home.comcast.net/~bruce323/spokes/. To keep costs low and to get low-level experience, they actually hand-wired onto a 100mil plated proto board that I had available. Lots of work, may turn out to have been a mistake, maybe next time we'll learn to do some etching at home, but anyway they're near hardware completion. I'm sorry this is so long but I have the following ....(drum roll) ... "TOP TEN LIST OF QUESTIONS ABOUT RGBIKE": #10. Can we eliminate the JP3 RXD/TXD connector. Or if you used it productively, how; and is there any issue with it loading RST# at the wrong time and causing debugwire to fail. #9. Briefly, what's the purpose for switches U$17 and U$24. #8. For T1-3 we went with P-channel FETs, so we'll modify the code to invert drive polarity. But do you know, when the 328P comes out of reset, are its IO's (hopefully) still tri-state, or are they driven (I hope not low) until programmed otherwise. #7. We're using 32 LEDs and two cascaded TLC drivers but we haven't analyzed processor bandwidth .... do you know whether your 16 LED design has much bandwidth to spare, or are we almost certainly hosed? We're running ATMega328 also at 20MHz. #6. For U$18 we went with a crystal, and the external caps as shown on the schematic, but I'm nervous about mechanical, and from the .brd file it looks like you went with a resonator. Is the resonator tolerance adequate and are you inclined to think we should change to the resonator? #5. When we bought the TLC parts, 5940's weren't available so we're using 5941's. Two differences I remember about 5941's: a) lower current drive, we'll deal with it; b) they don't have EEPROM for dot correction. Did you use the 5940 EEPROM for dot correction and would you expect we MIGHT see problems if we don't? Or maybe we'll make it happen with the 328P's EEPROM somehow. #4. Do you have experience w/ how low a supply voltage your design can typically handle? (We're using 4 series NiMH's and we have more current load with our 32 LEDs). #3. Your 16 LEDs are on 350 mil centers; our 32 LEDs

(co-linear, same side of the board) are on 300 mil centers to fit the 100 mil proto board. How did you decide on the image's "aspect ratio", so to speak -- (1) distance between the LEDs, vs (2) rotational angle for updating the array. This may not be a clear question but if you have comments (are we hosed?), pls let us know. #2. If we decided to go with your design as it is, would you ever consider supplying bare boards to folks like us for $$? AND ..... (drum roll....) ..... the #1 question on the TOP TEN LIST ..... Yow, should we be paying you a consulting fee for all this? Thanks for some or all answers!!!!

Pierred35 says: Aug 20, 2010. 6:50 AM **REPLY**

Hello Hazard, Good job! I working on a similar project since few weeks. Did you know the Anvii project (http://www.anvii.com/)? I'm sure we can inspirate us of their software and improve it adding some functions like colour, automatic text, ... My circuit board is more or less complet, I will begun the programation of my microcontroler in few days. I use a Microchip PIC 16F628A for the moment but I want to use later a PIC 18F2550 to be able use the USB interface and more. Good luck for the rest. I will put my projet on Internet as soon as possible, why not in my first instructable?

koko44 says: Jul 15, 2010. 11:58 AM **REPLY**

If we assemble microcontroller to the pcb, how can we program the firmware?

Hazard says: Jul 19, 2010. 3:32 PM **REPLY**

The board has a ISP connector

epsilon-minus says: Jun 28, 2010. 7:07 AM **REPLY**

I can't seem to find the values for R5, R6 & R7. Are they 2.2k like the one you use to set the IREF on the TLC5940? I can't quite make out the colours of their banks on the photos. Nice Project BTW, I'm making one atm. Cheers, Dan

epsilon-minus says: Jul 7, 2010. 5:55 AM **REPLY**

I guessed 2.2k was ok for these resistors as they are just there for safety. Sadly nothing is working though still. The Atmega programs ok using your default files but no LEDS are lighting. I have checked all the soldering at it all looks good, no shorts or dry joints. Do you think the problem could be because I have made the double sided version with 16 LEDS down both sides? Do I need to change the code for this version of the hardware. I tried changing the 2.2k resistor to a 1k resistor to give more current to the extra LED's but this has made no difference. Any help or tips would be appreciated as I am starting to run out of ideas. Cheers, Dan

Hazard says: Jul 8, 2010. 10:06 AM **REPLY**

Actually I never built the double side version, so I hope haven't made a mistake when I routed the new LEDs. But I think it should work fine. Anyway, what steps have you taken to troubleshoot it? Have you check all the traces for continuity or shorts? Did you solder the jumper wires? Are the LEDs correctly placed? Anothes and Cathode to the right places? First you should check if the microcontroler is running. Does it send the correct signals to the TLC? If it seems that nothing is working, try to assemble the circuit in a breadboard, with a couple of LEDs. The circuit is small enough, its easy to follow. Good luck :D

epsilon-minus says: Jul 9, 2010. 3:35 AM **REPLY**

Thanks for the info and thanks for getting back to me. I don't think the LEDs are routed incorrectly. I thought it might be to do with them not getting enough current but I changed the 2.2k iref resistor to give more current and this didn't fix it. I have check all solder and connections and soldered the jumpers but still without success. I did notice that when I accidently shorted the GSCLCK pin on the TLC that the LED's illuminated and cycled through some colours. So I thought it might be a timing issue. The Atmega is programming correctly via ISP but maybe it's something so do with the timing fuses. Could you confirm the correct settings for the168/328 with this 20mhz resonator. Thanks again for your help. This is a really nice projectand I'd love to get it working. Cheers, Dan

Hazard says: Jul 19, 2010. 3:31 PM **REPLY**

Ok, here are the fuses for the 328p: Extended: 0xFF High: 0xD3 Low: 0xBF Check it out here: http://www.engbedded.com/fusecalc Can you calculate for the 168?

Hazard says: Jul 9, 2010. 5:45 AM **REPLY**

When I get home I'll check the fuses for you.

Did you etch your own board? If so, did you check the continuity in all traces? And shorts with other traces/ground plane?
Do you understand how the micro comunicates with the TLC?
Are you using the 168 or 328?

epsilon-minus says: Jul 9, 2010. 6:24 AM **REPLY**

I got the PCB printed by a local company and I checked the continuity. I looked through the code and thecommunication with the TLC file seems to make sense. I was using a 328 but I just *cough* bricked it while experimenting with difference fuse settings. I should be able to reset it using voltage ISP but that means swapping it out so for now I'm using a 168. So setting would be great for both if you have them. Thanks again. Dan

glompos21 says: Jun 23, 2009. 10:59 AM **REPLY**

Can you tell us the algorithm that you are using to transform the image into bytes?

Hazard says: Jun 24, 2009. 4:46 AM **REPLY**

Sure! But in the next few days I'll be very busy. I'll get to it when I get the time. But I can tell you that each line from the matrix, is one radial line of the wheel. And since it is 12bits for 16 LEDs, and the microcontroller is 8 bits, I used a line of 24bytes in length. This results in the information of each dot, being overlapped. Like: (8) (4,4) (8) (8) (4,4) (8) this stores information for 4 dots, with the low and high n*bble overlapped, alternating.

schroedc says: Jun 23, 2010. 3:31 PM **REPLY**

I'm still struggling to correlate the image to the data bytes as well. Can you elaborate w/an example?

dj3365 says: Jun 17, 2010. 10:41 PM **REPLY**

Hello: What kind of download cable? ISP is it? How do I download the MCU in it? Please explain more specifically?

wchill says: Jun 7, 2010. 12:57 AM **REPLY**

This RGB LED POV design is awesome. However, I don't have a bike, so I want to turn it into a POV wand. How would one go about converting a spoke POV to a wand POV? I don't know enough about these to know what to do...

paplaukias says: Jun 3, 2010. 1:12 PM **REPLY**

Hi,
could you please tell me where the POV dongle should be connected to program the microcontroller.
thanks

MRedmon says: Apr 19, 2010. 6:38 PM **REPLY**

Did you ever develop the software to convert the images?

Hazard says: Apr 20, 2010. 5:37 AM **REPLY**

Sorry, I haven't...

naruto the ninja13 says: Apr 11, 2010. 10:28 AM **REPLY**

how fast do you need to go for the image to show properly?

darthneo says: Mar 25, 2010. 10:16 AM **REPLY**

I'm excited... i finally got my sample led chips :D... i forgot all about them i ordered a few months ago and just recieved them :D

zeroemission says: Mar 30, 2010. 8:41 AM **REPLY**

it's too bad advanced electronics are beyond my comprehension as i'd like to make a cheap multi-spoke monochrome set of wheel lights. to do it properly with off the shelf gear costs HUNDREDS of dollars when you could probably do it for $50 or less DIY style.

maybe someone should make a kit with assembly instructions for those of us who don't know electronic theory

darthneo says: Mar 30, 2010. 1:55 PM **REPLY**

There are tons of resources, if you want to start learning microcontrollers is it a bit expensive, a programmer is about 25$ then you need to buy the microcontroller and all the other parts you need for a project.

If you want to just jump in and start messing around with microcontroller and electronics I would suggest getting a few things first:
Multimeter (about 10$)
Wirestripper (less then 10$)
Solderless breadboard (10-30$ depending on size, its a lot easier if you jumpers with it but its to make them from solid speaker wire)
Programmer (to program microcontrollers, i'd suggest the USBTinyISP, its a kit so you need to solder it together, its 22$+S&H @ http://www.ladyada.net/make/usbtinyisp/)
A solder iron if you don't already have one, i wouldn't suggest a cheap 10$ but it'll work for most things, its better to get a temperature controlled one (from 10$ to over 100$)
Solder (I always run out when I need it, cost can be a couple of dollars up to 25$ depending on how much and quality)
And some solid 22-28 guage wire for the breadboard (i bought a 3 pack from radio shack for about 8$ has 33 feet of red, green, and black wire)

If you want a DIY bikespoke led kit i would suggest getting the one from ladyada, theres really only two downsides to her kit, it is a bit pricey (imo), and its only 1 color (red, yellow **OR** blue) 37.50$ for red or yellow, and 45$ for Blue. It comes with everything you need (don't think it comes with solder, just the parts the PCB, and its already pre-programmed), she has some nice instructions on the website and a nifty program for creating images

zeroemission says: Apr 1, 2010. 8:35 PM **REPLY**

oh no! i do NOT want to learn microcontrollers & circuit theory! it's all chinese voodoo to me! LOL i hate computers too. if i can't visualize and objects "gears & levers", my brain hates it like poison. that's what i was talking about.

about the most complicated things i could do from schematics are wiring LEDs with the proper resistor for a given voltage or design a simple 1st order loudspeaker crossover with 1 capacitor & 1 inductor coil. that's about as technical as i care to get when it comes to electronics.

if controllers cost that much, i can kind of see why hokeyspokes etc. are so expensive then, but really, i'd be happy with a simple blue

monochrome checkerboard pattern.

i've also thought about incorporating cheap $7 x 30 color changing battery powered light strings or just monochromes into a variation on scraper wheels. for cheap "wheel bling"

i would have thought there's some sort of simple "2 channel" timer/controller that could stagger timing to produce checkerboards without programming. there'd need to be some sort of motion detector though to keep the images stable i guess.

glgi says: Mar 18, 2010. 7:08 PM **REPLY**

Hmmm, if I were up to this I would put live video on each wheel. The cyclist's eyes maybe from headcam? Perhaps eyes on the back wheel with mouth on the front and PA for voice?... OR, Other images from live.webcams? Haven't seen this yet, kids but, someone must do this soon, if you aren't working on it already. Burning Man yearns...

P.S. maybe even just video from front and from back or from cyclist POV on the wheels.

josephluiz says: Mar 16, 2010. 8:00 AM **REPLY**

very cool

karnold70 says: Mar 9, 2010. 9:20 AM **REPLY**

As strange as it may sound, I agree with both of you. I'm looking forward to using SMT parts, but I'm not quite there yet. I invested in a very nice station, complete with vaccum pump 'desolder' pencil and Hot Air Pencil. But getting the hang of uing the parts... just a bit daunting. Through Hole are definatly simpler and more forgiving.

siddhanth says: Mar 3, 2010. 11:21 AM **REPLY**

dude according to what i understand the hall effect sensor makes the circuit function independently/adjusts the POV according to RPM of the cycle tires right...? you have used a simple multispoked bicycle wheel. what about a MOTORBIKE wheel? can the same be achieved on 15" or 17" wheels?

Hazard says: Mar 4, 2010. 5:19 AM **REPLY**

Yes, it adjusts to the RPM of the wheel. But I wouldn't try it on a motorbike. Too dangerous at high velocities.

siddhanth says: Mar 4, 2010. 6:09 AM **REPLY**

One can actually use it on motorbike IF it adjusts to RPM of wheel ;-) one must use a superglue to fix the stuff on the tyre along with electronic components else the stuff will come out in random direction due to torque acting on it...

siddhanth says: Mar 3, 2010. 11:33 AM **REPLY**

one more thing can the rgb lights be replaced by lights of some other kind? i mean the rgb itself but not of this specific brand or shape.. or maybe more luminance?

view all 122 comments