NITK Surathkal

THINK. CREATE. ENGINEER 2016

BATRACE

A PROJECT REPORT

Submitted by

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ABSTRACT:

The bat race is a racing game played by two players. It consists of a led board consisting of two tracks made up of 56 pairs of red and blue LEDs strung together in the shape of a bat. The players are supposed to trigger the circuits to increment their led on the board and complete the track. The first player to complete the track wins and it is indicated by the entire track lightning in the colour of the winner. The circuit resets automatically after 5 seconds.

The triggering mechanism is flexible and for the most part replaceable so that any damage to the triggers does not affect the LED driver board. In 2015 stamping pads were made where the user was supposed to stamp on them in order to increment their led pointers on the board. In 2016 however the project received an upgrade where in cycles were used for as triggers. The user had to cycle stationed cycles in order to increment their led pointers.

At the brain of the project sits a msp430g2231 driving an two arrays of seven TLC5916 constant current led driver 8 bit registers driving 112 LEDs for red player and 112 LEDs for blue player. The seven ICs are cascaded with data out of one IC connected to data in of the next ICs.

The triggering mechanism gives interrupts to the MSP which the MSP interprets and drives the cascaded shift registers. When the circuit is initialized ones are shifted into the tracks of both the participants at the start of the track. The micro controller counts 4 interrupts and clocks in a zero to the shift registers. By doing so the initialized ones are shifted by one position and it appears that the player advanced a position on the track.

The entire circuit was powered by a 12V 2 Amp wall adapter. 7805 voltage regulators were used in parallel to power the TLC5916 ICs and 3.3v regulators were used to power the MSP. The LEDs were connected to the driving board using ribbon cables and female header connectors.

In 2016 IR sensors were made and mounted beneath the bi cycles' pedals in order to detect a complete revolution and trigger the interrupt. The IR sensors were made of lm358 and other discrete components. The pedals were wrapped with E.G. sheets to make them reflect IR effectively. Special stands were made for the cycles to keep them stable.

BLOCK DIAGRAM:

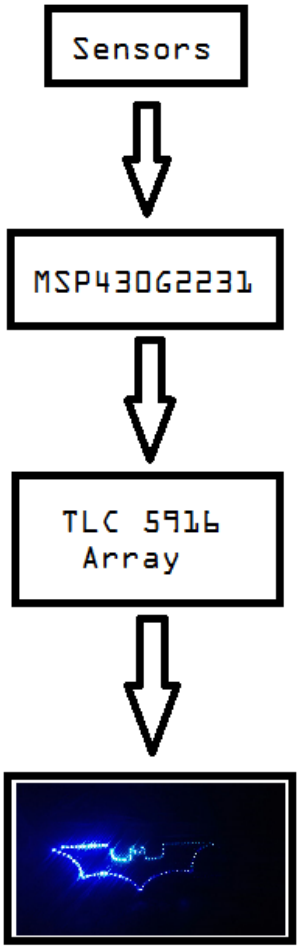
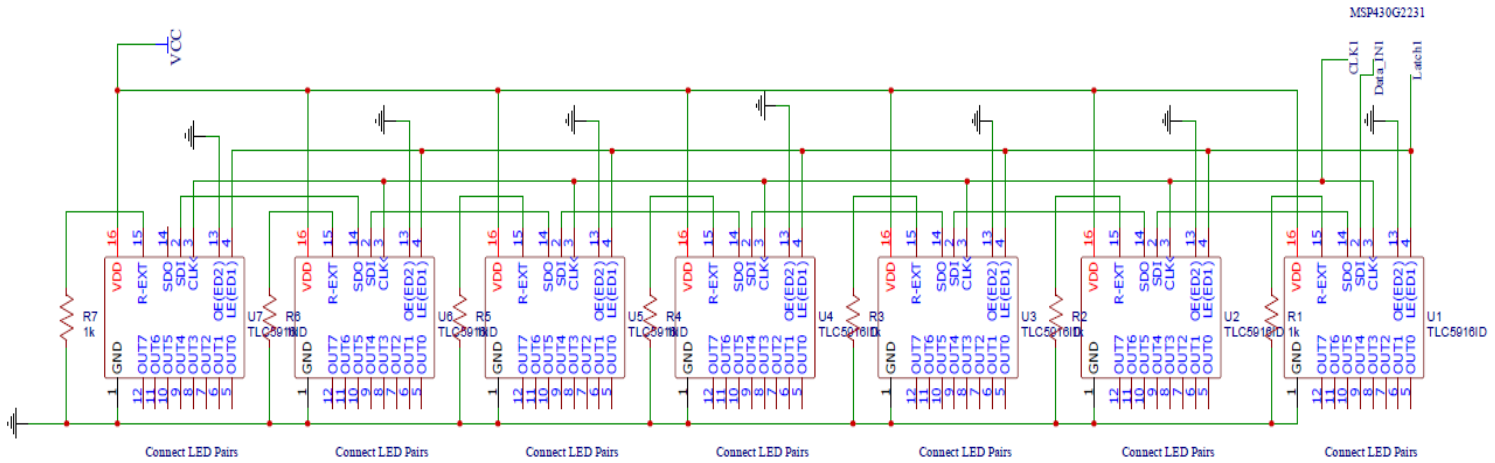


Fig. Block Diagram of Bat Race

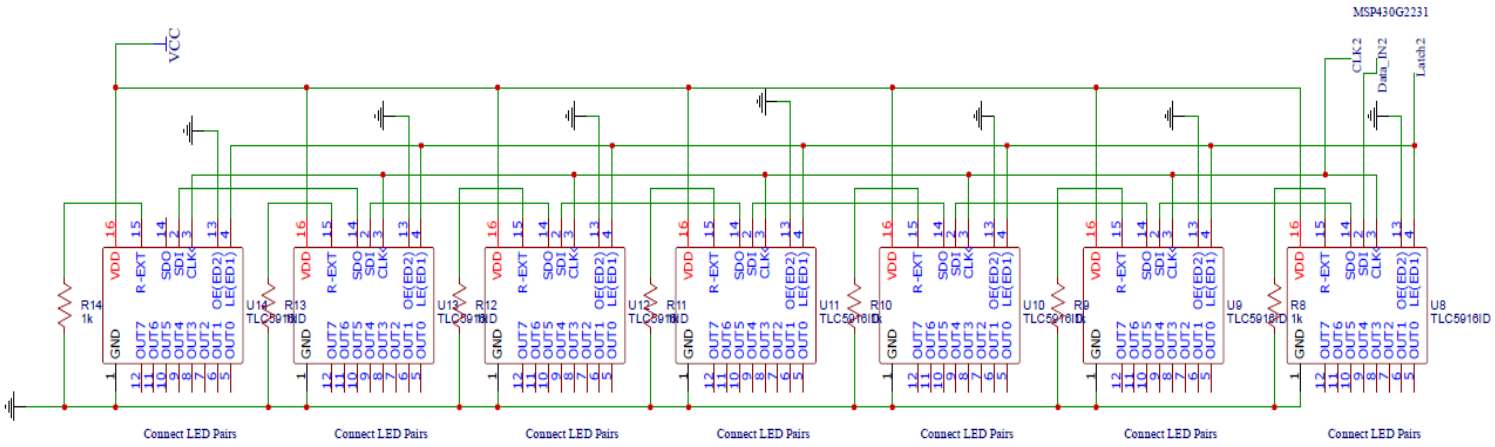
Components Required :

1. 12V 2 Amps Adapter X 1
2. TLC5916 X 14
3. MSP430g2231 X 1
4. TI Launch Pad X 1
5. Perf/Vero board X 1
6. Blue and Red LEDs 112 each.
7. Plywood.
8. Ribbon cables, zip ties, glue gun.
9. Solder gun, solder wire.

HARDWARE SETUP



RED Player's Driver Circuit



Blue Player's Driver Circuit

Problems Faced:

Debugging the board consumed a lot of time. Significant time and effort was required to solder new LEDs, pair them and solder the wire. The LEDs were very fragile as well because every now and then the legs of the LEDs broke off. The cycle stands were not as stable as expected because of which the sensors couldn't work properly. The E.G. sheets came off because some players were very enthusiastic.

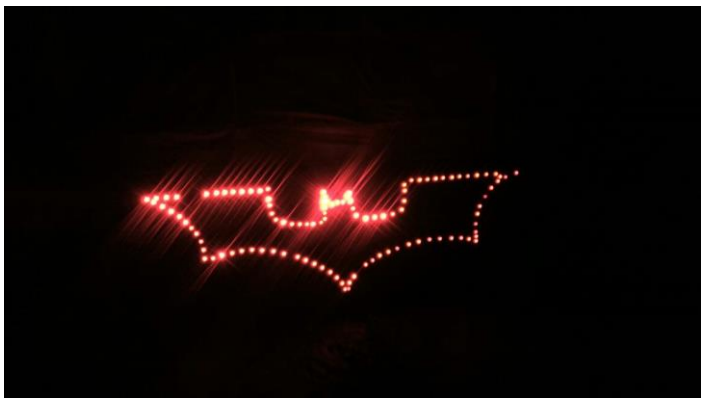
FUTURE WORK:

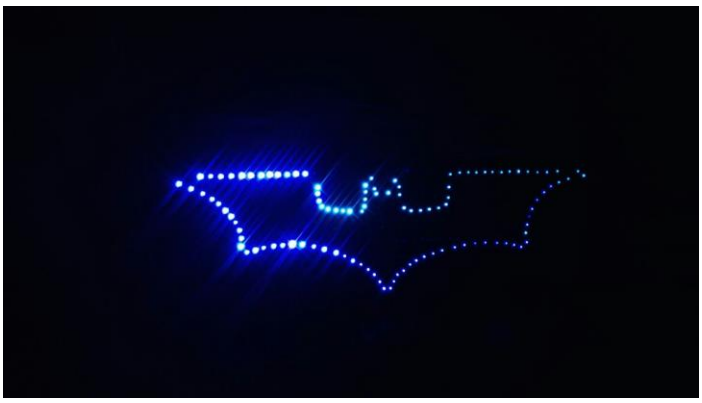
Sensors could be positioned properly and mounted on the bicycle itself for proper detection. The cycles were not very stable and moved when the players pedalled at high RPM. The players reached the top speed of pedalling very quickly and saturated eventually so other triggering mechanism should be worked on. The regulators heated very much as the 7805 linear voltage regulators are very inefficient at higher currents and dissipate a lot of power.

CONCLUSION:

The project is very stable and successful and with proper mechanical structures and stable triggering mechanism. It is a really fun activity that many visitors enjoy. The flexibility of triggering mechanism makes it very versatile and so one can get highly creative with it.

Pictures of the event:





Thank you.