My project – a Clock / Night lamp

It is a clock / night lamp that is controlled by an LDR.

It is a matrix of neo pixels connected to the 5v adapter and Arduino.

The principal of work is that when LDR senses that the amount of light in the room drops beneath a certain threshold the Night lamp will be switched on, similarly when the LDR senses that the amount of light is above the threshold it will switch the clock on.

Components of the project: A 11 * 9 matrix of Individually Addressable LEDS , Arduino, Jump wires, LDR, 10K resistor, Switch, 5V Power Adapter and a barrel jack adapter, wood or plastic for the base.

Artem D.

Idea formation

After the lecture with LEDS I decided that I want to do something with them, as it would be interesting because I like the art that uses lights and LEDS, as well as useful for me personally.

After gathering the information about individually controlled LEDS , looking at other projects and watching YouTube videos, I came up with a few ideas:

- LED night lamp activated by clapping / light. That also shows time.
- LED spinning holographic effect lamp that can display text.
- Nixie IN-12 Indicators lamp.

After further research I had to turn down the spinning holographic effect lamp as it would be too hard to implement. And the problem with the Nixie IN-12 indicators lamp was that the IN-12 indicators are not produced anymore therefore it is hard to get a hold of them.

Iterative design

1) Get the components:

The Individually Addressable Led strip was bought from amazon:
https://www.amazon.co.uk/gp/product/B078S6Z9KG/ref=ox_sc_act_title_1?smid=A2CRFKF5XF9GCG&psc=1

The Arduino, Jump wires , LDR, 10K resistor, switch, 5V Power Adapter and a barrel jack adaptor were borrowed from the university.

Lastly, I found and bought some wood material from B&Q.

2) Making the body and the housing for the LEDS. I calculated the dimensions of the body and drew out the spacing for the LEDS. Then I cut everything from the wood material and assembled it. Finally, I cut the led strips according to the width of the plane, connected them with jump wires ,soldered and stuck them to the plane.

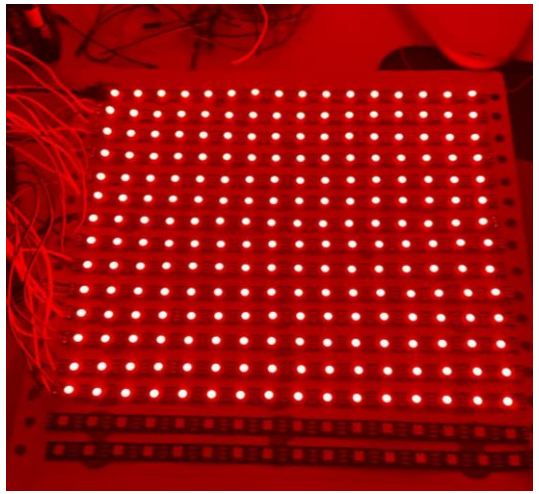
3) Connecting everything to the Arduino and adding a switch, the led pins were connected to the digital pins on the Arduino and the LDR was connected to the analogue pin with the resister. In addition, I connected the voltage from the 5v adaptor to Arduino through Vin, to power the Arduino without a computer.

4) Write a program that gets the data from LDR checks if it exceeds a certain threshold, and according to whether it does or not switches the clock or the night lamp on. And program the clock and the night lamp accordingly.

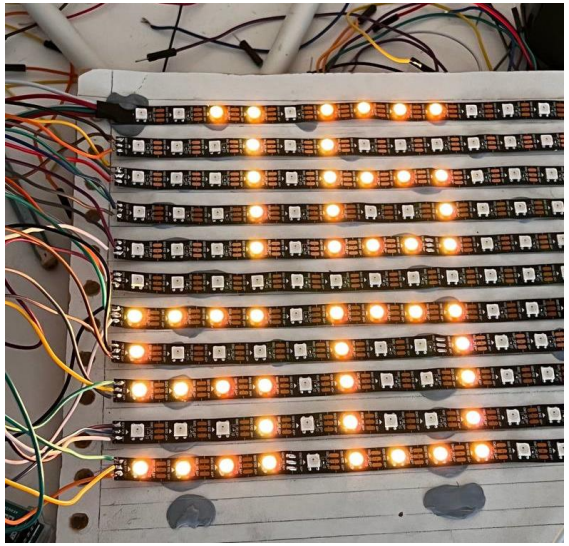
Development process

- Making the body: Cutting out the plane and the LEDS, then sticking them in the correct order.

- Checking that it works: Connecting the 5V , ground and data to the LEDS in check that they work.

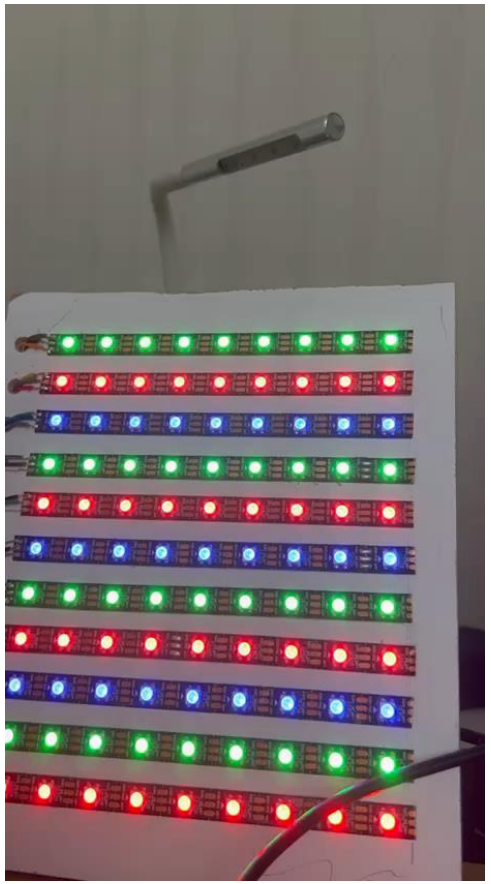


- Programming the clock and the ambient mode: Getting the data from the time library and outputting the correct numbers to the LEDS.



- Connecting the LDR:

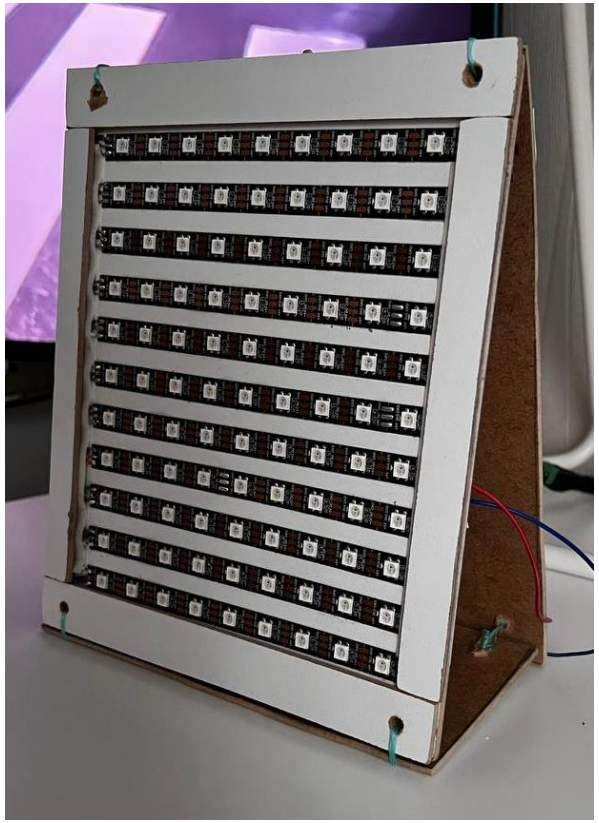
First working prototype (watch the demo for the video).



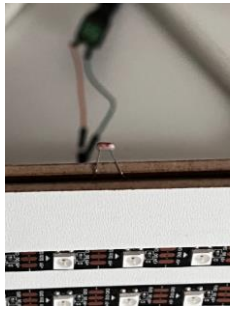
Development process

Finished project:

Body:

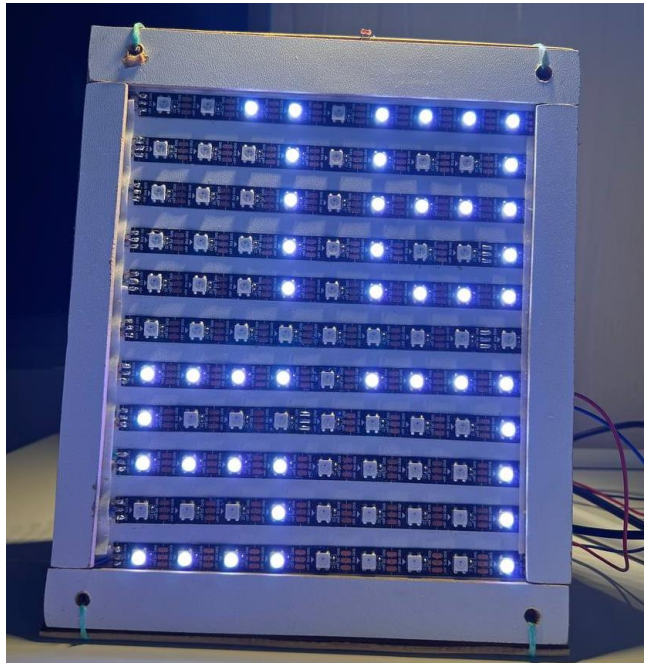


LDR



Switch

Clock:



Night lamp: 3x speed

Problems

1) After connecting and checking that the soldering is okay and that the LEDS work, I came across the first major problem. Because the LEDS were connected one after another in a series circuit, the jump wires resistance was building up with each strip therefore the color turned from white to yellow and eventually red. In addition to that, I was outputting 6 V instead of 5 V.
I solved this by connecting them in parallel, using a 5v adapter instead of a battery and having a common ground between the Arduino and the LEDS.

2) Programing Issues:

The LEDS were returning inconsistent values, this was because I was using a battery. When I started using the 5V adapter as well as a 10K resistor the LDR started returning consistent values.

Running out of space of the Arduino. This was solved by making the code more efficient.

Possible improvements

- Real time clock as if the Arduino shuts down the clock will reset as well.
- Add animations to the night lamp although that will include making the program more efficient or adding more memory.
- Make it portable, so that it doesn’t need a power outlet.