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TEMPERATURE CONTROL MODULE BASED ON ARDUINO UNO[5]

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Abstract: *One of the most important parameters of the environment is temperature. By controlling it we can improve the felling for comfort. To control the temperature is used controller. This paper suggest a controller based on Arduino to manage temperature.*

Keywords: *Temperature, Arduino, Data collection*

Introduction

The need for good and healthy environment in our work places. That imposes for an example to have a good temperature in rooms which are used for work and rest. And I think the good temperature for work is about 23-25 degrees Celsius. That's why I made a schema with Arduino Uno, very sensitive sensor LM 35, diodes and LED display. And Arduino rules that room temperature. When the temperature is below 23 degrees Celsius, signal goes to heather to pick it up. Temperature increase till 25, then the heather stop. But if it is too hot then the room temperature must be decrease. For that can be used some fans or cooler. And the idea is the same. When the temperature falls below 25 degrees Celsius the cooler or the fan must be stopped. To the temperature influence a lot of factors. Like how many people work in that room, how often open the windows or door, how many devices exude heat in that area. Also the ambient temperature is a very serious factor. And not to the last place the position of the room (south, west, east, and north) Barber, R., De La Horra, M., & Crespo, J., (2013), Ishikawa, M., & Maruta, I., (2009). Change in temperature is relatively slow process, which can allow us to measure it.

Exposition

The focus of this paper is to develop a block diagram and functional code. The block diagram we make can be seen on Fig.1.

This is simple block diagram (Fig.1.) of the device. That contains sensor for temperature LM35 (Fig.3.). Arduino (Fig.2.) is the microcontroller which is used, because is affordable, easy to program, don't requires external devices to be program. Liquid Cristal Display to display the current temperature. Relays which are connected output pins of the microcontroller via opt coupler to protect the microcontroller. Also to the output of the controller are connected 2 led for indication which relay is active.

[5] Докладът е представен на студентската научна сесия на 09.05.2019 г. в секция ЕЕА с оригинално заглавие на български език: МОДУЛ ЗА УПРАВЛЕНИЕ НА ТЕМПЕРАТУРА БАЗИРАН НА АРДУИНО УНО.

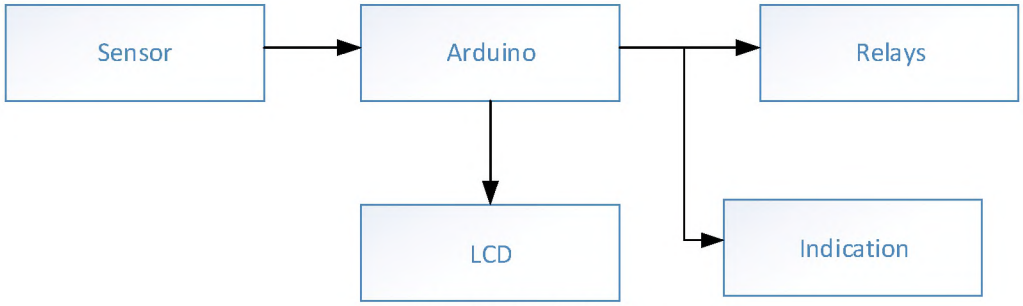

Fig.1 Block diagram

Arduino used is this task is Arduino Uno. Which have AT mega 328p microprocessor. [2]
– Up to 20 MIPS Throughput at 20 MHz
– 6-channel 10-bit ADC in PDIP Package
– 1.8 - 5.5V for ATmega328P

From Arduino is used 1 ADC and digital pins as output.

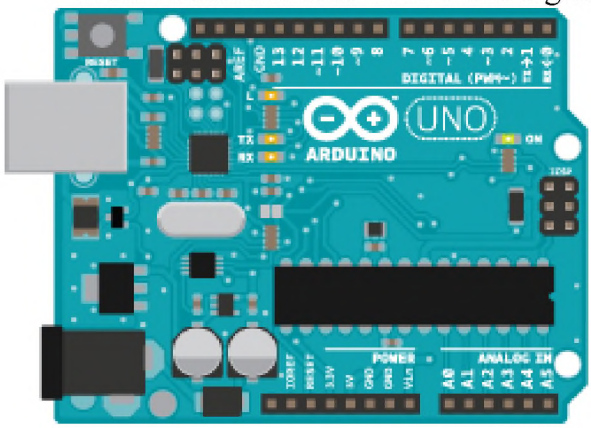

Fig.2 Arduino Uno board

LM35 have this parameters [1]:

- 0.5°C Ensured Accuracy (at 25°C)
- Rated for Full −55°C to 150°C Range
- Operates From 4 V to 30 V
- Less Than 60-µA Current Drain

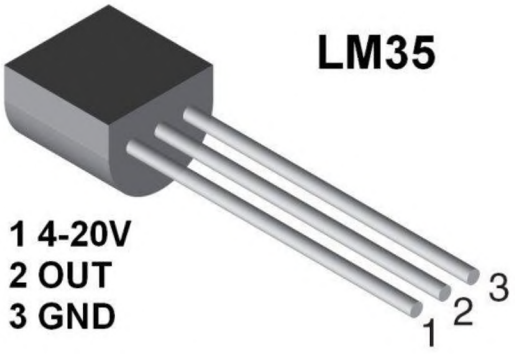

Fig.3 LM35 temperature sensor

The logic diagram is relatively simple. It begins with measurement of the temperature. Then the value of the temperature is compared with predetermined value, if the temperature is higher than this predetermined value. The algorithm continue with turning off the heating and turning on the cooling. If the comparison isn't true, then continue with comparing the value of the temperature with other predetermined value. If the temperature is lower than the predetermined. Algorithm

continue with turning on the heating and turns off the cooling. If the comparison isn't true the algorithm will turn off the heating. This leads to the measurement of the temperature.

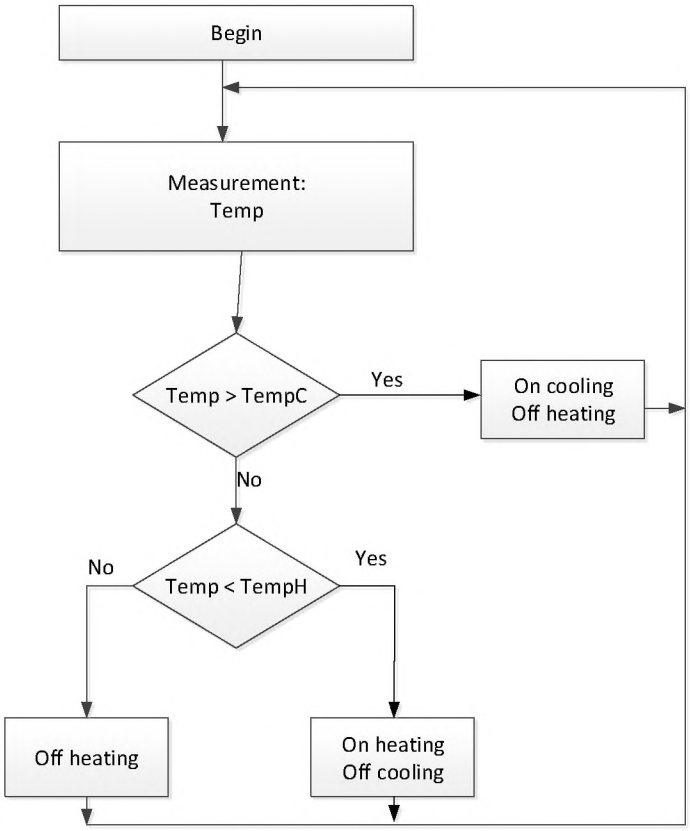

Fig.4. Logic diagram

Base on the block schematic is shown in figure 5. And is using the logic from Fig.4. The code can be seen in Addendum 1. By changing parts of the code we can change the temperature points in which the cooling and heating are turn ON or OFF. They can't be on in the same time. In this code the temperature that have to be higher than TempC to turn on the cooling. If the temperature is lower than TempH the heating have to turn on the heating. By changing the values set to TempC and TempH we can set desired temperature in the room.

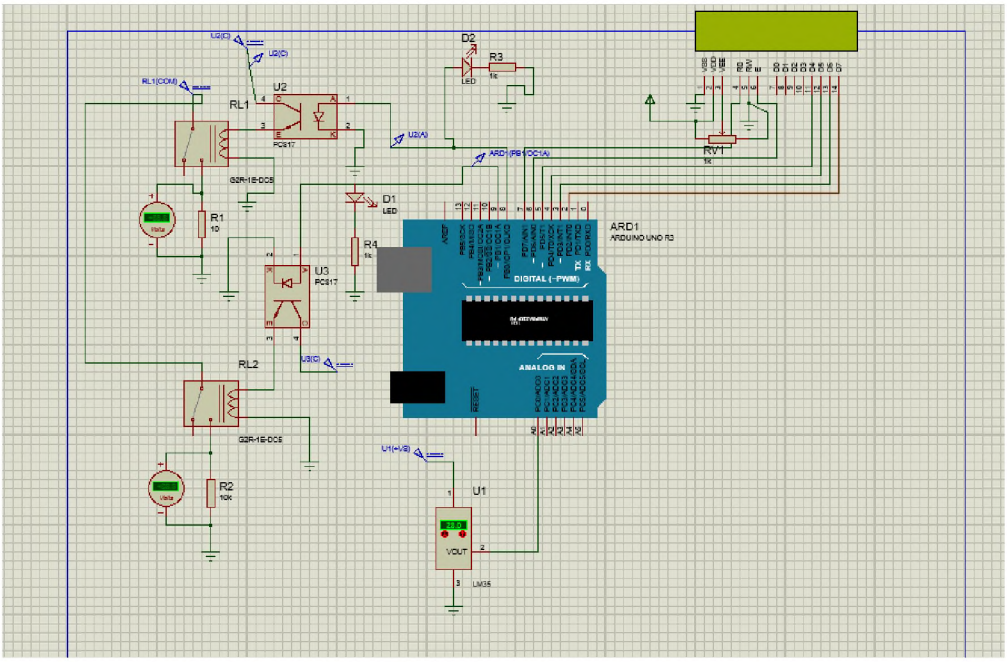

Fig.5. Schematic

Simulation results are acceptable. The device can be used to control the temperature in a room. Controlling the temperature in work space or in living space is important [6].

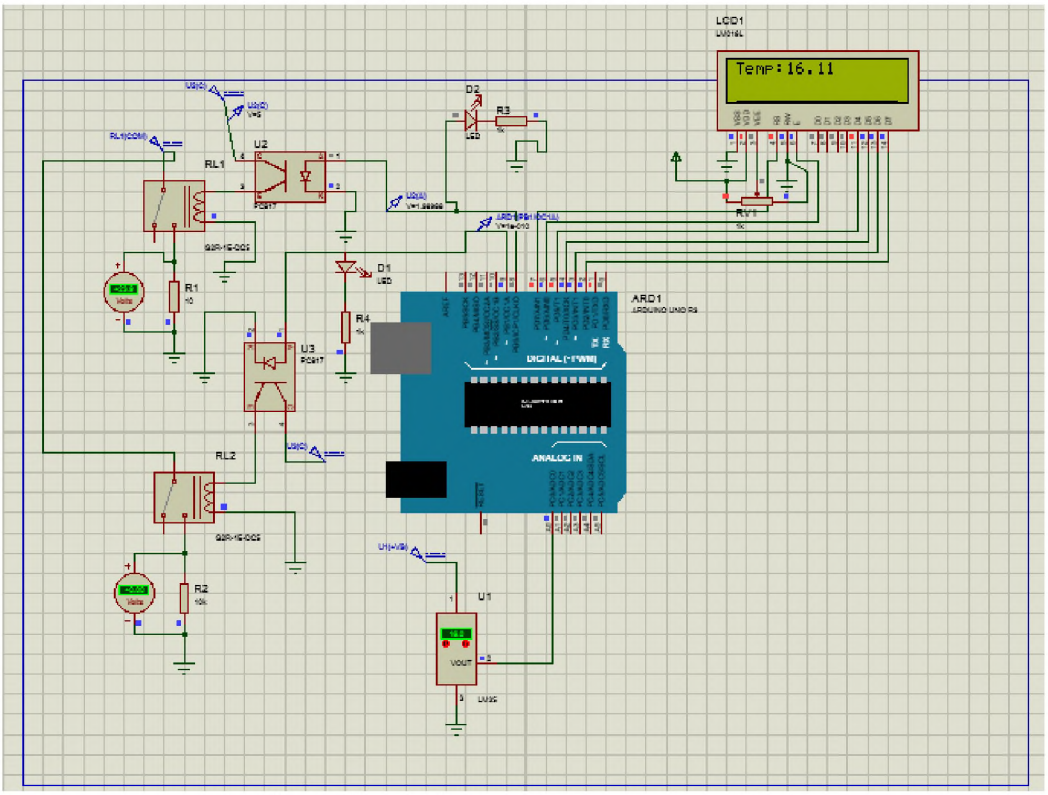

Fig.6. Simulation result temperature 16°C.

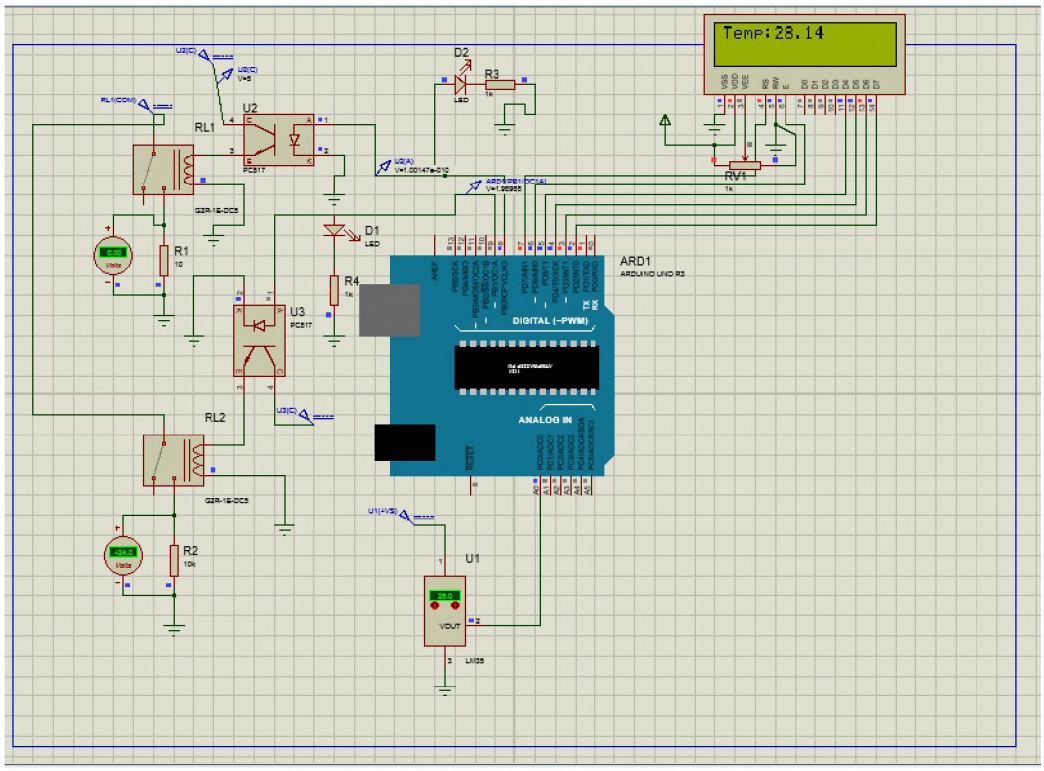

Fig.7. Simulation result temperature 28°C.

Conclusions

It is made an algorithm and block diagram. Based on them is suggested controller for managing temperature in a room using Arduino. Simulations of the system are made. Everything work as we expect.

ACKNOWLEDGEMENTS

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