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Paper Authors
Dr. Bazani Shaik, Dr. M. Muralidhara Rao , P.Siddik Ali , Bhavanarayana K, Vimal Teja , Vinay Kumar, K. Ravindranath

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Design and Development Of Automatic Sanitization and Temperature Measuring System

Dr. Bazani Shaik[1], Dr. M. Muralidhara Rao [2] , P.Siddik Ali [3] , Bhavanarayana K [4]

Vimal Teja [5] , Vinay Kumar[6], K. Ravindranath[7]
[1,2] **Professor, Ramachandra College of Engineering, Eluru 534007, AP**
[3,4,5,6,7] **Assistant Professor, Ramachandra college of engineering, Eluru 534007, AP**
bazanircee@gmail.com

Abstract

The design and development of automatic sanitization and temperature measuring systems are used to prevent the COVID 19 virus and other viruses which are come from the air. This system has two sub-systems Sanitizer dispenser Temperature measuring system. The temperature measuring system is a non-contact type and displays the human temperature on LCD. The sanitizer dispenser system is designed and developed to deliverthe sanitizer. The system utilizes an Arduino UNO, temperature sensor, ultrasonic sensor, LCD, pilot lights, power supply, and frame. In our research, we designed and implemented automatic sanitization and temperature monitoring system, which can function in an automated way using Arduino UNO. The experimental results weretested for different values of temperatures and found to work with 100% accuracy. This is a low-cost and effective setup that may help people in the view of pandemic COVID 19. There is still much space is there for future development that would bring happening more.

Key Words: COVID-19, LCD, Arduino UNO.

1 Introduction

This “Design and development of automatic sanitization and temperature monitoring system” measures the temperature of a person using a temperature sensor and tells us whether the temperature is normal or abnormal. The system is designed using Arduino UNO and all the modules are interconnected together and are programmed with the Arduino IDE tool. Due to the pandemic of COVID-19, temperature measurement of persons became one of the major tasks is to detect the affected one. For doing this [1] contactless measurement and social distanceare becoming more and more challenging. As a part of the solution, this paper proposes the measurement of temperature and if found abnormal it gives a danger alarm sound so that every one of us may be alert. Arduino can find its many applications nowadays because of its simplicity of programming features. Unlike, the normal micro-controller, the Arduino provides a board USB for the port for communicating with PC and power supply, with ATmega328p that runs on 16 MHz The layout of PCB Aurdino shows in Fig. 1. In the face of a likely acceleration of the virus spread in the country of 110 million people, launched a nationwide door-to-door temperature screening campaign to identify, isolate, and treat those who are infected, or probably are, and prevent or mitigate the spread of the new coronavirus. According to the Ministry of Health, as of August 18, 2020, there are a total of 31,336 cases, 18,268 active cases, and 544 deaths. According tothe state-owned Ethiopian News Agency (ENA)[2], many regional states also have begun taking body temperature using thermometer guns. The WHO issued a bulletin on ways to protect oneself from the virus andto help prevent its spread. These include regular and thorough cleaning ofthe hands either with soap and water or with alcohol-based products. A regular check of body temperature is also recommended. An

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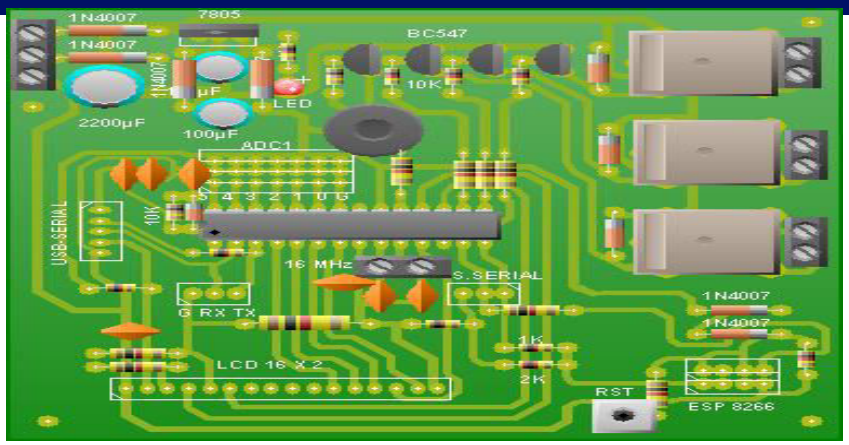

elevated temperature is one way to identify a person who may have a COVID-19. Infection, although an infected

Fig. 1. Layouts of PCB Aurdino

a person may not show an [2,3]elevated temperature or other easily detectable symptoms. To provide accurate contact measurement, the testing object and the sensor must be in thermal equilibrium which can lead to longer response times and reading inaccuracies offset by ambient temperature. On the other [4] hand, non-contact measurement using infra-red radiation provides quick and accurate temperature data and without requiring direct touch. In recent years, non-contact measurement methods have been used for numerous applications such as medical, environmental monitoring, home automation, automotive electronics, aerospace, and military applications.[5,6] proposed the working principle of Ard9uino and using it as a tool for study and research. In his paper, he discussed theworking principle of Arduino and its applications. The different types of Arduino boards and their comparison was discussed and tabulated. The programming part was done with the Arduino IDE tool and explained with some the examples like Arduino Satellite and Lilly pad Arduino.[7,8] Proposed a low-cost effective wireless protection system using Arduino. He used a temperature sensor and developed a system that will send an email notificationto a mobile phone or fire station nearby.[9,10] designed a time-based temperature controlling unit using Arduino that helps in saving wastage of energy. Inthis, it displays real-time temperature and displays it on LCD. The programming was done in such a manner that when the temperature goes beyond a certain limit and then controlling the unit so that energy wastagecan be minimized [11,12] proposed a fuzzy PID control system basedon PROTEUS. The experiments on sealing machine walls and demonstrated heat output simulations using Matlab. Designed a room temperature control system that works on the microcontroller. Like a temperature is used to measure the temperature and based on some defined boundaries set by theprogrammer, the room temperature was controlled using a network-enabled control system.

2 Experimental Work

The microcontroller is an integrated circuit (IC) device shown in Fig. 2. used for controllingother portions of an electronic system, usually via a microprocessor unit (MPU), memory, and some peripherals. These devices are optimized for embedded applications that require both processing functionality and agile, responsive interaction with digital, analog, or electromechanical components.

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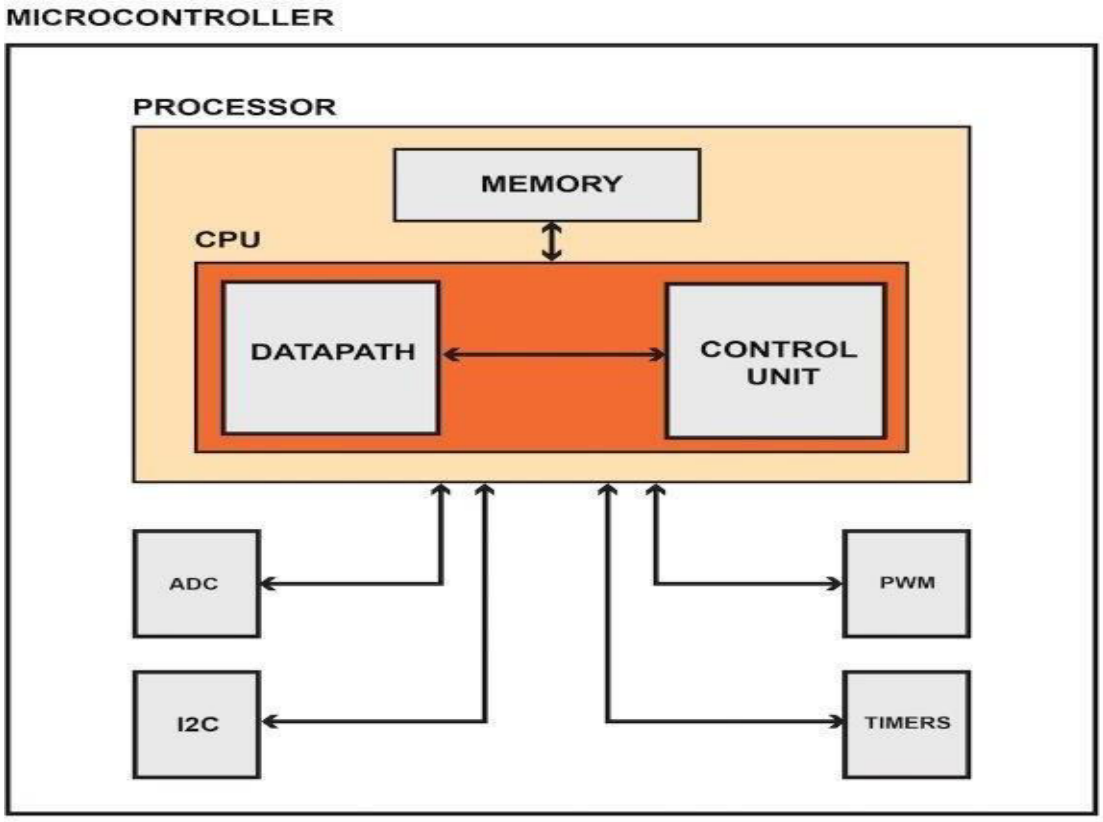

Fig. 2. Microcontroller Flow

In this research ATMEGA328P and Arduino Uno Pin mapping shown in below Fig. 3. is a high-performance, low-power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it isused in ARDUINO boards.

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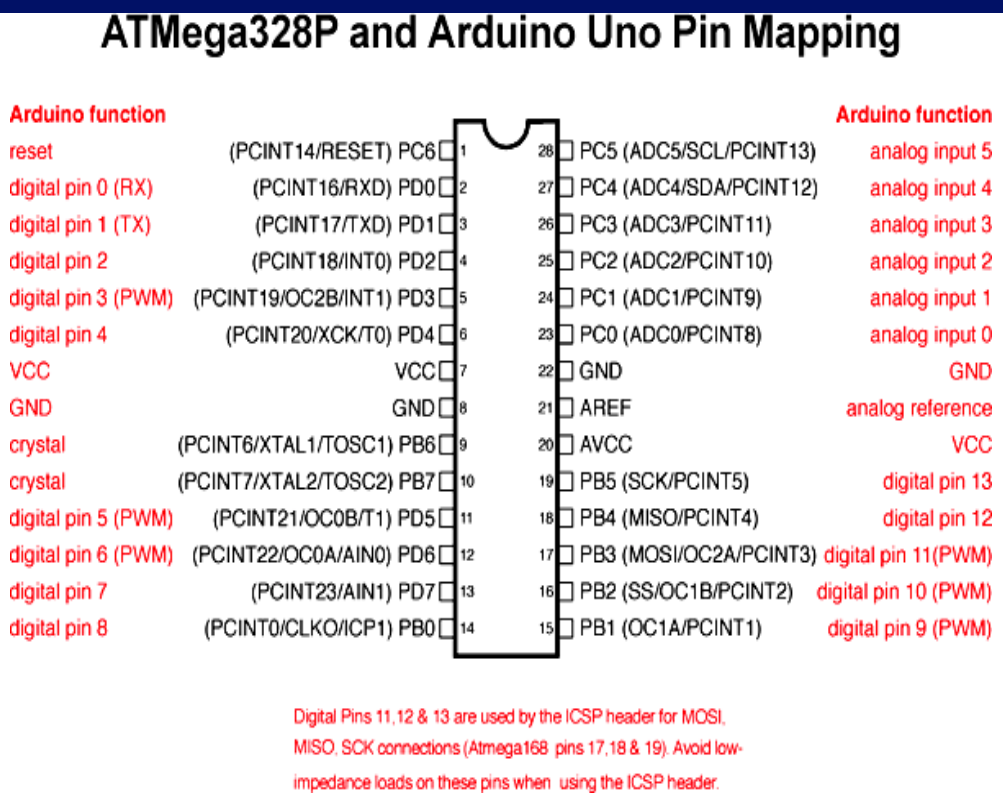

Fig. 3. ATMega 328P and Aurdino Uno Pin Mapping

The L293D is a popular 16-Pin **Motor Driver IC** is shown in Fig.4. As the name suggests it is mainly used to drive motors. A single **L293D IC** is capable of running two DC motors at the same time; also the direction of these two motors can be controlled independently. So if you have motors that have operating voltage less than 36V and operating current less than 600mA, which are to be controlled by digital circuits like Op-Amp, digital gates, or even Micron rollers like Arduino, PIC, ARM, etc. The pin configuration diagram is shown below

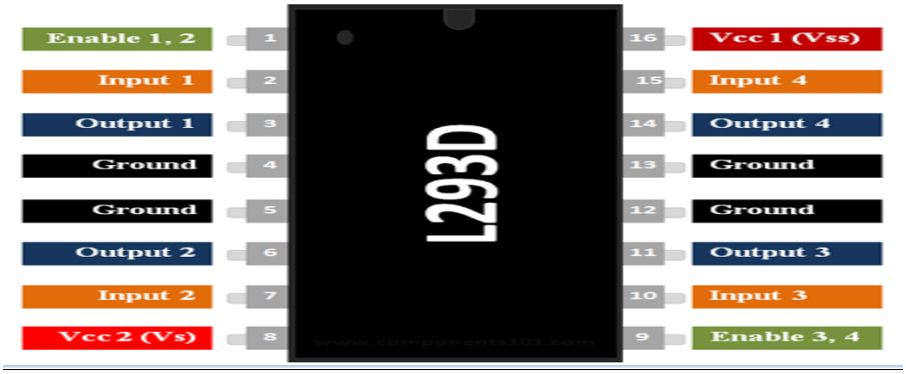

Fig. 4. Motor Drive Pin Configuration

The R385 6-12v motor for spraying the sanitizer pump is shown in Fig. 5 to human hands.R385 6-12V DC Diaphragm Based Mini Aquarium Water Pump is an ideal non-submersible pump for a variety of liquid movement applications. It has enough pressure to be used with a nozzle to make a spray system. The pump can handle heated liquids up to a temperature of 80°C and when suitably powered can suck water through the tube from up to 2m and pump water vertically for up to 3m.

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Fig. 5. The layout of the sanitizer pump

Possible uses/projects include a small aquarium pump, automatic plant watering system, making a water feature, or music-activated dancing water features to name but a few. When pumping a liquid the pump runs very quietly. The pump is also capable of pumping air, though when pumping air the pump is quite noisy in comparison. The R385 requires between 6 – 12V DC and between 0.5 – 0.7A and will deliver its maximum operating values when power is at the upper end ofthese ranges. The Automatic sanitization and temperature measurement system is shown in Fig. 6, This immersible pump can be used to water your plants, make a fountainor waterfall, and even change your fish tank water. It works quietly with a sound level under 30db.

Fig. 6. Automatic Sanitization and Temperature Measure System

3 Results and Discussions

The design and development of automatic sanitization and temperature monitoring systems are successfully worked and the prototype of our technology. In this research, we include further the door closing and opening system by using the small CD drive. In this project, the complete work is shown on the LCD and the automatic door system is also displayed. In this paper, we are taking only 3 inputs and successfully given the 4 outputs. This is the complete project in future peoples are using very highly.

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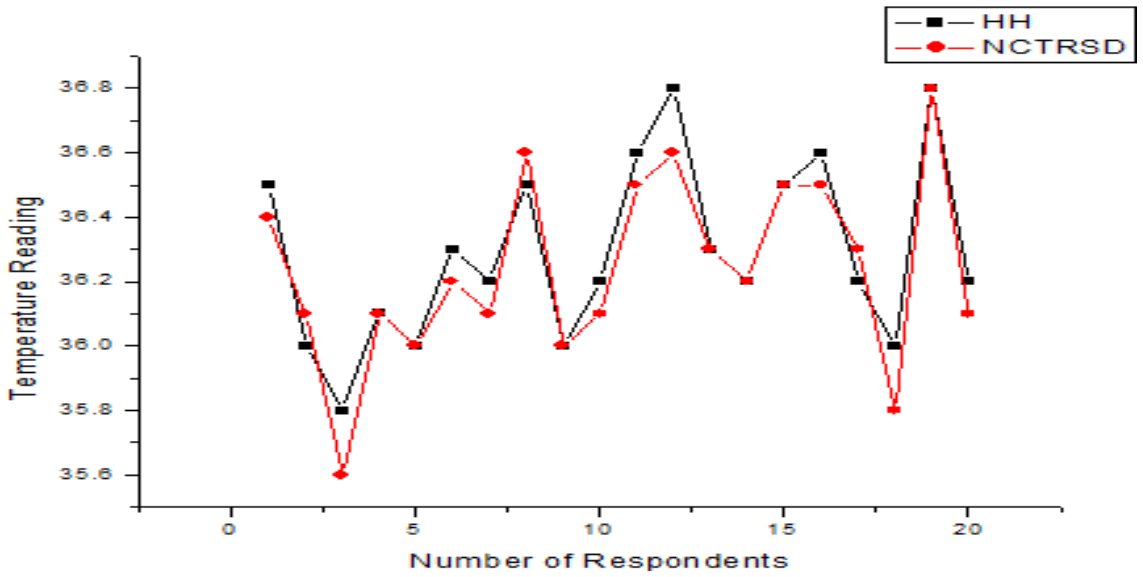

Fig. 7. Respondents to Temperature

The above graph is drawn between temperature sensing vs. several respondents. Here some person's temperatures are very low and some person'stemperatures are very high as shown in the graph.

4 Conclusions

This paper designed and implemented automatic sanitization and temperature monitoring system, which can function in an automated way using Arduino UNO. The experimental results were tested for different values of temperatures and found to work with 100% accuracy. This is alow-cost and effective setup that may help people in the view of pandemic Covid 19. There is still much space is there for future development that would bring happening more. To draw a concluding line to the project it can be said that ina war with an invisible enemy the device is a weapon for survival in thispandemic situation. In future it can be manufactured in any household at a very low cost and can be installed anywhere be it in offices, educational institutes, public transport, regular shops, etc. peoples are highly used thistype of machines in anywhere and anytime.

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