

Post Pandemic Solution for Safety

Manas Jahagirdar^{1*}, Vikram Motghare², Akshay Bhandarkar³, Dhanashree Sirsikar⁴, Gaurav Agrawal⁵

^{1,2,3,4}Student, Department of Electronics & Telecommunication Engineering, Govindrao Wanjari College of Engineering and Technology, Nagpur, India

⁵Assistant Professor, Department of Electronics & Telecommunication Engineering, Govindrao Wanjari College of Engineering and Technology, Nagpur, India

Abstract: The system proposed can be used to regular checkup of the COVID patients while maintaining the social distancing. Also, the data sensed by the sensors is directly sent to doctor, reducing the cost of paying regular visits to doctor. The IoT platform used in the system helps to transfer the real time patient's data remotely to host device. Automatic hand sanitizer is useful to facilitate the hand sanitizer liquid out of the bottle, so it is more effective to use and does not run out quickly. This research uses the Research and Development (R&D) method. The result of this research is an automatic hand sanitizer with a large size hand sanitizer that can be mounted into a tool. This automatic hand sanitizer will automatically release the hand sanitizer fluid which approves the sensor under the user's hand protective device. To track the patient health micro-controller is in turn interfaced to an LCD display and wi-fi connection to send the data to the web-server (wireless sensing node). In case of any abrupt changes in patient heart-rate or body temperature alert is sent about the patient using IoT. This system also shows patients temperature and heartbeat tracked live data with timestamps over the Internetwork.

Keywords: Servo motor, LCD display, Bluetooth module, PIC.

1. Introduction

In this COVID-19 pandemic period which is a global outbreak, hand hygiene is the core preventive measure in the spread of the disease as advised by WHO (World Health Organization) which includes washing hands with water and soap regularly, hand sanitizing using hand sanitizers, etc. Hygiene refers to the practices conducive to maintaining health and preventing disease especially through cleanliness such as washing hands, coughing in the elbow etc. Hand washing helps to prevent any diseases that spread through contact. In order to eliminate most of the germs on the hands, one needs to apply a good hand washing practice. In most healthcare settings, alcohol-based hand sanitizers are preferable to hand washing with soap and water because it can be easily tolerated and it is also more effective at reducing bacteria. Hand sanitizer is a liquid, gel, or foam generally used to decrease infectious agents on the hands. A sanitizer is designed to kill germs on skin, objects and surfaces.

The increase in COVID patients has also led to decrease in the relative number of doctors per patient as a solution for this the patients with minor symptoms are home quarantined. In such situation maintaining personal health and immunity is very important for a home quarantined patient without being

regularly monitored by the doctors. Recently, the patient monitoring systems is one of the major advancements because of its improved technology. Currently, there is need for a modernized approach. They need to visit the patient's ward for necessary diagnosis and advising. Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. The problem with this traditional approach is that there are chances of getting doctors and health personnel affected with the COVID due to coming in contact with contagious patient. In order to solve these two problems, the patients are given knowledge. In order to improve the above condition, we can make use of technology in a smarter way. In recent years, health care sensors and advanced microcontrollers play a vital role to detect and monitor human body physiological parameters.

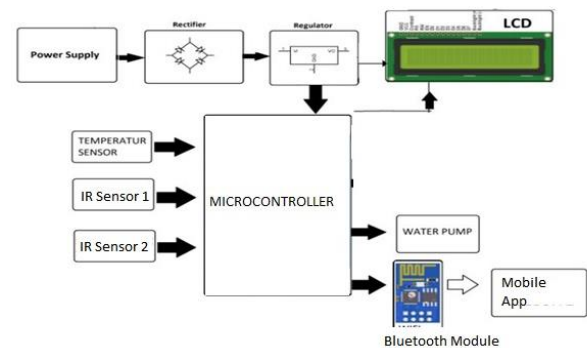


Fig. 1. Block diagram

2. Block Diagram

A. Regulated Power Supply Circuit

The working of the components coupled in the circuit above is revealed in the following table.

Table 1

1	INPUT	In this pin of the IC positive unregulated voltage is given in regulation.
2	GROUND	In this pin where the ground is given. This pin is neutral for equally the input and output.
3	OUTPUT	The output of the regulated 5V volt is taken out at this pin of the IC regulator.

As we have made the whole circuit till now to be operated on

*Corresponding author: manasjahagirdar24@gmail.com

the 5V DC supply, so we have to use an IC regulator for 5V DC. And the most generally used IC regulators get into the market for 5V DC regulation use is 7805. So, we are connecting the similar IC in the circuit as U1. IC 7805 is a DC regulated IC of 5V. This IC is very flexible and is widely employed in all types of circuit like a voltage regulator. It is a three terminal device and mainly called input, output and ground. Pin diagram of the IC 7805 is shown in the diagram below.

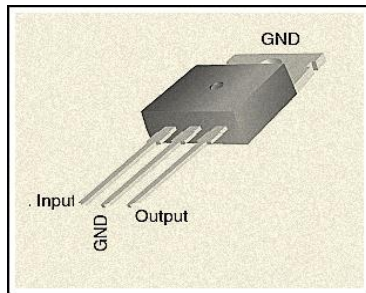


Fig. 2.

B. 16x2 LCD Module

LCD display is an inevitable part in almost all embedded projects and this article is about interfacing 16×2 LCD with 8051 microcontroller. Many guys find it hard to interface LCD module with the 8051 but the fact is that if you learn it properly, it's a very easy job and by knowing it you can easily design embedded projects like digital voltmeter / ammeter, digital clock, home automation displays, status indicator display, digital code locks, digital speedometer/ odometer, display for music players etc etc. Thoroughly going through this article will make you able to display any text (including the extended characters) on any part of the 16×2 display screen. In order to understand the interfacing first you have to know about the 16×2 LCD module. 16×2 LCD module is a very common type of LCD module that is used in 8051 based embedded projects. It consists of 16 rows and 2 columns of 5×7 or 5×8 LCD dot matrices. The module we are talking about here is type number JHD162A which is a very popular one. It is available in a 16-pin package with back light, contrast adjustment function and each dot matrix have 5×8 dot resolution.

C. Working of ULN2803 IC

ULN2803 is a high voltage, high current Transistor Array IC used especially with Microcontrollers where we need to drive high power loads. This IC consists of eight NPN Darlington connected transistors with common Clamp diodes for switching the loads connected to the output. This IC is widely used to drive high loads such as Lamps, relays, motors etc. It is usually rated at 50v/500mA. This article brings out the working of ULN2803 IC and how to use it in a circuit. The ULN2803 IC consists of eight NPN Darlington pair which provides the proper current amplification required by the loads. We all know that the transistors are used to amplify the current but here Darlington transistor pairs are used inside the IC to make the required amplification. A Darlington pair is two transistors that act as a single transistor providing high current gain. In this pair the current amplified by the first transistor is further amplified

by the next transistor providing high current to the output terminal. When no base voltage is applied that when is no signal is given to the input pins of the IC, there will be no base current and transistor remains in off state. When high logic is fed to the input both the transistors begin to conduct providing a path to ground for the external load that the output is connected. Thus, when an input is applied corresponding output pin drops down to zero there by enabling the load connected to complete its path.

Purpose of ULN2803

Most of the Chips operates with low level signals such as TTL, CMOS, PMOS, NMOS which operates at the range of (0-5v) and are incapable to drive high power inductive loads. However, this chip takes low level input signals (TTL) and use that to switch/turn off the higher voltage loads that is connected to the output side.

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D. Servo Motor

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate an object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight package. Due to these features they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc. Servo motors are rated in kg/cm (kilogram per centimeter) most hobby servo motors are rated at 3kg/cm or 6kg/cm or 12kg/cm. This kg/cm tells you how much weight your servo motor can lift at a particular distance. For example: A 6kg/cm Servo motor should be able to lift 6kg if the load is suspended 1cm away from the motor's shaft, the greater the distance the lesser the weight carrying capacity. The position of a servo motor is decided by electrical pulse and its circuitry is placed beside the motor.

Working Principle of Servo Motors

A servo consists of a Motor (DC or AC), a potentiometer, gear assembly and a controlling circuit. First of all, we use gear assembly to reduce RPM and to increase torque of motor. Say at initial position of servo motor shaft, the position of the potentiometer knob is such that there is no electrical signal generated at the output port of the potentiometer. Now an electrical signal is given to another input terminal of the error detector amplifier. Now difference between these two signals, one comes from potentiometer and another comes from other source, will be processed in feedback mechanism and output will be provided in term of error signal. This error signal acts as the input for motor and motor starts rotating. Now motor shaft is connected with potentiometer and as motor rotates so the potentiometer and it will generate a signal. So as the

potentiometer's angular position changes, its output feedback signal changes. After sometime the position of potentiometer reaches at a position that the output of potentiometer is same as external signal provided. At this condition, there will be no output signal from the amplifier to the motor input as there is no difference between external applied signal and the signal generated at potentiometer, and in this situation motor stops rotating.

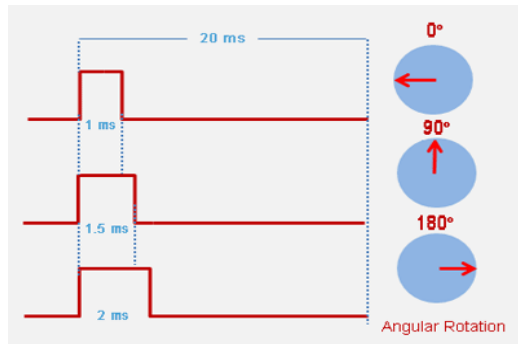


Fig. 3.

Servo motor can be rotated from 0 to 180 degree, but it can go up to 210 degree, depending on the manufacturing. This degree of rotation can be controlled by applying the Electrical Pulse of proper width, to its Control pin. Servo checks the pulse in every 20 milliseconds. Pulse of 1 ms (1 millisecond) width can rotate servo to 0 degree, 1.5ms can rotate to 90 degree (neutral position) and 2 ms pulse can rotate it to 180 degree. All servo motors work directly with your +5V supply rails but we have to be careful on the amount of current the motor would consume, if you are planning to use more than two servo motors a proper servo shield should be designed.

E. PIC

Peripheral Interface Controller (PIC) is microcontroller developed by a Microchip, PIC microcontroller is fast and simple to implement program when we contrast other microcontrollers like 8051. The ease of programming and simple to interfacing with other peripherals PIC become successful microcontroller. We know that microcontroller is an integrated chip which consists of RAM, ROM, CPU, TIMER and COUNTERS. The PIC is a microcontroller which as well consists of RAM, ROM, CPU, timer, counter, ADC (analog to digital converters), DAC (digital to analog converter). PIC Microcontroller also support the protocols like CAN, SPI, UART for an interfacing with additional peripherals. PIC mostly used to modify Harvard architecture and also supports RISC (Reduced Instruction Set Computer) by the above requirement RISC and Harvard we can simply that PIC is faster than the 8051 based controllers which is prepared up of Von-Neuman architecture.

F. Bluetooth Module

HC-05 module is an easy-to-use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for

wireless communication. This serial port bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

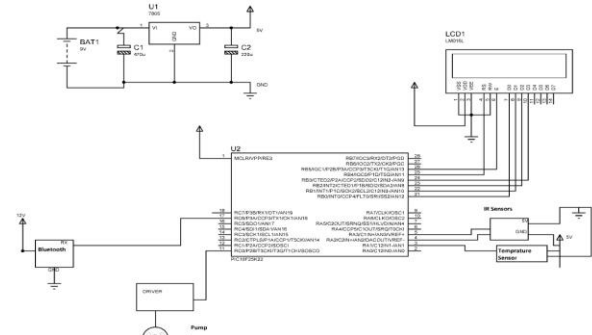


Fig. 4. Circuit diagram

3. Results

Hands are considered to be the primary mode of infectious diseases, especially for those living in close proximity such as college residence halls, shopping malls, bank halls, market areas etc. Because of the frequent contact with hands and multiple surfaces, the incidence of cross-contamination is significantly increased. Hand hygiene is a major requirement for human health and many infectious diseases can be emerged if proper hand hygiene procedures are not implemented. Hand washing is the simplest, important and cost-effective way to improve hand hygiene in health care and support the prevention of infectious disease. Moreover, it is challenging to monitor body temperature during sleep or accidentally for getting to check. Therefore, IoT systems' help has played a critical role in the healthcare system for real-time monitor. On the other hand, a wearable device is a useful tool for thermal body measurement. As discussed in the authors propose that wearable sensors can detect illnesses by continuous fever monitoring.



Fig. 5. Hardware setup

4. Conclusion

The system introduced COVID-19 Safety monitoring system monitors Sanitization, body temperature. Authenticate medical staff can view and track the data in real time. The developed prototype is very simple to design and use. The developed

system will improve current health care system that may protect lots of lives from death. The early identification of any health problem can help the patient to take necessary emergency measures, which can potentially save the patient's life. IoT can help in this regard. IoT based health monitoring systems can monitor the patients in real-time and warn the patient of any abnormalities. The idea of a smart health monitoring system using the IoT architectures is a novel contribution in the field of medical science and it will reduce health issues and unwanted deaths.

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