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Smart I Robot for Health Care System by using SW Framework and IOT

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Abstract: *The proposed IoT-based automated healthcare monitoring & sanitizing system, mainly deals with complete COVID-19 care precautionary measures as well as reduce receptionist work to check BP, temp of patient. The automation of systems for everyone is turning very frequently in the present. Along with sanitizing, this project aims at providing contactless temperature & pulse rate monitoring using thermal sensors & heart beat sensor within the same system. There are various alert indication mechanisms that would be used in this system along with a cloud-based and app-based approach. Providing the best solution to this is the aim of our project. The design depicted shows the preventive measure that can be taken during the COVID-19 pandemic in the whole world. Sanitizers have become the most significant commodities right now. By the new rules and regulations given by WHO vigorous sanitization is needed to survive. The design gave the solution for the problem stated. The design introduces an IOT based automatic hand sanitizer and temperature as well as heart beat sensing system place on moving robotic machine which control by wirelessly. Here to give instruction to newcomers we provide some recorded audio to play as well as LCD display to show instruction as well. This robotic machine can be move by using Bluetooth based wireless system*

Keywords: IOT Web Server, Pulse Rate Sensor, Contactless Hand Sanitizer, Movable Robotic Vehicle, Automation.

I. INTRODUCTION

The proposed IoT-based automated healthcare monitoring & sanitizing system, mainly deals with complete COVID-19 care precautionary measures as well as reducing receptionist work to check BP, temp of the patient.

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Internet of Things (IoT) development brings new opportunities in many applications, including smart cities and smart healthcare. Currently, the primary usage of the IoT in healthcare can be categorized as remote monitoring and real-time health systems. Controlling and managing dire situations, such as the one in 2020 when the coronavirus dis-ease (COVID-19) took over the world, can be achieved with the help of IoT systems, without imposing severe restrictions on people and industries. COVID-19 causes respiratory symptoms and appears to be more contagious in comparison to SARS in 2003

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Health is always a major concern in every growth the human race is advancing in terms of technology. Like the recent corona virus attack that has ruined the economy of China to an extent is an example how health care has become of major importance. In such areas where the epidemic is spread, it is always a better idea to monitor these patients using remote health monitoring technology. So Internet of Things(IoT)based health monitoring system is the current solution for it[1].Remote Patient Monitoring arrangement empowers observation of patients outside of customary clinical settings (e.g. at home), which expands access to human services offices at bring down expenses [2]. The core objective of this project is the design and implementation of a smart patient health tracking system that uses Sensors to track patient health and uses internet to inform their loved ones in case of any issues.

II. LITERATURE SURVEY

In [1], the paper mainly says about the hospital grasped infections, which is about 2 million Patients per year and also says that it is 8th leading cause for deaths annually in USA. It also says that hand washing is important and also effective with proper hand washing steps, but washing with soap and water is time consuming for peak hours in hospitals. This paper also showed the effectiveness of the alcohol-based hand sanitizers, which reduced infection rates by whopping 30%. They used hand sanitizers with 60 to 70 percent ethanol or isopropanol for reducing significant number of pathogens. The patients were also given about 4.25-ounce containers of hand sanitizer alongside their beds. For 10-month period of using hand sanitizers showed a result of 36.1% infection reduction.

In [2], the paper says about the infection caused by drug resistant micro-organisms which causes increase in death rate and also complications, the multidrug resistant bacteria includes Methicillin Resistant Staphylococcus aurous (MRSA), Extended Spectrum Beta-lactamase (ESBL) producing bacteria, Multidrug Resistant Pseudomonas aeruginosa(MDRP), which are very common worldwide. Several antibiotics have increasing multidrug bacteria isolation rate, even personal protection equipment (PPE) can't be effective in isolation rate of MSR A. Hence, they emphasize about the use of alcohol based hand sanitizers since the alcohol based hand sanitizers had negative association with MRSA isolation rate, which means that hand hygiene is very important in hospitals.

In [3], the paper says about emergence of the novel Corona virus(SARS-CoV-2), which has caused unexpected challenges to health of the people of this world, the paper also aims at reducing the transmission rate of the disease. The paper explains about the virus structure and how is it different from that of the bacterial structure, which means that virus has single stranded or double stranded RNA or DNA encapsulated in 'capsid' and virus can replicate only in presence of a host and described as 'living entities. Bacteria also have almost the same structure including DNA or RNA along with 'Cell Membrane' and can replicate without a host.

Sparsh and Agarwal [4] described a remote health monitoring sys-tem for the collection of blood pressure values from patients through mobile phones. Values recorded on mobile phones are supplied and displayed to doctors or caregivers through the web interface in the system. Doctors can monitor and manage the patient's condition through the system and provide feedback to the patient remotely.

A secure IoT based modern healthcare system using Body Sensor Network (BSN) referred to as BSN-Care was proposed by authors in Ref. [5]. The proposed system measures and monitors physiological parameters such as blood pressure, electrocardiogram (ECG), and electroencephalography conditions in the body through wearable sensors. The values of measured parameters are collected and sent to the Local Processing Unit, which is also the coordinator of the system. Data received by the BSN-Care server from the body of the patient are fed into the database for analysis. Based on the analysis and degree of abnormality in the values, the system alerts the family member, local physician or emergency unit contact of the patient. The system is secured using a lightweight anonymous authentication protocol, which confirms the identity of anyone using the BSN-Care server. For privacy, data integrity and data freshness, the Offset Codebook (OCB) authentication encryption scheme was used

III. PROPOSED SYSTEM

PIC 18f4520 Microcontroller

It is an 8-bit enhanced flash PIC microcontroller that comes with nanoWatt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, security system and end-user products. This microcontroller has made a renowned place in the

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market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.

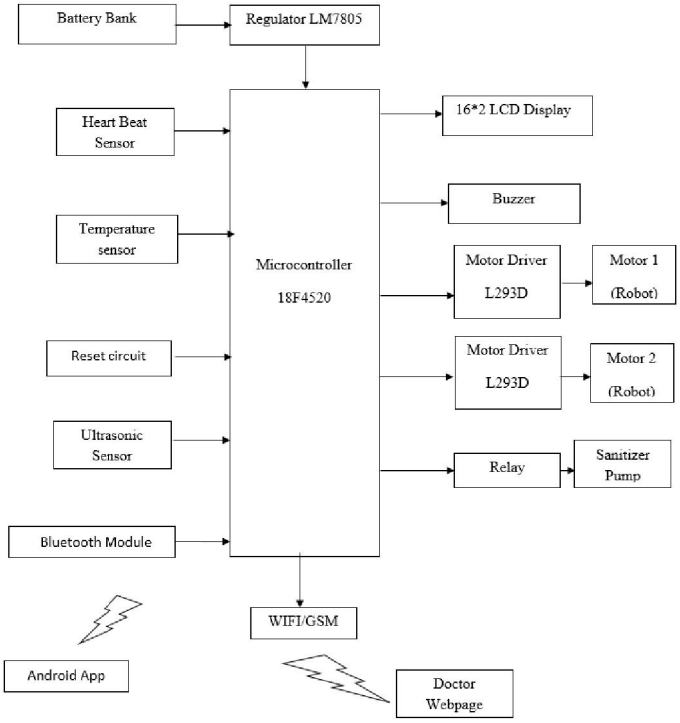

Fig. 1. Block Diagram

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF
Divided into 256-byte banks
There are total of F banks
Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bit
Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
Program memory stores the program and also static data in the system.
On-chip External
On-chip program memory is either PROM or EEPROM.
The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig. 1. PIC18f4520

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Pulse Rate Sensor

Heartbeat sensor provides a simple way to study the function of the heart which can be measured based on the principle of psycho-physiological signal used as a stimulus for the virtual- reality system. The amount of the blood in the finger changes with respect to time.

The Sensor is Based IR molded in silicon , So Once the Finger is inserted Heart Beat will not miss t. In order to calculate the heart rate based on the blood flow to the fingertip, a heart-rate sensor is assembled with the help of OP-AMP for monitoring the heartbeat pulses.

Specification

- Input Voltage - 5v
- POT Given to adjust Sensitivity
- Pulse Output - 3.3- and 5-volt level

Fig. 3. Pulse rate Sensor

LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

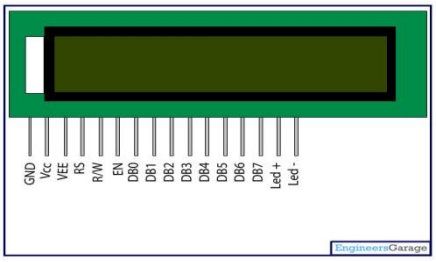

Fig. 4. LCD Display

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Ultrasonic Sensor

Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound. Our ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo.

Typically, a microcontroller is used for communication with an ultrasonic sensor. To begin measuring the distance, the microcontroller sends a trigger signal to the ultrasonic sensor. The duty cycle of this trigger signal is 10µS for the HC-SR04 ultrasonic sensor. When triggered, the ultrasonic sensor generates eight acoustic (ultrasonic) wave bursts and initiates a time counter. As soon as the reflected (echo) signal is received, the timer stops. The output of the ultrasonic sensor is a high pulse with the same duration as the time difference between transmitted ultrasonic bursts and the received echo signal.

Fig. 5 Ultrasonic Sensor

GSM Module

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open a connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands. SIM800 is a complete Quad-band GSM/GPRS solution in a LGA type which can be embedded in the customer applications. SIM800H support Quad-band 850/900/1800/1900MHz, it can transmit Voice, SMS and data information with low power consumption. With tiny size of 15.8*17.8*2.4 mm, it can fit into slim and compact demands of customer design

Fig. 5 GSM Module

L393D Motor Driver IC

he L293D is a popular 16-Pin **Motor Driver IC**. 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 which has operating voltage less than 36V and operating current less than 600mA, which are to be controlled by digital circuits like Op-Amp, 555 timers, digital gates or even Microcontrollers like Arduino, PIC, ARM etc.. Using this **L293D motor driver IC** is very simple. The IC works on

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the principle of **Half H-Bridge**, let us not go too deep into what H-Bridge means, but for now just know that H bridge is a set up which is used to run motors both in clock wise and anti-clockwise direction.

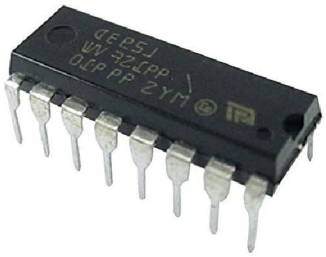

Fig. 5 L293D Motor driver ic

Thingsspeak IOT

ThingSpeak is an application platform for the Internet of Things. ThingSpeak allows you to build an application arounddata collected by sensors. Features of ThingSpeak include real-time data collection, data processing, visualizations, apps, and plugins. At the heart of ThingSpeak is a ThingSpeak Channel. A channel is where you send your data to be stored. Each channel includes 8 fields for any type of data, 3 location fields, and 1 status field. Once you have a ThingSpeak Channel you can publish data to the channel, have ThingSpeak process the data, and then have your application retrieve the data.

IV. CONCLUSION

The Internet of Things is considered now as one of the feasible solutions for any remote value tracking especially in the field of health monitoring. It facilitates that the individual prosperity parameter data is secured inside the cloud, stays in the hospital are reduced for conventional routine examinations and most important that the health can be monitored and disease diagnosed by any doctor at any distance. In general, IoT based health care platform which connects with smart sensors attach with human body for health monitoring for daily check-up. In this paper we discussed about IoT based patient monitoring system. The system technologies being used by smart phones or gadgets in present time where we also mentioned about advantages, challenges and opportunities. Due to the importance of observing medical patient, continuous remote monitoring is necessary. Our project work is giving the opportunity to monitor patient continuously by using the web and apps service along with live monitor and mobile message service. This work also compared the early aged medical system between present time health monitoring.

V. ACKNOWLEDGMENT

It gives us great pleasure in presenting the paper on “Smart I Robot for Healthcare System by using SW Framework & IOT” We would like to take this opportunity to thank our guide, Prof. Akshay Pathere, Assistant Professor, Department of Electrical Engineering Department, Amrutvahini Collage of Engg., Sangamner for giving us all the help and guidance we needed. We are grateful to him for his kind support, and valuable suggestions were very helpful.

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