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Health Mirror

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***Abstract:** This paper describes and explains design and working of a mirror made smart enough to be a health mirror which is IoT based and works with Arduino mega. This health mirror act as a personal health assistance which helps to do regular health checkups within few seconds. It does following tasks like, contactless human body temperature measurement, oxygen level measurement and pulse rate measurement. When body temperature or oxygen level or pulse rate goes above limit, it gives warning in form of voice command and captures the image of the person standing in front. It also displays current date and time and room temperature and humidity. The health mirror can be used in our home as well as at entrance of any organization.*
***Keywords:** Health mirror, Smart mirror, Smart personal health assistant, Arduino mega, Contactless.*

I. INTRODUCTION

We all know that prevention is better than cure. For prevention and early detection of any health disease it is important to keep track on our health regularly. Taking care of our health is most important thing because health is the real wealth. But in today's world of hectic lifestyle, due to lack of time and ever-changing priorities we usually forget this simple yet crucial life lesson most often. But our health is most crucial and should not be ignored at any cost. Visiting doctor regularly is time consuming and expensive.

Each time we leave our home for any event, we stand in front of mirror and start grooming which takes several minutes of our day. Mirrors are fundamental grooming aids, but that is not the only benefit they can provide. As years pass by, every year there is some new technology in the market which makes our lives easier.

One such thing which has put into focus is a normal looking mirror turned into a smart mirror. Smart mirror also knows as magic mirror which is an intelligent mirror used to access many user-friendly information such as current weather conditions, news, time, events, social sites, etc. is widely available in market. Therefore, we thought of using a mirror to tackle this problem. That is why in this paper, we present this health mirror which is built to self-assess and track our health regularly within seconds while simultaneously allowing person to go through their morning routine without visiting doctor which makes it easier, less time consuming and inexpensive. With one single health checkup at home before leaving for work, school, college, etc. we can make health our top most priority.

II. LITERATURE SURVEY

In the year 2003 there was this person Phillips he built a Mirror TV applying the same principles of a smart mirror. Basically the product was a normal TV that was put behind the two-way mirror so that the TV would look like a mirror when turned on and as a TV when switched on.

They had come up with another option too. They wanted to keep the mirror larger than the TV. This example was presented by Phillips. He wanted his children to watch cartoons while brushing their teeth simultaneously. In the year 2005 Phillips came up with a research project called MyHeart.

The idea was to built a informative mirror. The original product was just a simple TV that functioned well as a mirror. The MyHeart research project would integrate a display to show various medical statistics. But this project required electronics stuck up on to the body to collect and analyze the data. The mirror serves as an informative display.

In the year 2011 James Law Cyber tecture made a commercial sold smart mirror. This mirror is much in line with the smart mirrors we have come across till today. The product consist of LCD display 32*37 two way mirror. The display shows the weather forecasts, internet streaming,TV, current time and various other widgets. The smart mirror has n number of input methods such as remote controller, smartphone app and an onscreen virtual keypad.

In the year 2013 Franco Chiarugietal proposed a paper discussing the motivation and rationale behind the project. The idea was to get out quantitative features official expressions related to stress, anxiety and fatigue and use the features to quantify an individual's well-being. The features had to be got out from data collected from multisensory devices.

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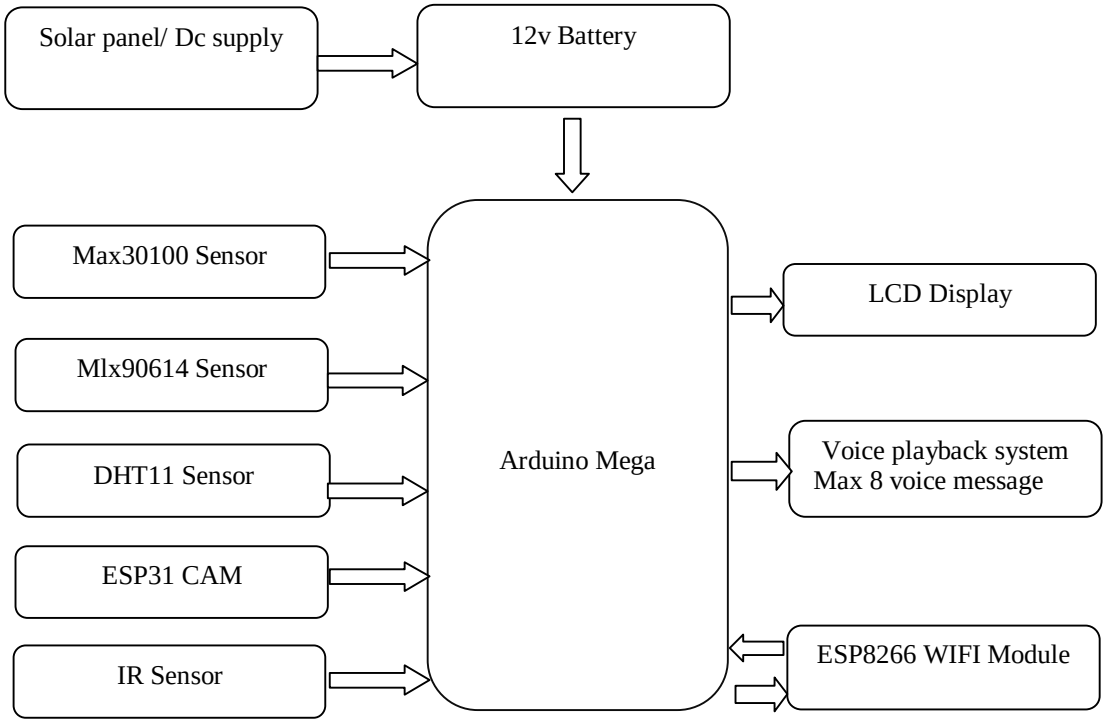
III. ALGORITHM

1) *Step 1:* Switch on the power supply or use solar panel.
2) *Step 2:* Display the title of project on mirror.
3) *Step 3:* Connect Wi-Fi module to display current date and time.
4) *Step 4:* Display room temperature and humidity.
5) *Step 5:* Check for user in front of mirror. If yes, Display body temperature, oxygen level and pulse rate. If no, GOTO Step 4.
6) *Step 6:* Switch off power supply when not in use.

IV. COMPONENTS REQUIRED

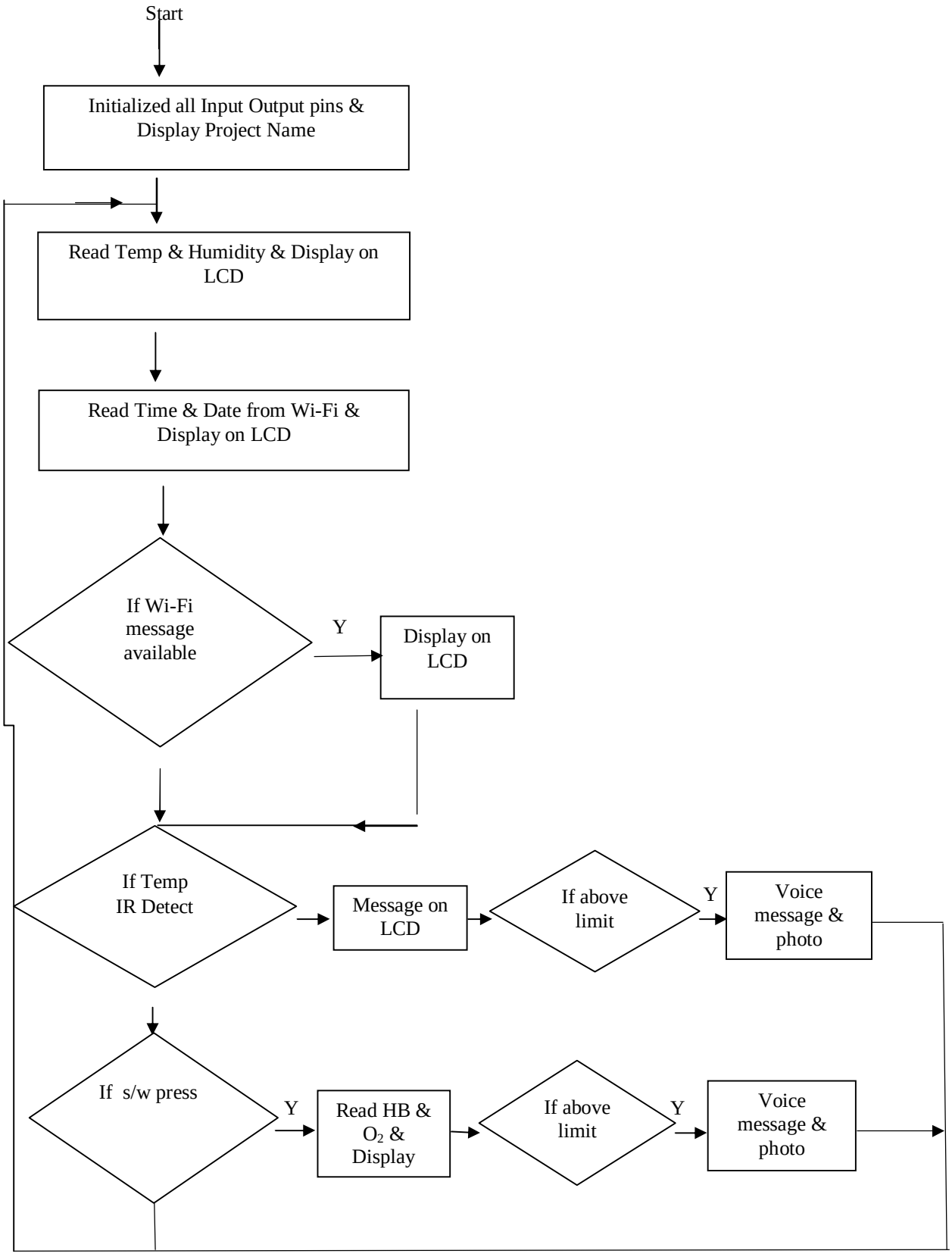
	Components Required	
	Component name	*Application*
1	Arduino Mega2560	Forms the CPU of system
2	LCD Display	To display results
3	ESP8266 Wi-Fi Module	For current date and time
4	Mlx90614	For contactless body temperature
5	Max30100	For SOP2 and Pulse rate
6	ARP33A3	For voice commands
7	DHT11	For room temperature and humidity
8	ESP32 CAM	For camera
9	Mirror	To provide surface
10	12v Solar Panel	For power supply
11	12v Reachable Battery	For power supply

V. BLOCK DAIGRAM



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VI. FLOW CHART



VII. WORKING

1) *Power Supply:* In this project we have come up with two power supply options. One is 12 V Battery and other one is a Solar Panel. The whole system works on 5V. Since 5V Battery & 5V source is not available. So a Booster module was put in place.The 12V Battery supply converts into 5V.
2) *Camera:* There is a camera attached on top of the smart mirror. Camera works on 5V.The function of the camera module is to capture the image of the person and view it later.
3) *SPO_2 Sensor max 30100:* This sensor is attached at the left side of the smart mirror. The sensor works on 5V. The function of the SPO_2 sensor is to measure the oxygen rate of the person.
4) *Temp Sensor MLX90614:* This sensor is attached at the right side of the smart mirror. The sensor requires 3.3V supply. The function of the Temp sensor is to measure the body temperature and heart beat of the person. There is a switch provided to scan.
5) *DHT11 Sensor:* This sensor is attached to the right side of the smart mirror. It displays the room temperature and humidity.
6) *IR Sensor:* This sensor is attached next to the camera module on top of the smart mirror. The IR sensor works on 5V. The IR sensor detects person if it is standing in range or not.IR sensor detects whether the person is infront of the smart mirror or not. If the person comes infront of the IR sensor it takes the note of the body temperature of the person.
7) *Arduino Mega:* Arduino is the main component of our project. We give input to it and Arduino performs all the operations which we have given in form of code . After performing all the operations it gives the expected output to us.
8) *LCD Display 20*4:* The LCD Display is used in this project to display the outputs of each and every sensors put into use. We can display any message on the LCD display.
9) *Voice Playback System:* The Voice Playback system module works on 5V. Maximum 8 messages can be recorded and played. This model gives instructions to the person when it is infront of the smart mirror. In case temperature of person is more than threshold value then this voice module will give warning alarm.
10) *ESP8266 Wifi Module:* The Wifi module supplies 3.3V. The function of the module is to update the data on the web page.

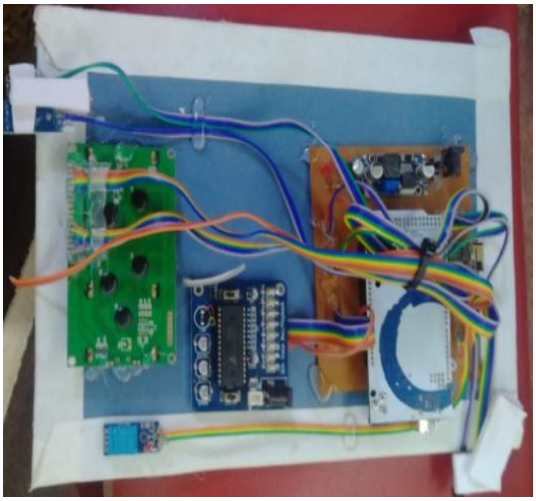


Fig.1 Implementation of the system

VIII. CONCLUSION

The objective of this undertaking is to build up a mirror which is smart and can be used to track our health regularly without visiting doctor. We have successfully built the health mirror using IoT, programmed with embedded c which has important health features such as contactless human body temperature measurement, oxygen saturation level measurement and pulse rate measurement. It also displays current date and time.

IX. FUTURE SCOPE

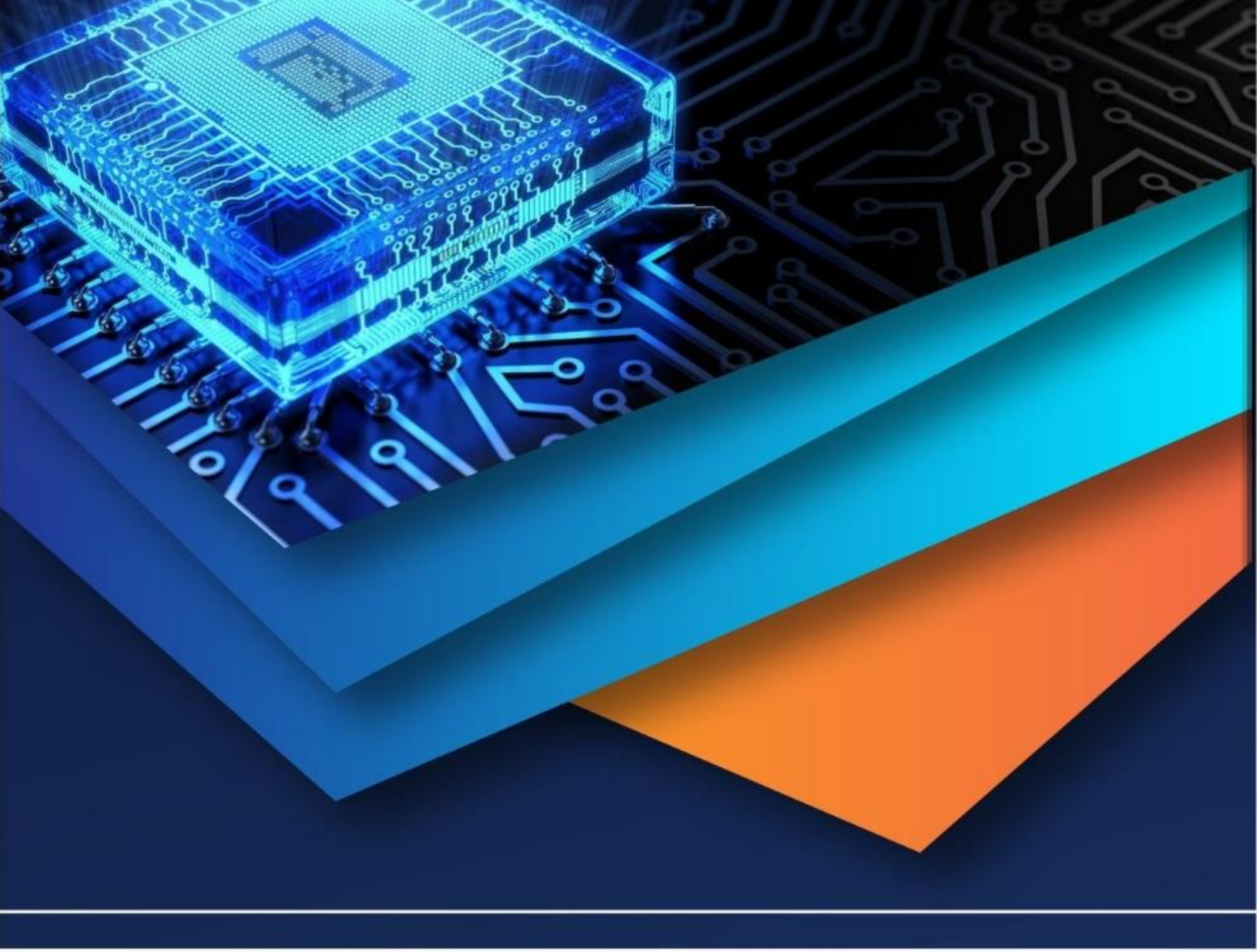
In future this project can be improved by adding more features like diabetes detection, heart attack or cardio vascular disease with person's breath or changes on face using Artificial intelligence or Machine learning technology. We can also add face scanner in mirror which can scan person's face and display their mood status and store it regularly which can be useful to track if person has signs of any mental disease such as depression, anxiety, etc.

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