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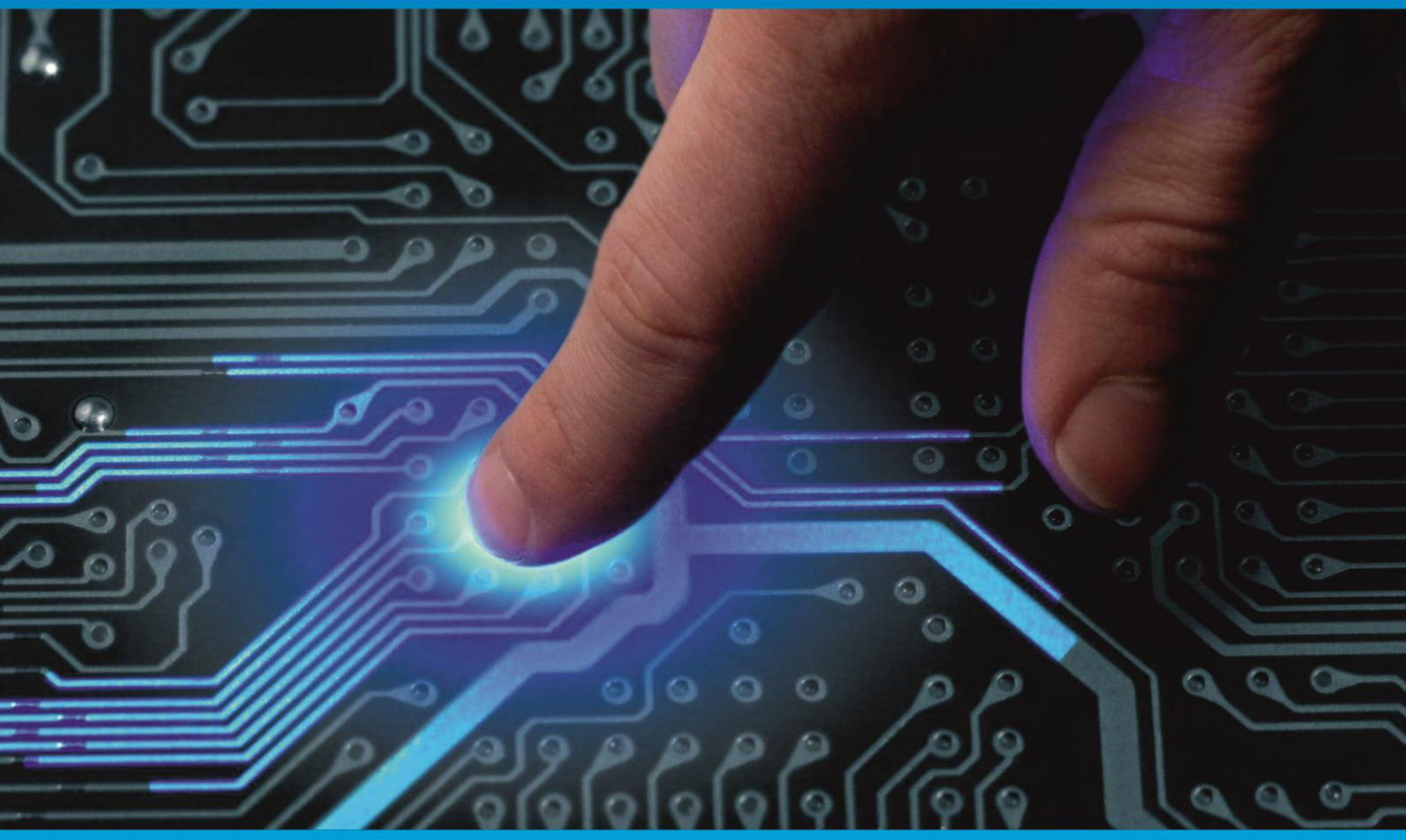

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IoT Based Smart-Assist Compact Ventilator Mechanism for Patient

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ABSTRACT: Basically, a ventilator leads control over the body's breathing procedure when sickness has made the lungs come up short. This gives the patient opportunity to ward off the contamination and recoup. Different sorts of clinical ventilation can be utilized. Mainly, a mechanical ventilator has several uses, there are assistance for cardiac arrest or an asthmatic patient and COVID patient. So before providing with a mechanical support, a number of factors are taken into consideration including age, effort of breathing and several others. When the problem arises of airways like asthma and covid, ability to exchange gases is reduced, for instance, pneumonia disease. People suffering from disease such as asthma, pneumonia, covid and other breath related disease can make use this IOT based smart assisted compact ventilator. The project is designed with aid of a micro-controller and sensors like heart rate sensor, respiratory sensor, and temperature sensor along with a driver circuit. When the condition of the patient is abnormal then the ventilator will automatically TURN ON. Furthermore, the entire design is connected to GSM module which is used to alert the status of the patient by sending an SMS to the guardian's number and buzzer will also activated at same time.Our project is designed in a cost-effective manner and it works fully automated without any human interference.

KEYWORDS: Internet of Things (IoT), Ventilator Mechanism, Automated Process, Global System for Mobile Communication (GSM)

I. INTRODUCTION

The COVID-19 crisis may cause shortages of ventilators used to treat patients with severe respiratory symptoms [1]. COVID-19 patients can experience acute respiratory distress syndrome (ARDS), which causes extreme difficulty breathing due to fluid leaking into the lungs. Mechanical ventilation can help to treat these patients by providing oxygen while the underlying disease runs its course [2]. Appropriate oxygen delivery is a mainstay of critical care and in COVID-19 can prevent death from ARDS and hypoxemia [3]. Another main disease asthma is a growing problem. The people like infants, pregnant woman, elders, adult and toddlers suffer from asthma. So many people have suffered from chronic lung diseases. Asthma is more common in urban and rural areas. Asthma is mainly caused by smoking, dust particles and air pollution. Due to no ventilation of air the patient suffered from breath problems and even to respiratory issues [4]. USUALLY, elder people suffered a lot. In most of hospitals, the patients are not monitored at correct time. So with help of new technology we are going to smart ventilator system.

II. RELATED WORK

In the proposed frame work,we make use of heart rate sensor along with respiratory sensor [5] to mentor the necessary vitals of the patient and display on a screen. An emergency buzzer alert is fitted in the system to sound an alert as soon as any anomaly is detected. [6-8] Here we use a silicon ventilator bag coupled driven by DC motors with 2 side push mechanism to push ventilator bag. Ventilator mechanism perform it depend on respiration level [9,10]. If respiratory level is how low then the system will make a call to the guardian of the patient using GSM module and the variation of heart beat level also will updated to IOT . The entire system is driven by Arduino controller to achieved desired results and to assist patients in covid pandemic and other emergency solutions. Every status will be displayed on lcd and uploaded in cloud server by using IOT technology.

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III. PROPOSEDBLOCK DIAGRAM

The block diagram of the proposed method is shown in figure 1.

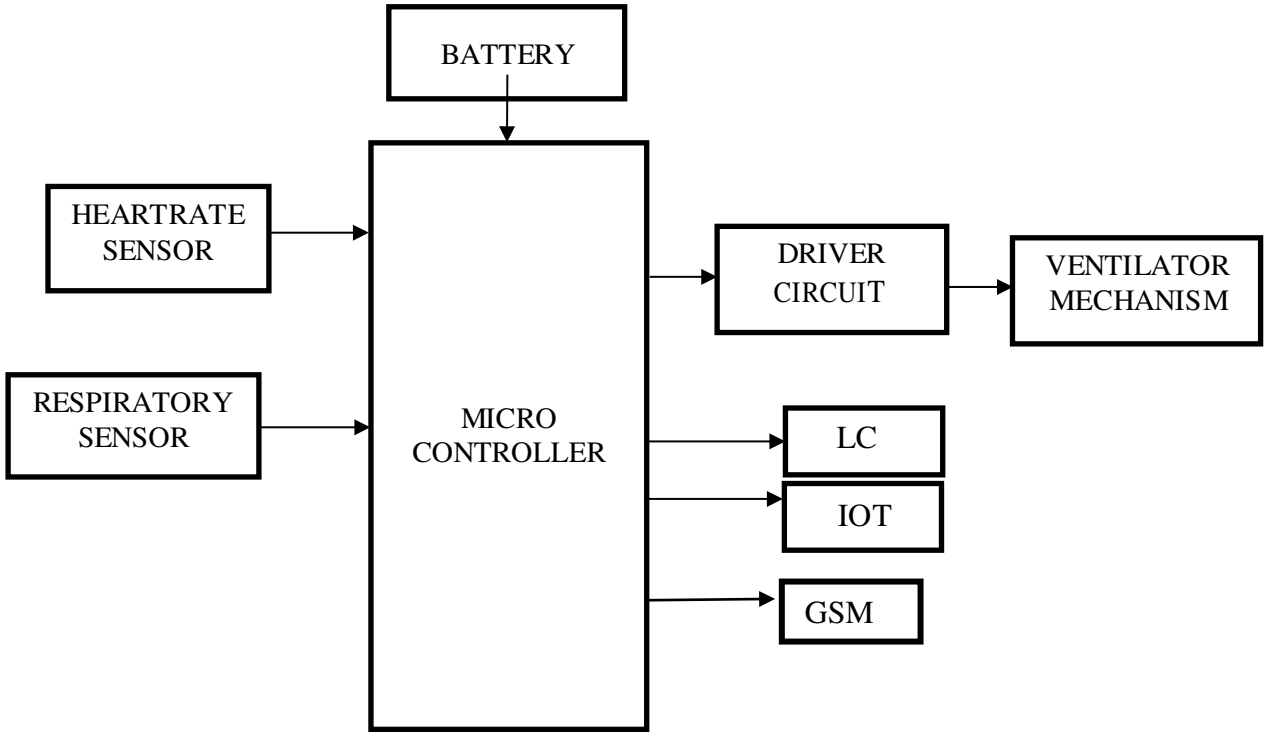

Figure 1: Block Diagram of the proposed method

IV. PROPOSED METHOD

The project is designed with aid of a micro-controller and sensors like heart rate sensor, respiratory sensor, temperature sensor along with a driver circuit. The driver circuit is used to ON and OFF the ventilator mechanism.The entire design is connected to GSM module which is used to alert the status of the patient. The design work in such a way, all three sensors check for the patient health parameters.The heartbeat sensor, respiration sensor and temperature sensor is used to check the patient health conditions which are connected to the relative analog port pins (A0, A1,A2).Here we are utilizing microcontroller along with which the LCD is associated with the PORT PINS (13,12,11,10,9,8). In 8-bit LCD we utilize 4- data lines. The register selects and enable pins is associated with the digital pin (13,12) of controller. So the condition of the patient can be displayed on LCD.The driver circuit is connected with microcontroller when the condition is abnormal then the ventilator will automatically TURN ON. IOT circuit is connected to the microcontroller when the condition goes abnormal it will send an SMS to the given number and buzzer will also activated at same time. GSM is connected with the UART1 for initiate a call when a condition goes abnormal. Buzzer will be connected in digital pin (5) of controller to intimate alarm.

V. RESULT

Thus we have use Arduino IDE software and sensors like Heartbeat sensor, Respiratory sensor to monitor patients health parameters and executed a design successfully which intimates the patients guardian with call and SMS and even the database of health parameters are stored in an IOT app, simultaneously the ventilator is turned on automatically with the help of microcontroller.The images in figure 2 and 3 shows the output of the project, which intimates the user by altering the call in figure 2 and indicates SMS alert to the user when the health goes abnormal in figure 3 and the lcd output of project is displayed as shown in figure 4.

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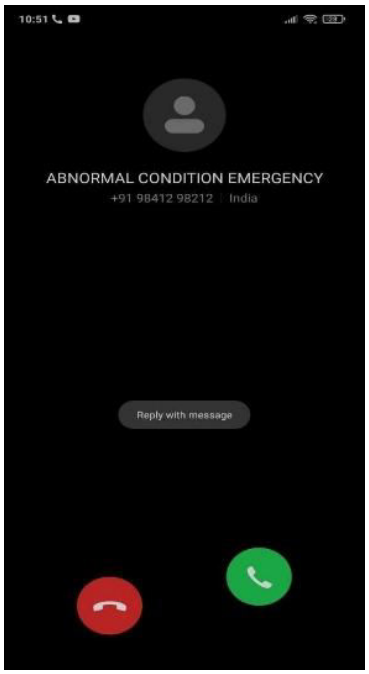

Figure 2: Call Alert

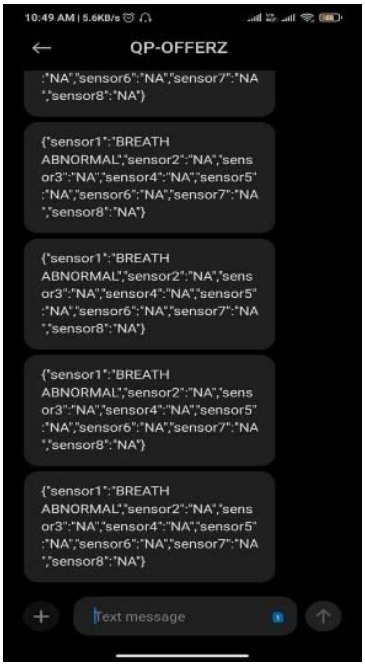

Figure 3: SMS Alert

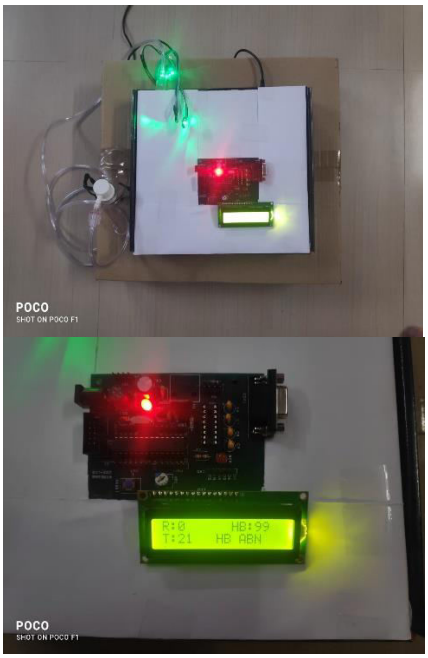

Figure 4: Display alert

VI. CONCLUSION AND FUTURE WORK

Our project is designed in a cost-effective manner and it works fully automated without any human interference and proposed an idea of monitoring patient's health status in order to know whether they are at risk or in normal condition. It helps to regulate patient bodysystematically. This system can be employed in homes so that it helps patients to regularly check in their condition rather than going to the hospitals regularly.In future we are working further on the project design to make it more automated and we are going to add a web cam to monitor the patient and train the design with image non-recognition and ML Algorithms to improve accuracy of the sensors and alarming systems.

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