A Low-Cost Approach To Monitor Elderly Wellbeing On Embedded Platform

Abstract

This research work includes finding an answer for observing the elderly wellbeing. It can likewise be utilized as a part of provincial regions or remote ranges where legitimate doctor's facility offices are not present. The examination work is focused on setting up a minimal effort framework on implanted stage which can check the state of an elderly patient's body with a predefined set of parameters. A lot of this exploration is principally focused on building a close immaculate model with keeping the expense of the framework to be worked to the base. This framework will roll out a decent improvement in what individuals look like towards social insurance area. Keeping the cost least and building the framework to check the state of a human body continuously will pull in most to this straightforward and dependable framework to make utilization of. The present framework constructed will check through its different sensors the rate of heart beat, blood oxygen level, the temperature of the body in degree centigrade and the breath rate.

1. INTRODUCTION

On the off chance that we consider the Indian present day society, the rate of the older folks is on the developing scale. The need of taking their consideration is in high need. Particularly, for those older folks who will live in the home alone without anybody's
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guide. Numerous home frameworks are intended for this reason however they don't fill the sole need of observing the elderly wellbeing. In this developing period of innovation, it is in the high need to mix the innovation with the social insurance foundation to achieve everybody's requirement for it. Remote medicinal services are the main route conceivable to achieve the poor on time. Individuals living in the extremely remote territories of the province need minimum human services offices. On account of the crisis, in such remote spots, it is exceptionally troublesome for them to go after the therapeutic offices inopportune time. This study supports the requirement for the remote human services with which we can give the essential guide to the patients in the remote reaches at whatever point required.

2. LITERATURE SURVEY

There are numerous other social insurance frameworks for observing the wellbeing state of a human body. The e-Health Sensor Shield V2.0 permits Arduino and Raspberry Pi clients to perform biometric and therapeutic applications where body observing is required by utilizing 10 distinct sensors. Be that as it may, the medicinal services framework which I am proposing here will be way less expensive contrasted with the frameworks which are now present in the business sector.

The proposed framework doesn’t trade off on any of the functionalities contrasted with the current frameworks. Be that as it may, likewise the remembering the cost element it makes an extraordinary showing with regards to with its base sensors’ setup.

3. MOTIVATION

Another primary purpose of proposing the new model is the procurement of social insurance frameworks in the small-town territories of India. At the point when reviewed principle disadvantage with the rural medicinal services framework is the accessibility of specialists and a plentiful number of healing facilities. In this way, the rustic individuals of our nation are lingering behind to get appropriate restorative offices.

The way that numerous financial specialists are hoping to put their cash in the urban social protection framework is aptitude set obtained by the specialists there.

Considering urban medicinal services then again, the metropolitan urban areas have the accessibility of a sufficient number of specialists and healing facilities. Yet, only this can't make the point that the urban populace is getting the ideal treatment. The urban medicinal services base is giving the perfect arrangement, however, a quick one.

Moving towards building perfect answers for giving elderly human services checking framework in rustic ranges, there are a couple of critical objectives to be met remembering the present situation in nation's provincial territories. The expense is the main restriction. We need to consider a practical approach to take care of the issue with a close perfect arrangement. The second element is the execution of the framework. We couldn't overlook the execution criteria while keeping the expense to the base.
As per the World Bank out of an entire people of India, around 68% of the populace lives in the rustic locale. Alongside this, another stunning reality is that exclusive 35% of specialists in our nation are treating the country populace. Only this motivated me enough to begin this anticipate. Here in this anticipate I put my exertion in finding an answer for the issues confronting by country zones with respect to human services procurements. This minimal effort portable human services framework can give the essential levels of reports on the significant wellbeing angles.

![Figure 1: Rural Healthcare Statistics – India 2015](image_url)

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Figure 1 shows the graphical representation of the statistics. The Graph is prepared comparing mainly two attributes. Primary Healthcare Centre (PHC) and Community Health Centres (CHC). Community Health Centre CHCs: Community Health Centres are available is basic health unit in the urban areas.

Primary Health Centres: The basic units with the most basic facilities, and especially serving rural India, generally at the level of a panchayat.
4. PROBLEM STATEMENT
To set up a minimal effort and low power remote medicinal services unit which can screen the wellbeing condition and send the report to the concerned specialists.

5. PROJECT OBJECTIVE
- To make utilization of sensors for removing the data like temperature, appraisal of blood vessel oxygen immersion, or SpO2, heart rate and breath rate in a human body
- Extract the qualities got from sensor onto a PC or a tablet.
- Using appropriate interfaces and programming to control and show the outcomes with a graphical client interface.
- Prepare alert module and send the alert warning to an individual group of specialists if the sensor values extracted from the patient body cross a threshold.

6. SYSTEM DESCRIPTION

The complete proposed framework depiction is as in figure 1. Every one of the sensors is instated in the first place before the test. Through a client interface, an arrangement of tests that can be taken will be shown on to the screen. A test at once is to be chosen out of four. Temperature test to distinguish the body temperature, heart rate test to identify the
heart rate every moment, SpO2 test to recognize the level of oxygen present in the body,
lastly the breath test which gives back the outcome as the number of times a man breathed
in the oxygen.

Temperature test gives the outcome in 2-3 seconds. All different tests are taken for
a moment long to get the exact results with the varieties in the readings. An entire moment
long of one-minute perusing will help the guardians or specialists to check the varieties in
the readings and therefore foresee the genuine condition on their insight.

7. HARDWARE REQUIREMENTS
There are numerous equipment parts utilized as a part of building the model which
incorporates a microcontroller board and sensors. The rundown of the board and sensors
utilized as a part of the model are as given in the table underneath.

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Arduino UNO R3</td>
<td>Microcontroller Board</td>
</tr>
<tr>
<td>2 LM-35</td>
<td>Temperature Sensor</td>
</tr>
<tr>
<td>3 Infrared and Photo Sensor</td>
<td>Blood Oxygen Level</td>
</tr>
<tr>
<td>4 MX4115AP</td>
<td>Heart Beat rate</td>
</tr>
<tr>
<td>5 Nasal Prongs</td>
<td>Air – Flow sensor</td>
</tr>
<tr>
<td>6 HC-05</td>
<td>Respiration Rate</td>
</tr>
<tr>
<td></td>
<td>To Get the flow of air from nose to sensor</td>
</tr>
<tr>
<td></td>
<td>(MX4115AP)</td>
</tr>
</tbody>
</table>

8. HIGH LEVEL SYSTEM DESIGN
Figure 2 gives the diagram of framework outline in short. A 5v power supply must be
given to the microcontroller board. All the outer sensor segments' information is given to
the board. The Arduino UNO R3 board controls the force supply to the sensors going from
1.5v to 5v. Correspondences between the segments in the setup are done on the serial
interface.

The HC-05 Bluetooth module deals with a trade of information between the client
interface and the setup. The client interface presently in this connection is given on a
Bluetooth enabled PC or tablet.

Sensor yields went on to the PC are gotten on the flip side and are examined in
MATLAB stage. Each inspected is plotted on the diagram to break down the readings.
Numerous calculations are set up to check the specimens. In the event that the levels of the
yield tests from the sensors gave are inside the level of edge, they are dealt with as
protected. In the event that any example or set of tests traverse the edge level, then that
specific perusing is sent to the alert module.

The ready framework here will be an electronic mail module. This will be activated
once the sensor yield qualities are over the typically predefined edge level. An email will
be sent to individual restorative commanding voices if there should arise an occurrence of the rustic situation and if there should arise an occurrence of elderly, to their family specialists. The alert email will contain the time and date alongside the readings from the sensors which have crossed the limit set.

Figure 3: System Architecture

Figure 4: System Design

9. RESULTS AND ANALYSIS
In this section, you will see the actual results after processing the samples from the various sensors.

I. Temperature Module
   - The LM-35 Temperature Sensor gives us the values in form of voltage, in mV.
• We can scale the output voltage to get the graphical representation.
• Scaling: 1 Degree change in temperature value outputs 10mV.
• Thus 1°C □ 10mV.
• Read Temperature On Microcontroller – LM35 is connected to pin A0.

Figure 5: Temperature output in Degree Celsiu

Normal body temperature can range from 97.8 degrees F (or Fahrenheit, equivalent to 36.5 degrees C, or Celsius) to 99 degrees F (37.2 degrees C) for a healthy adult.

II. SpO2 and Heart Rate Modules
SpO2 stands for peripheral capillary oxygen saturation, an estimate of the amount of oxygen in the blood. More specifically, it is the percentage of oxygenated hemoglobin (hemoglobin containing oxygen) compared to the total amount of hemoglobin in the blood (oxygenated and non-oxygenated hemoglobin).

This value is represented by a percentage. If your Pulse Ox™ says 98%, this means that each red blood cell is made up of 98% oxygenated and 2% non-oxygenated hemoglobin. Normal SpO2 values vary between 95 and 100%.

Most adults have a resting heart rate of 60-100 beats per minute (bpm). The fitter you are, the lower your resting heart rate is likely to be. For example, athletes may have a resting heart rate of 40-60 bpm or lower.
III. Respiration / Airflow Sensor Module

A normal breathing rate for an adult at rest is 8 to 16 breaths per minute. For an infant, a normal rate is up to 44 breaths per minute. Tachypnea is the term that your doctor uses to describe your breathing if it is too fast, especially if you have fast, shallow breathing from a lung disease or other medical cause.
10. CONCLUSION & FUTURE ENHANCEMENTS

This paper introduces an ease installed framework outline and execution for observing the health condition of elderly who stay alone or alongside the overseers at home. The framework can be further streamlined with the messaging module which can send the messages to the individual medicinal group at the season of crisis. This improvement will be considered with higher need. Additional to that an application for handheld devices can be developed which can make the work of tracking the status of health much easier to the care takers. Further the project will be migrated to the android platform application and will be tested with different conditions of the human body.

11. REFERENCES