Health Monitoring System Using IoT

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Subject: Special Aspects of Automation
Task: IoT Project

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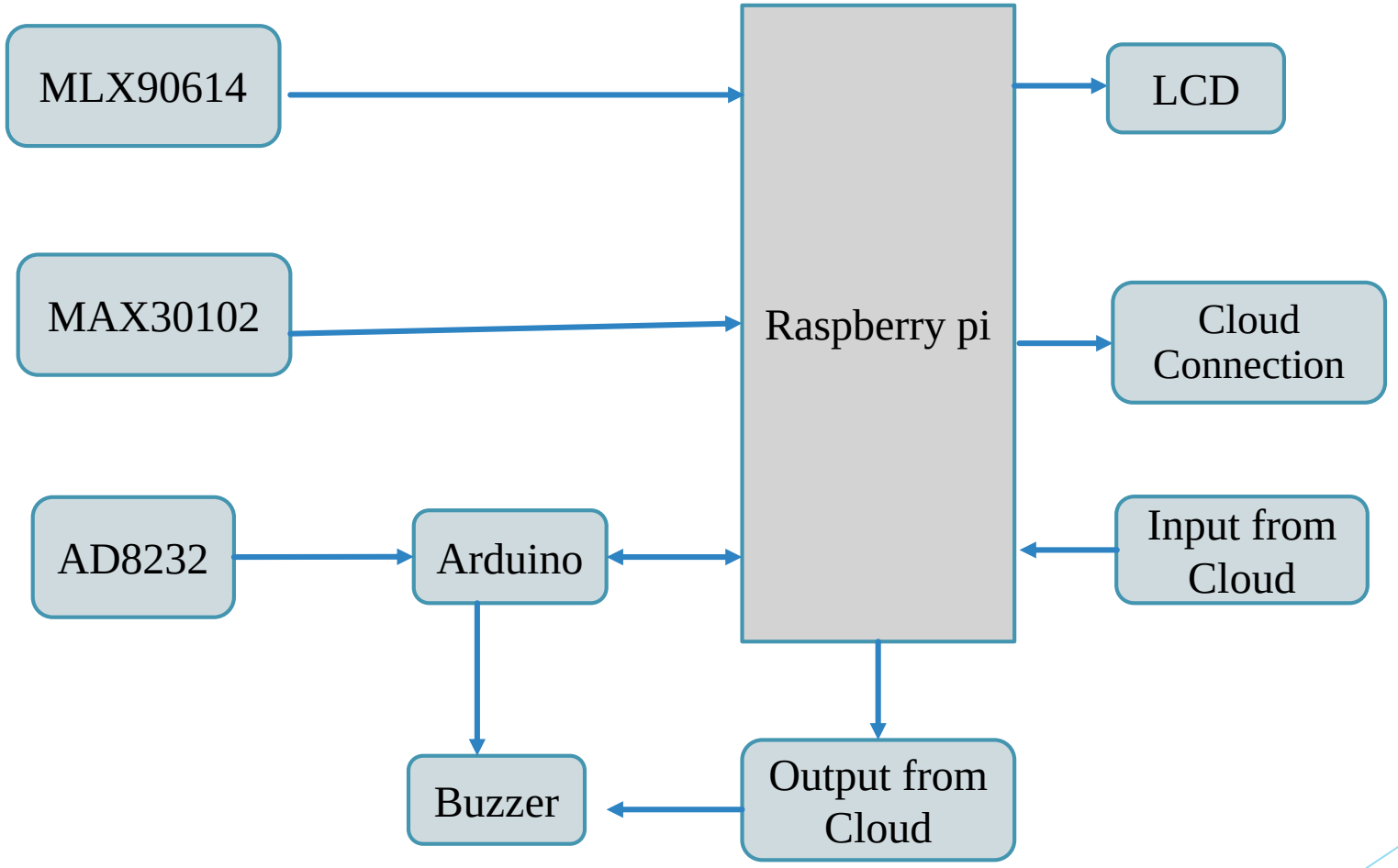
Overview

The core objective of this project is to design and implement a Smart Health Monitoring System based on IoT. The Sensors are embedded on the patient's body to sense various parameters such as pulse rate, ECG and body temperature. These sensors are connected to the control unit, which calculates the values of the sensors. These values are stored in the IoT cloud service to the base station. By using the IoT platforms, the data can be accessed at any remote place. Therefore, the disease can be diagnosed by the doctor from a distanced location.

Why Health Monitoring Systems?

- Growing population and the lack of enough healthcare workers
- The need for indirect contact and social distance due to present Covid situation
- More patients could be monitored by one doctor
- Faster respond to the patients
- Reducing the need of personal healthcare
- Allowing healthcare professionals to be more alert to their patients

Block Diagram



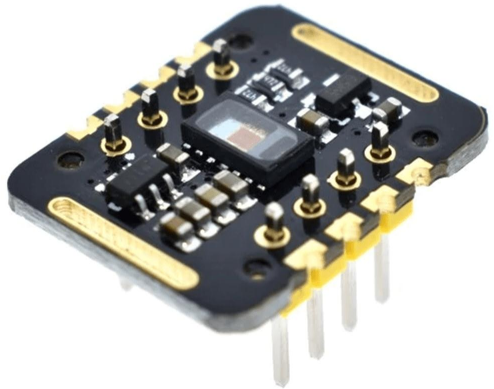
List of Components

- Arduino Uno
- Raspberry pi
- Breadboard
- MAX30102 – Pulse Rate Sensor
- MLX90614 – Temperature Sensor
- AD8232 – ECG Sensor
- 16*2 LCD
- Buzzer

Components Description

MAX30102 (High-Sensitivity Pulse Oximeter and Heart-Rate Sensor for Wearable Health) is:

- An integral pulse oximetry and heart-rate monitoring biosensor module
- Comprised of internal LEDs, photodetectors, optical elements, and low-noise electronics that greatly reduce ambient light



Components Description

MLX90614 (Contactless Infrared (IR) Digital Temperature Sensor):

- Consists of two devices embedded as a single sensor:
  - sensing unit
  - processing unit
- Measures the temperature between -70° C and 382.2°C.
- Measures the temperature of the object using infrared rays.

Components Description

AD8232 (Single-Lead, Heart Rate Monitor Front End)

- Uses AD8232 analog IC, which is the main component of this ECG module.
- Performs three functions on small bi-potential signals in noisy conditions including:

  - extraction

  - amplification

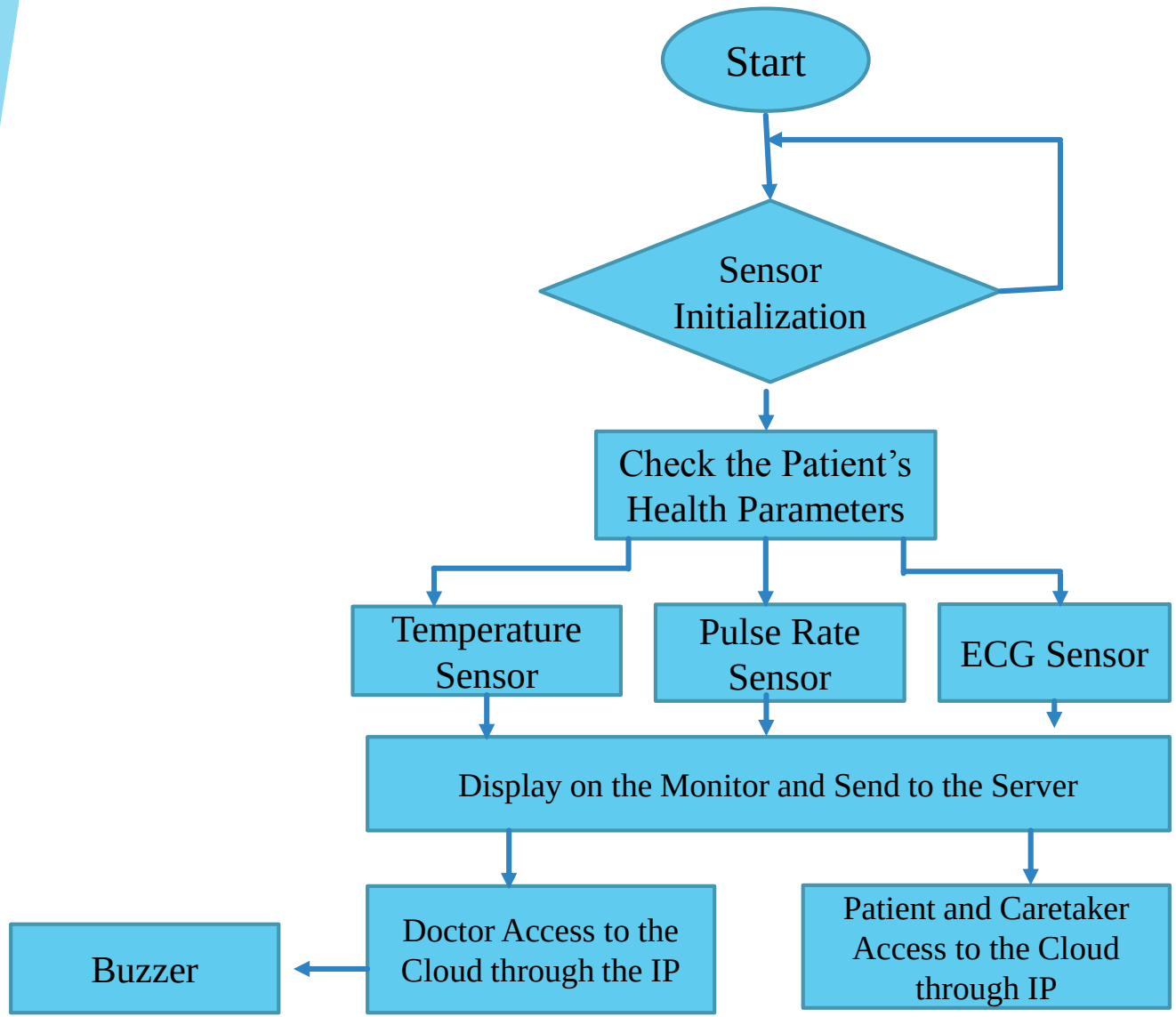
  - filtration

Description of Implementation

Measuring the health parameters is done by sensors:

- MAX30102 measures:
  - Heart Rate
  - Oxygen Level
- MLX90614 measures:
  - Body Temperature
- AD8232 measures:
  - ECG
- LCD shows:
  - values of sensors

Flowchart



Results in Terminal:

```
Next iteration is starting ...
No New Messages.
Patient's Surrounding Temperature : 27.490000000000001
Patient's body Temperature : 38.250000000000006
hr detected: True
sp detected: True
Patient's Heart Rate:   73
Patient's SPO2 Level:   99
ECG peak value 0.0
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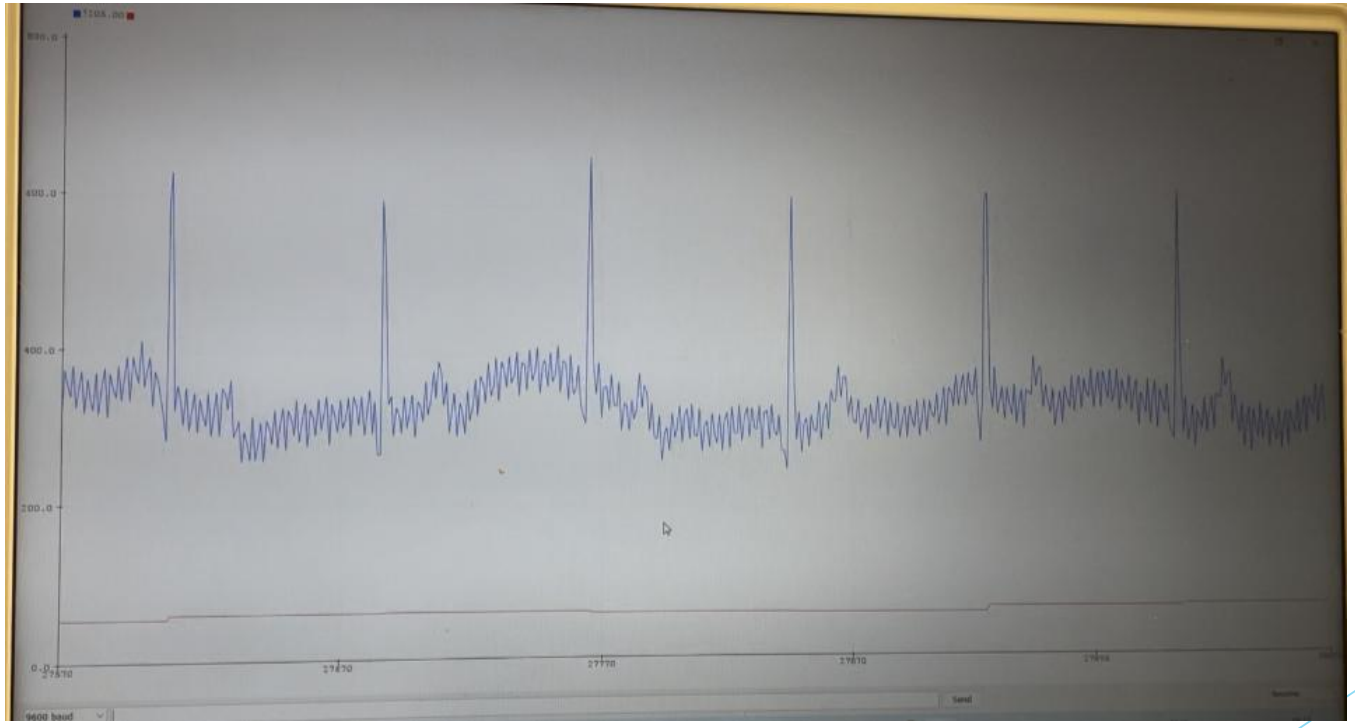

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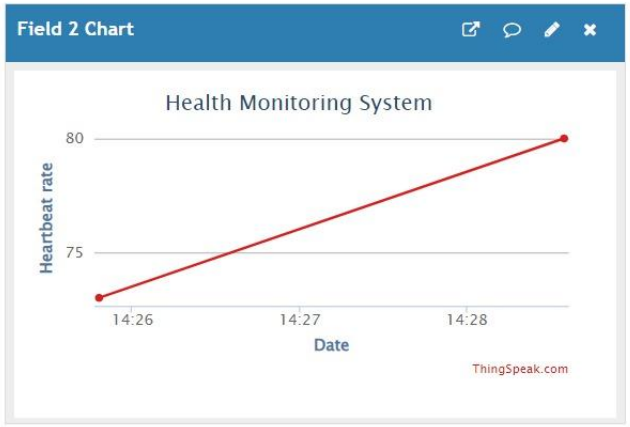
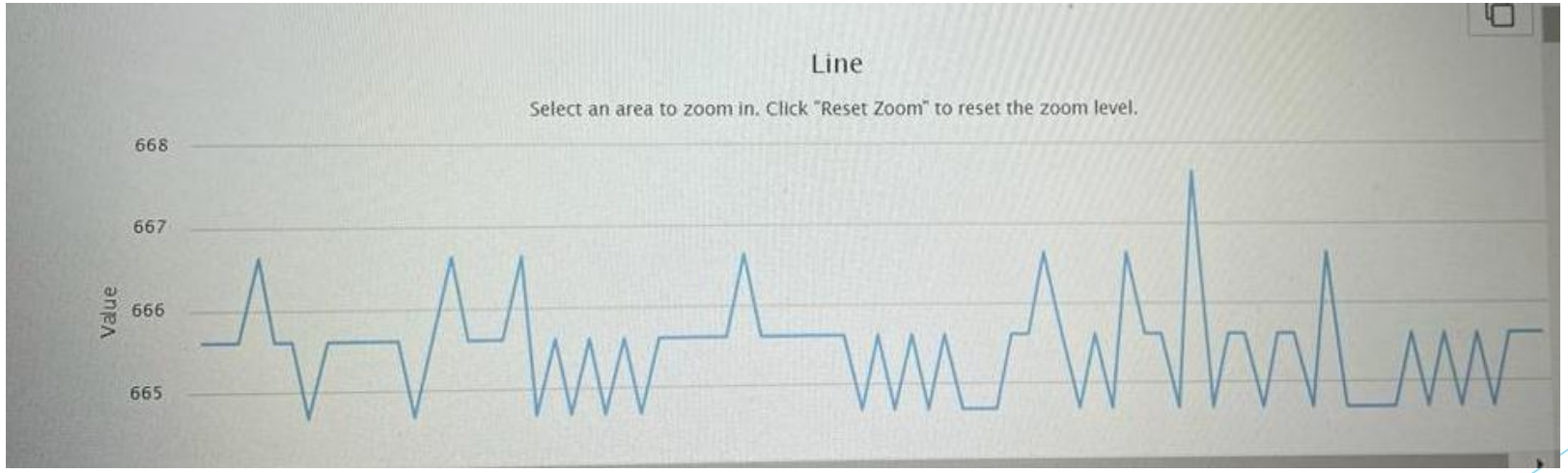
Results on IoT:





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Future Aspects:

- In case of an emergency, sending alert message directly to the hospital by measuring actual real time values and giving if else conditions by comparing them to the normal condition values.
- The doctor can set the medicine intake alarm as per the his time table.
- As environmental pollution plays an vital role in human health. Therefore, in future we will try to collect data from sensors placed in homes, cars and offices. This data will be used to assess health risks and improve treatment plans.

Thank you!!!