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18/ENG04/006
Electrical Engineering

1. This application is a web smart health system that would allow the detection, display, storage, transmission of data and also allow access of the database via the web. This system would help to minimise human interaction that is involved with monitoring and tracking the health status of infected patients, which in turn would help to reduce the possible spread of COVID-19 amongst more medical personnel.

   The framework of the web based health tracking and monitoring system is as follows. A number of medical sensors would be connected to the patient in order to obtain vital signs which would be converted to biomedical signals that would be transmitted via Wi-Fi/cellular. The data received is then analysed. In the case of abnormality found a medical expert would be alarmed in order to help contain the situation, while in the case of no abnormality the system would keep on monitoring the patient's vital signs. A webpage would be used to access patient information from the hospital database, if the need arises.
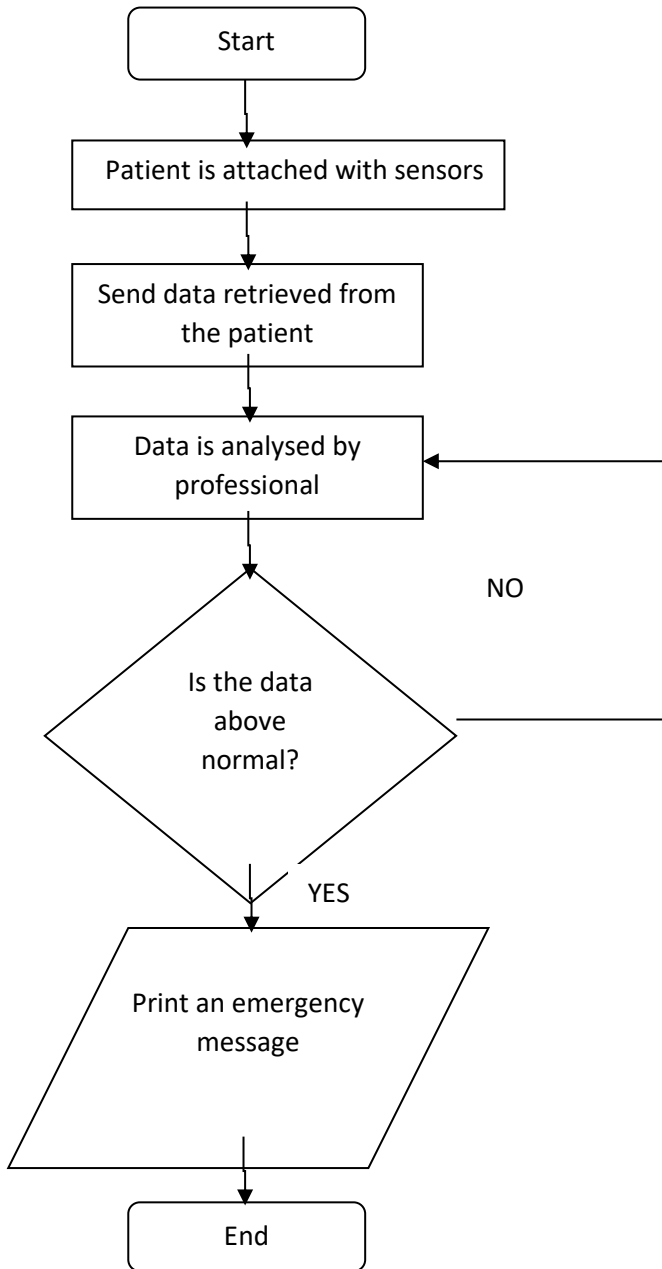
2. Hardware Features:
   a. Sensors: these are medical sensors that will check for the patient's vital signs (temperature, pulse rate, respiration rate, heart rate, blood pressure).
   b. Server: this is a device that would allow the maintenance and sharing of the medical database of the patients.
   c. Computers: this could be a Smartphone, laptop or desktop that can be used to access the web based health tracking and monitoring system in order to retrieve patient information.

   Software Features:
   a. Database Management System (DBMS): this is a software application that is designed to allow the definition, manipulation, retrieval, and management of the hospital's medical database.
   b. Web Design Package: this software would be used to design the web template that would be used to access patient information via the internet. It would also help to organise and manage the digital information on the website.
   c. Access control management software: this software would control who has access to medical records using the two-factor authentication. This is to ensure that the medical data isn't altered or tampered or given access to the unauthorized personnel.

3.

Flowchart:

```
        ┌──────────────────┐
        │      Start       │
        └──────────────────┘
                 │
                 ▼
    ┌────────────────────────────┐
    │ Patient is attached with    │
    │          sensors            │
    └────────────────────────────┘
                 │
                 ▼
    ┌────────────────────────────┐
    │ Send data retrieved from    │
    │      the patient            │
    └────────────────────────────┘
                 │
                 ▼
    ┌────────────────────────────┐
    │ Data is analysed by         │◄──────┐
    │      professional           │       │
    └────────────────────────────┘       │
                 │                     NO │
                 ▼                        │
            ╱─────────╲                   │
           ╱  Is the    ╲                 │
          ╱   data above  ╲───────────────┘
          ╲   normal?     ╱
           ╲             ╱
            ╲───────────╱
                 │ YES
                 ▼
        ╱──────────────────╲
       ╱ Print an emergency  ╲
      ╱      message          ╲
      ╲───────────────────────╱
                 │
                 ▼
        ┌──────────────────┐
        │       End        │
        └──────────────────┘
```

Step 2: Data is collected from the sensors attached to the patient.
Step 3: Data received is analysed by a professional
Step 4: If data exceeds normal values
  -Mark patient
  Else
  -Go back to Step 2
Step 5: Print an emergency message
Step 6: End

Algorithm:

Step 1: Start

4. Top Down Approach

```
                          ┌──────────────────┐
                          │   Smart Health   │
                          │      System      │
                          └──────────────────┘
                    ┌───────────────┴───────────────┐
          ┌──────────────────┐          ┌──────────────────┐
          │   Web Design     │          │    Database       │
          │    Package       │          │   Management      │
          │                  │          │    System         │
          └──────────────────┘          └──────────────────┘
        ┌──────────┴──────────┐                  │
┌──────────────┐  ┌──────────────┐      ┌──────────────────┐
│   Database   │  │ Editing Tools│      │ Database Engine  │
└──────────────┘  └──────────────┘      └──────────────────┘
       │                 │                       │
  ┌──────────┐      ┌──────────┐         ┌──────────────┐
  │ Updating │      │ Editing  │         │ Data security│
  └──────────┘      └──────────┘         └──────────────┘
                         │                       │
                   ┌──────────┐         ┌──────────────┐
                   │Authoring │         │ Processing of│
                   └──────────┘         │    data      │
                                        └──────────────┘
```