By carefully regulating the timing of traffic signals and the speed of approaching cars, intersection control tries to maximize junction throughput and reduce stopping time.
The authors in the research suggest a revolutionary decentralized traffic light control system that utilizes wireless sensor networks.
The wireless sensor network, the localized traffic flow model policy, and the higher-level coordination of the traffic light agents are the three levels of the system architecture. The nearest Intersection Control Agent (ICA) receives data from the wireless sensors, which track the number, speed, and other characteristics of passing cars, and uses it to estimate the intersection's flow model.
The real-time adaptive control of the traffic signals is the key contribution. This will also enhance the movement of cars. By regulating the traffic lights, an intersection control agent controls the intersection. To control a larger area, several intersection agents can communicate with one another.

5.2.2 Industrial IoT

The Industrial Internet of Things (IIoT) is the collection of sensors, instruments and autonomous devices connected through the internet to industrial applications. This network makes it possible to gather data, carry out analyses and optimise production, increasing the efficiency and reducing the costs of the manufacturing process and the provision of services. Industrial applications are complete technological ecosystems that connect devices and these with the people who manage the processes in assembly lines, logistics and large-scale distribution.

Current IIoT applications are primarily concentrated in manufacturing, transport and energy, with **an investment of over 300 billion dollars worldwide in 2019 which is expected to double by 2025.** In the immediate future it is expected that the adoption of the IIoT will result in the implementation of more industrial robots, such as cobots, warehouse and transport control systems, and predictive maintenance systems.
The difference between the Internet of Things (IoT) and its industrial version (IIoT) is that while IoT focuses on services for consumers, **IIoT focuses on increasing safety and efficiency at production sites.** For example, consumer solutions have focused on smart devices for the home, from virtual assistants to temperature sensors or security systems, or for people, such as wearables that monitor health.

CHARACTERISTICS OF THE INDUSTRIAL INTERNET OF THINGS (IIOT)

Not all systems can be classified as IIoT. In general, they need to be networked systems that generate data for analysis and produce concrete actions. The operation of IIoT systems is based on a layered structure:

Devices. The visible part of the system is the devices: sensors, GPS locators, machines, among others.

Network. Above this is the connectivity layer, i.e. the network that is established between these devices and the servers through cloud storage or edge computing.

Services. These are computer applications that analyse the data collected and process them to offer a specific service.

Content. This is the interface with the human operator, which can be a computer, a tablet or even devices such as virtual reality or augmented reality glasses.

APPLICATIONS AND SOLUTIONS OF THE INDUSTRIAL INTERNET OF THINGS (IIOT)

The applications of the Internet of Things in industry are varied, but below we review some of the most relevant:

- **Use of autonomous vehicles**
  The transport of components to the plant or products to the warehouse can be done by autonomous vehicles that are able to move from one side of the factory to the other by detecting obstacles.

- **Optimisation of machine performance**
  An inactive machine represents a loss of revenue. Thanks to sensors and data processing, it is possible to optimise machine utilisation time inside a manufacturing plant.

- **Reduction of human errors**
  Human operators will continue to be essential for many tasks, but the tools they use will be connected to the system to save time and avoid errors.

- **Improvement in logistics and distribution**
  Stored products incorporate sensors that provide real-time data on their location and even on their temperature and surrounding conditions which will be particularly useful during, for example, the distribution of the COVID-19 vaccine.

- **Decrease in the number of accidents**
  Wearables, such as goggles, bracelets and gloves, allow data to be collected from the operator wearing them. Examples of this data range from their location or proximity to machines, to their pulse, temperature and blood pressure, thereby reducing the possibility of accidents.

IBERDROLA

The impact of the Internet of Things
on some industries

ELECTRICITY
- Plant automation
- Checking of the condition of equipment
- Maintenance of sustainable environments

TRANSPORT
- Real-time management of orders and shipments
- Automated vehicle tracking
- On-demand inventory management

GAS AND OIL
- Measurement of crude oil extraction ratios
- Connected oil and gas pipelines
- Remote asset monitoring and management

HOSPITALITY
- Room automation
- Improvements in room service
- Integration between resorts

WATER
- Water flow controllers
- Waste water treatment
- Smart consumption management

Source: DZone.

5.3.1 Smart health

The healthcare monitoring systems has emerged as one of the most vital system and became technology oriented from the past decade. Humans are facing a problem of unexpected death due to various illness which is because of lack of medical care to the patients at right time. The primary goal was to develop a reliable patient monitoring system using IoT so that the healthcare professionals can monitor their patients, who are either hospitalized or at home using an IoT based integrated healthcare system with the view of ensuring patients are cared for better.

A mobile device based wireless healthcare monitoring system was developed which can provide real time online information about physiological conditions of a patient mainly consists of sensors, the data acquisition unit, microcontroller (i.e., Arduino), and programmed with a software (i.e., JAVA). The patient's temperature, heart beat rate, EEG data are monitored, displayed and stored by the system and sent to the doctor's mobile containing the application. Thus, IoT based patient monitoring system effectively monitor patient's health status and save life on time.

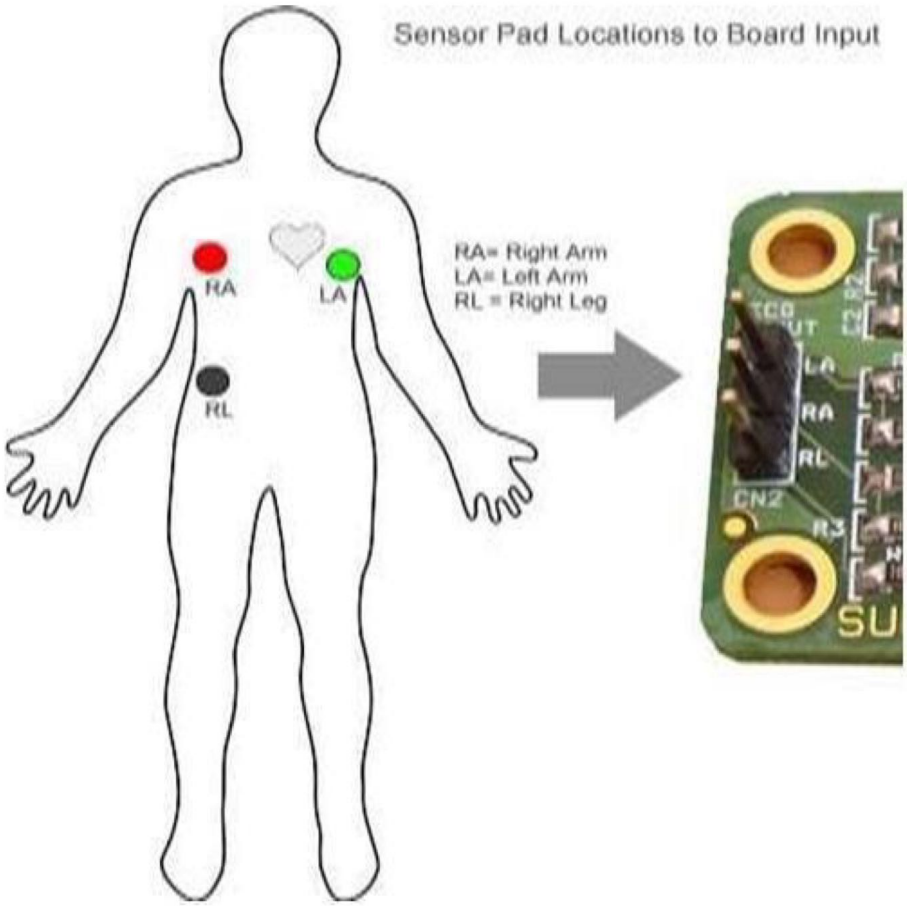
INTRODUCTION

The increased use of mobile technologies and smart devices in the area of health has caused great impact on the world. Health experts are increasingly taking advantage of the benefits these technologies bring, thus generating a significant improvement in health care in clinical settings. Likewise, countless ordinary users are being served from the advantages of the M-Health (Mobile Health) applications and E-Health (health care supported by ICT) to improve, help and assist their health.

According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. As we are truly inspired by this, we attempt to propose an innovative system that puts forward a smart patient health tracking system that uses sensors to track patient vital parameters and uses internet to update the doctors so that they can help in case of any issues at the earliest preventing death rates.

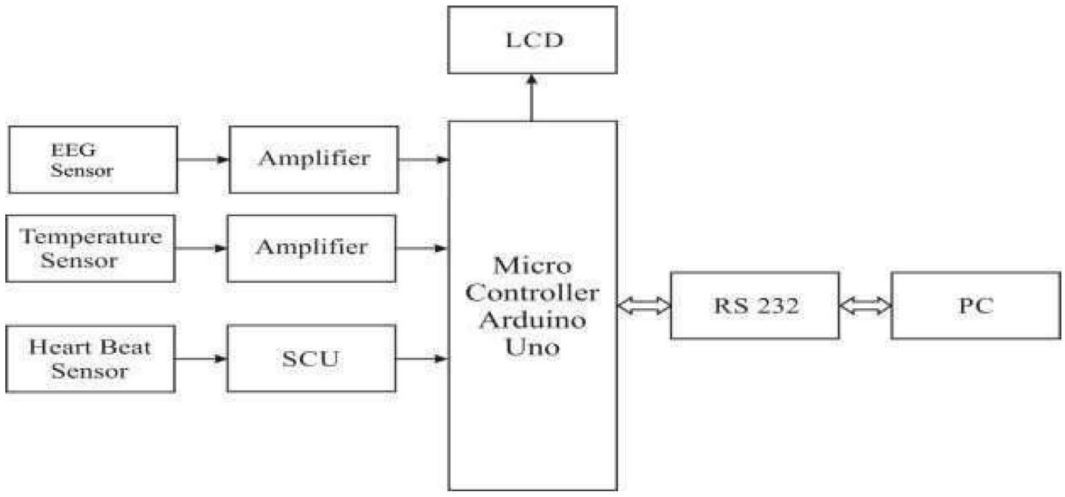
Signal Conditioning Unit

This sensor is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram and output as an analog reading. ECGs can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as an op amp to help obtain a clear signal from the PR and QT Intervals easily.

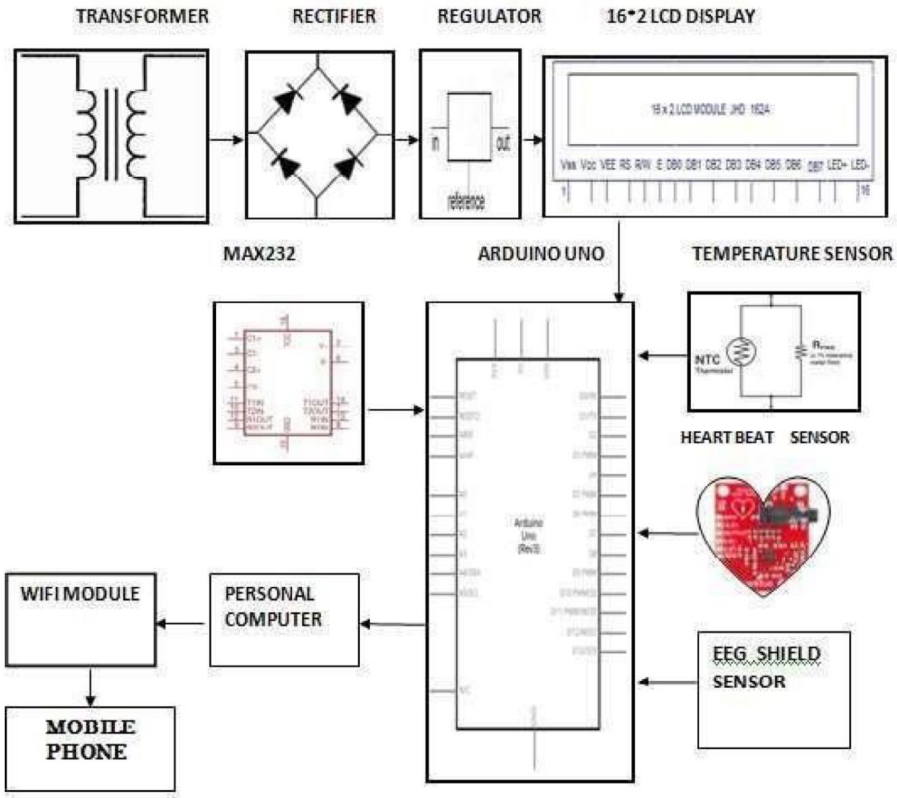


Position of Sensor Pads Input

Block Diagram



Block diagram of sensors connected with the PC



Block diagram of Health monitoring system

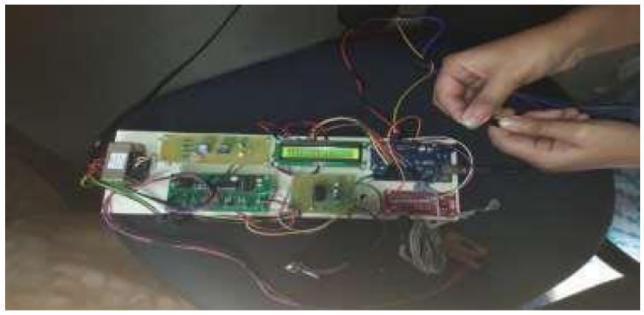
Operating Mechanism

STEP 1: The Heartbeat sensor is fixed to the patient's finger. This contains an IR sensor in it .Every pumping we get pulse from that sensor. This sensor output is given to the arduino viaSignal conditioning unit for amplification

Heart beat sensor

STEP 2

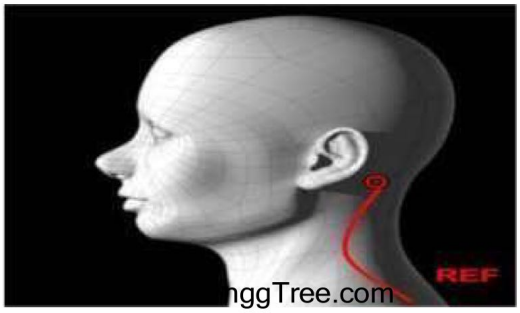
NTC type thermistor is used as a temperature sensor. This temperature sensor output variesbased on the temperature, this output is also given to arduino.



Temperature sensor

STEP 3

EEG sensor is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram output as an analog reading. ECGs can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as an op-amp to help obtain a clear signal from the PR and QT Intervals easily and connected to arduino.



EEG sensor

Step 4

All these values are transferred to PC via RS 232 and by using the URL,it is transferred to the mobile app created.

Output in LCD

Output in the Mobile Application:

The output is displayed in the form of string in a particular interval of time. The application is very simple as it just displays the analog values followed by a statement describing the kind of value displayed.

Output displayed in the mobile application device

Testing and findings health care unit

The Patient Health Monitoring System developed is tested using various persons with normal to abnormal health conditions. The various testing and findings producing results with minimal error rate and the observations are listed below.

Temperature Findings

The NC type thermistor used is programmed to display the value at room temperature for demo purposes with minimal error of + or – 5.