

# Improved biomedical sensing technologies and applications by using TEDS

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**ABSTRACT-** A In biomedical sensors having advancement in micro fabrication and in signal processing techniques, the use of transducer electronic data sheet (TEDs) is to suggest new features to improve performance of biomedical sensors and its applications. The development of smart transducers and sensors uses a family of standards.ISO/IEC/IEEE21451-X also known as IEEE1451.X is a family of standards that allows designer to project smart transducers and sensors having reference to protocols, TEDS, networks, web services, radio frequency identification and so on. TEDS are mainly used to store information related to patient clinical history and diagnostic criteria.

**Keywords:** TEDS, Biomedical sensors, reliability, patient adapting system, Diagnostic algorithm.

## 1. INTRODUCTION

A modern biomedical sensor consists of a biologically or biophysically-derived sensing element integrated with a physical transducer that performs a measurand into an output signal. In biomedical sensor it having ability to pick out one parameter without any interference to the other parameters. It having ability to measure small changes in a given measurand such as accuracy, time response, bio compatibility, aging characteristics, size, ruggedness, robustness, low cost.

Transducers, sensors and actuators, are defined by ISO/IEC /IEEE21451-X standards, are mostly used in different fields : industrial, biomedical, environmental, energy,etc. The ISO/IEC/IEEE21451-X is a growing family of standards responsible for the development of smart sensors. TEDS can be used to improve performances of biomedical sensors and instrumentation. The data processing algorithms can accommodate itself to the patient by learning his/her health history.

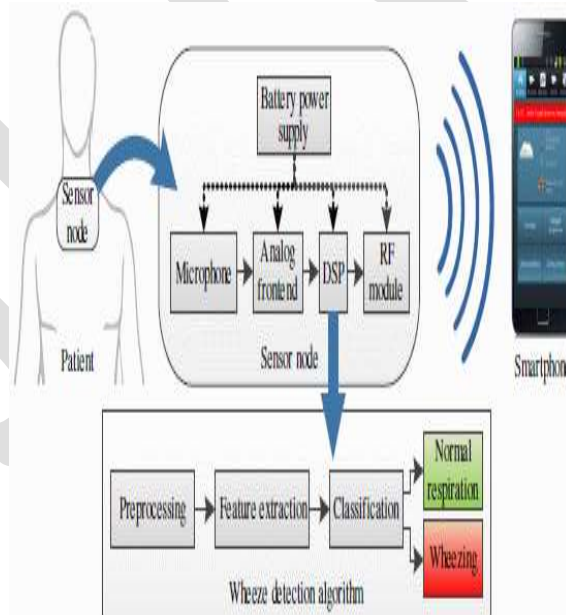


Figure. 1.1 Biomedical sensor.

The microscopic physical, chemical changes are produced when measurand interacts with sensing element.

Sensing technologies are: electrochemical bio-sensing technologies, optical bio-sensing technologies, Acoustic biomedical sensor. These are sensing technologies used in modern biomedical sensors.

### 1.1 TRANSDUCER ELECTRONIC DATA SHEET(TEDS).

TEDS is a standardized method of storing transducer identification, checking, correction data and manufacturer related information. The formats are defined in the IEEE1451 set of smart transducer interface which in turn contains an EEPROM memory called TEDS. It is a standard developed by the IEEE Instrumentation and Measurement society's sensor technology technical committee.

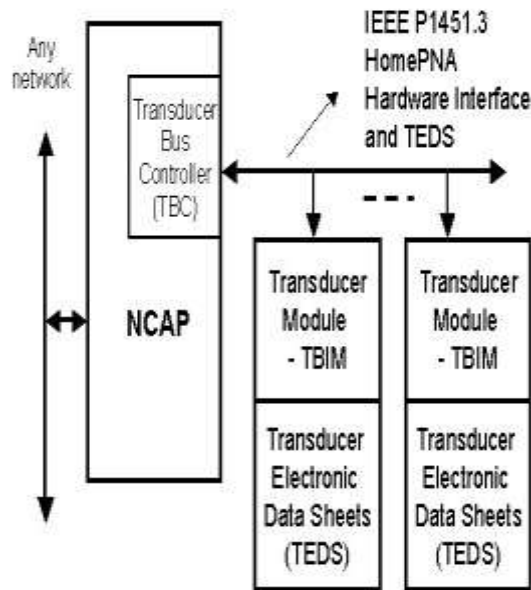


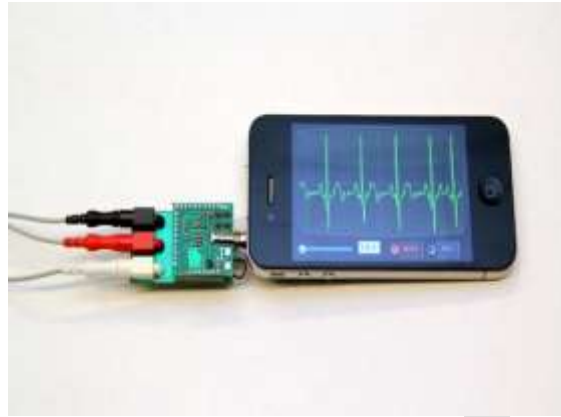
Figure. 1.2 TEDS.

A TEDS can store information related to sensor characteristics and parameters like type of device, designer, model number, serial number, accuracy, resolution, electrical output, frequency response etc. TEDS can include algorithms and additional information for data processing. TEDS having a family of standards and are open to allow user to define additional information concerning the data processing.

### 2. BIOMEDICAL SENSOR AND APPLICATION:

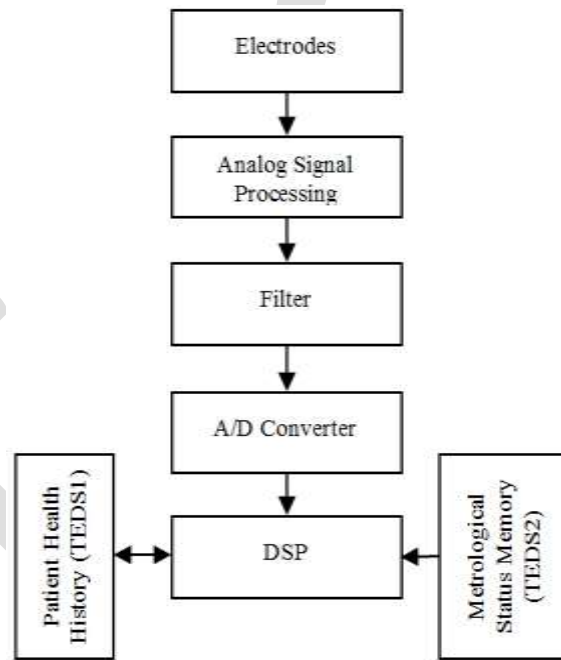
In biomedical sensor it having three application cases:

**A SMART ECG SENSOR :** A Smart ECG sensor is used for diagnosing cardiac arrhythmias. There are some portable devices available for monitoring the health care of patient at their homes. It provides both advantages for health care service and for the emotional status of same patient.



**Figure 2.1** The smart ECG Sensor.

The ECG Sensor checks the microelectric signals of heart at fixed sampling frequency. The system is based on a smart phone or a personal digital assistant(PDA) and ECG Sensor.



**Figure 2.2.** block diagram of ECG Sensor.



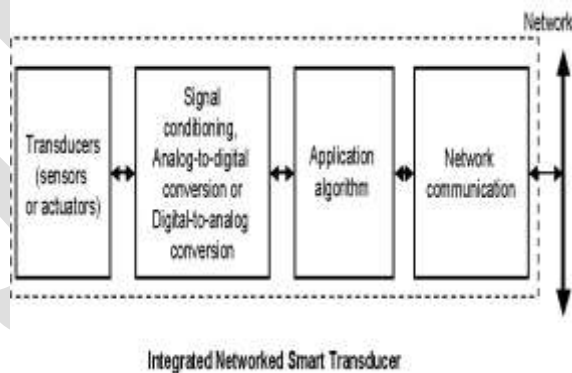
**Figure 2.3:** Final results of ECG sensor.

### 2.1 SMART VIBRATION SENSOR:

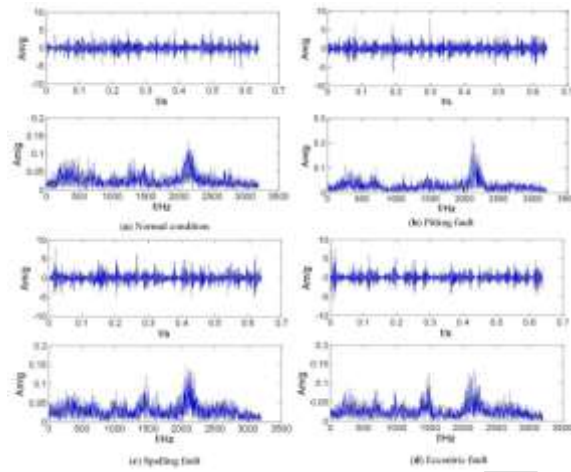
Smart vibration sensor is used for monitoring hand-arm vibration exposure. During their activity workers are continuously exposed to risks. So in work places requirements of accident prevention and security are required.



**Figure 2.4:** A Smart Vibration Sensor.



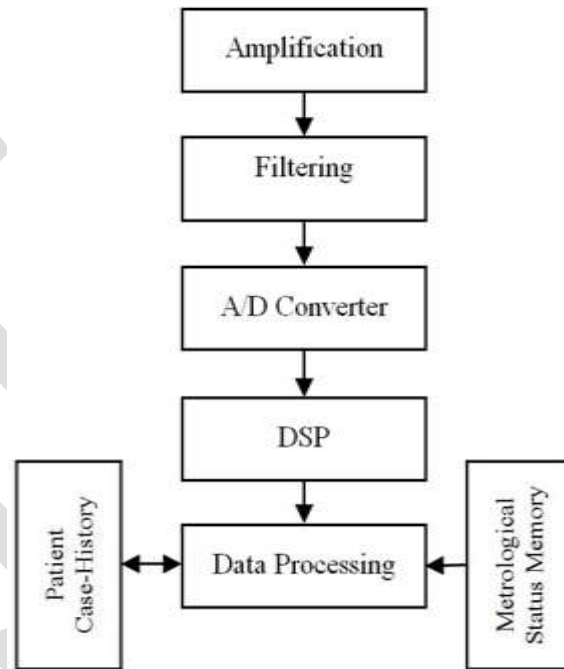
**Figure 2.5:** architecture of Smart vibration sensor.



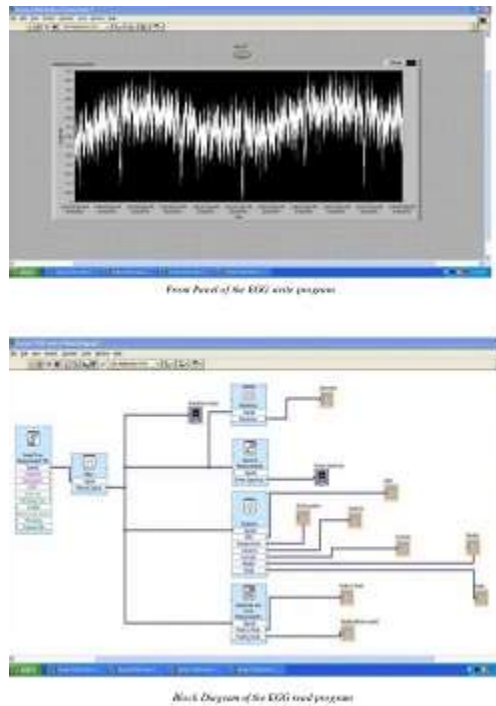
**Figure 2.6:** Final results of A Smart Vibration Sensor.

### 2.2 SMART EGG SENSORS:

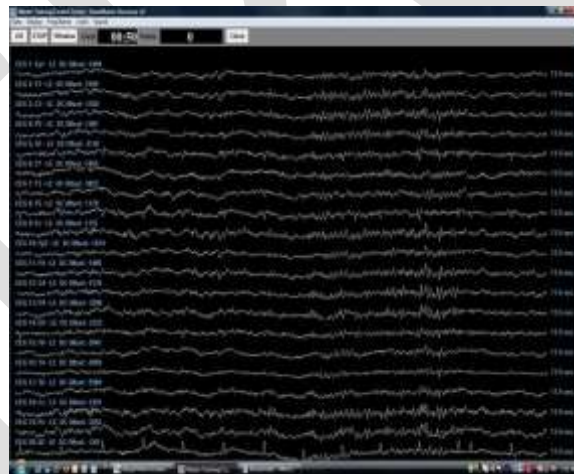
Smart EGG Sensors are used for diagnosing gastric disorders. Population of any age mostly suffering from gastric disorders.(EEG) Electrogastrographic technique records myoelectric signals of the stomach activity.



**Figure 2.7:** architecture of smart EGG sensor



**Figure 2.8:** Diagnosing with EEG Sensor.



**Figure 2.9:** Final results of EGG Sensor.

These are the applications cases of biomedical sensors.

### 3..CONCLUSION

Testing causes significant time delays in reporting results because of specialized laboratories located away from a patient, doctor or hospital. Modern sensors having techniques becoming inexpensive, accurate, reliable and reduce delay time. The use of TEDS is to provide the identification, clinical history and diagnostic criteria of patient. It improves the performance of biomedical sensors and instrumentation. Biomedical sensors can make medical care more personal by using personal monitoring devices.

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