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# Design and Development Of Speech Recognition System For Bio-Medical Devices Monitoring

Mr. Dilip R[1] , Dr. Ramesh K. B[2]
*Assistant Professor*
*Department of Mechatronics Engineering*
*Acharya Institute of Technology*
*Bengaluru, Karnataka India*
*Email: dilipr@acharya.ac.in*

***Abstract***

*Speech recognition technology has created it attainable for laptop to follow the human voice command and perceive the human languages. This project appearance at the development of a straightforward device which will be capable of transferring the information of a patient's very important signs to a far-off device wirelessly. the need of this project is to beat the issue that's sweet-faced by the doctors in observance multiple parameters at the same time. which can change them to watch patients while not having to be physically gift at their side, be it within the hospital or in their home. A patient's temperature, vital sign associate degree Electrocardiograph (ECG) square measure measured consequently to the given voice command by combining the virtual instrumentation technology and speech recognition techniques and square measure transferred wirelessly through an agent like Bluetooth or Wi-Fi. this may be through with the assistance of LabVIEW Platform. The LabVIEW code can generate acceptable management signal to observe the material body parameters. the whole work done on the LabVIEW platform.*

*Keywords: LabVIEW, MyRIO, ECG, Heartrate, Firebase, Speech Recognition*

## 1. Introduction

The analysis within the space of the speech recognition has been on going from past forty years. But, still there's an area for improvement within the speech recognition system. The speech recognition system is often outlined because the method of changing the acoustics signal, captured by the electro-acoustic transducer or phone, to a group of words. the primary result to convert the speech signal in to the text was supported the direct conversion of speech signal in to a sequence of speech sound, failed. the primary positive result to convert speech into text came in Nineteen Seventies once general pattern matching techniques were introduced. therein system solely few words may be recognized however currently a day's thousands of words are often recognized at the same time. Speech recognition technology has created it doable for pc to follow the human voice command and perceive the human languages. This project appearance at the development of an easy device which will be capable of transferring the information of a patient's very important signs to a foreign device wirelessly. during this project we've designed the program to browse the commands from the user, we've designed the interface to the laptop mistreatment MyRIO and also the associated circuits and that we have developed with wireless communication technology and designed the PCB for identical to convert the speech signal in to the text was supported the direct conversion of speech signal in to a sequence of speech sound, failed. Virtual instrumentation offers a brand-new form of analysis field to take advantage of instruments with the conception of "the computer code is that the instrument" additionally apply the virtual instrument technology to the speech recognition technology, the analysis amount is often clearly shortened and living of higher perform becomes repaid and straightforward. As a typical downside of pattern classification, speaker recognition is employed to spot the speaker or verify the speaker identity with the speech of speaker. Virtual instrumentation offers a brand-new form of analysis field to take advantage of instruments with the conception of "the computer code is that the instrument" additionally apply the virtual instrument technology to the speech recognition technology, the analysis amount is often clearly shortened and living of higher perform becomes repaid

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and straightforward. By utilizing the platform of the virtual instrument technology, LabVIEW, a form of speech recognition system.

## 2. Objective

To design and develop a user interactive system for the user using the speech, such that he can get to know the status of the human body parameters using speech in their all-time environment and stored.

## 3. Problem Definition

To access the patient body parameters user, have to check the paper documents, for real time access user have to go to patient room. For different parameters different devices have to interface the patient body. Speech is not 100% accurate and some time the user needs to speak twice to give the command as the noise plays a very vital role in this project. In the same way when the device has to be controlled immediately the speech command if not accepted on the first time can cause serious problems.

## 4. Solution For Problem

We can use a much better speech technology and at the same time we can also use the feedback system, so that the user can get to know the status of the patient any given point of time and also at the same time can know the previous data of a patient.

## 5. Proposed Block Diagram

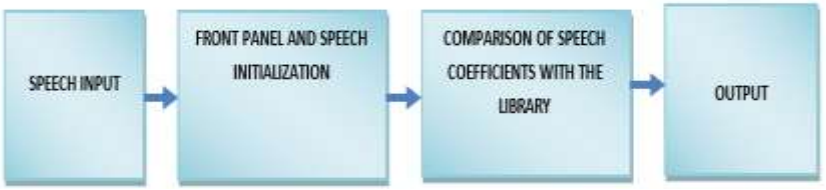



**Figure 1: Block diagram of speech recognition program**

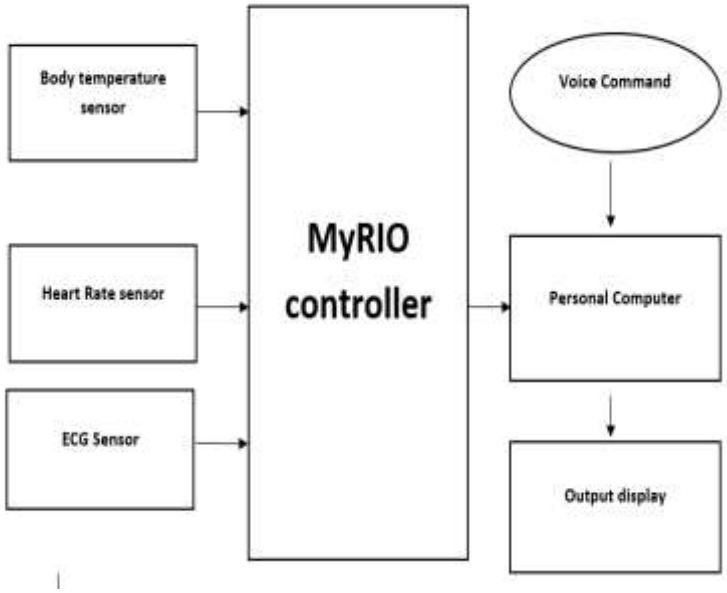



**Figure 2: Block diagram for interfacing sensors with MyRIO.**

## 6. Differnet Methedologies

### 6.1 Distribute Design

The University of Colorado has participated in every assessment of SPINE-I and SPINE-II beforehand. Our efforts towards the systems of research have quarreled on:

- the case of recent options for good speech recognition.
- Better ways of adjusting to the pattern.
- related economic degree, integrated approach to joint speech detection and recognition in clattering environments.

### 6.2 Automatic Voice reception (AVSD)

Inside the well-known Fourier analysis, automatic voice reception (AVSD) signal is countered into constituent sinusoids of different frequencies. Speaking of Fourier's analysis in our own way is a statistical technique for remodeling our reading of the signal from time to frequency.

### 6.3 Voice recognition victimization MATLAB

We appear to have a voice assortment framework built in this form. MATLAB can be a mixture of two words matrix & laboratory, discharged from the main face of scientific computation, simulation and interactive software by MathWorks. Its numerical analysis, matrix estimation, visualization and simulation of scientific knowledge in addition to simulating nonlinear dynamic systems and many alternatives Powerful options are implemented in a straightforward way thanks to the use of Windows environment, for research project, engineering style, and also the need for successful numerical diversity of scientific fields provides a comprehensive response, and for the most part combines with usual non-interactive programming languages in edit mode, on behalf of this advanced international computing level.

### 6.4 Speaker Recognition

Recognition of the speaker desires the recognition and verification. Automatic voice verification (ASV) is that the utilization of a computer to validate the claimed identity from a person's voice. The literature abounds with all totally different words for verificatory speakers, likewise as speech verification, speaker authentication, sound authentication, speaker authentication, and speaker verification. There is no a priori identity argument in automatic speaker recognition (ASI), and conjointly the device determines World Health Organization the individual is, that community the individual is also a member of, or (in the open set case) that the person is unknown.

### 6.5 MFCC Algorithm

It was discovered that MFCCs for each individual user was distinctive. sure, variations were discovered because of distinction within the vicinity of the recording space. These MFCCs area unit then compared, that is, the MFCCs of the example and real time input area unit compared for each user. In programming, geometrician distance is employed to check the example and real time input. during this manner, MFCC algorithmic rule is employed for voice recognition. Mel Frequency Cepstral Coefficients algorithmic rule may be a technique that takes voice sample as inputs. once process, it calculates coefficients distinctive to a specific sample. during this project, a simulation computer code referred to as MATLAB R2013a is employed to perform MFCC.

# 7. Construction And Working

## 7.1 Speech Recognition Program

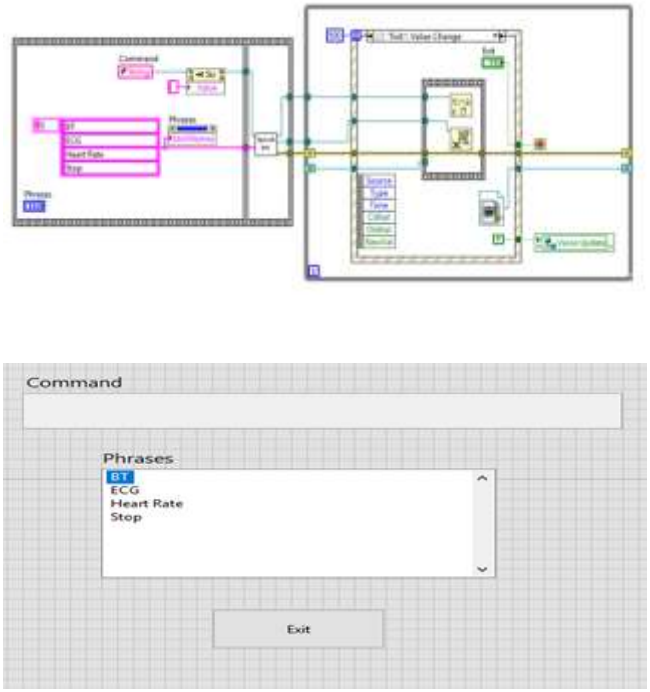



**Figure 3: Speech Recognition Program**

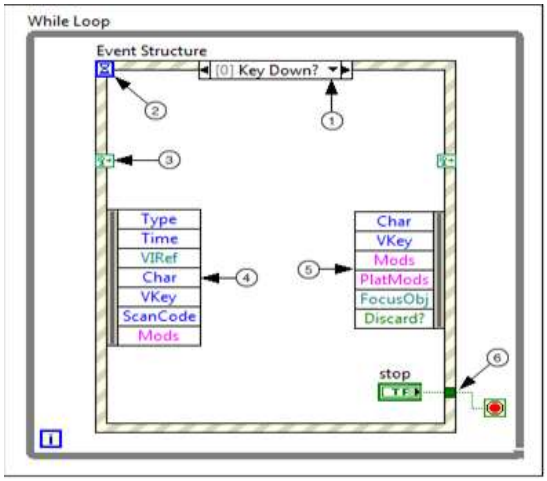



**Figure 4: Components in Event structure**

## 7.2 Working of speech recognition VI

In the phrase block the required speech commands are listed. Using string function, the input command is selected. Given speech command is compared with pre-set commands, if condition is true then the specific program will execute. If condition is false then it waits for a proper command

### 7.2.1Body Temperature

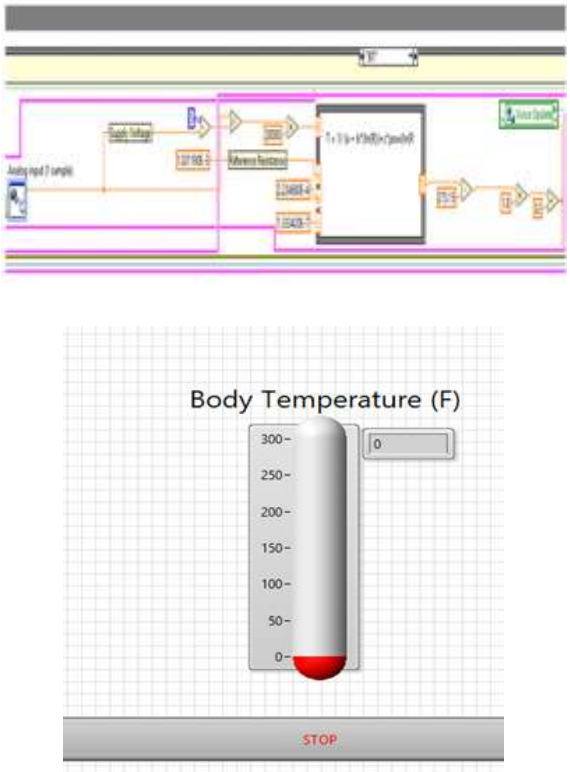
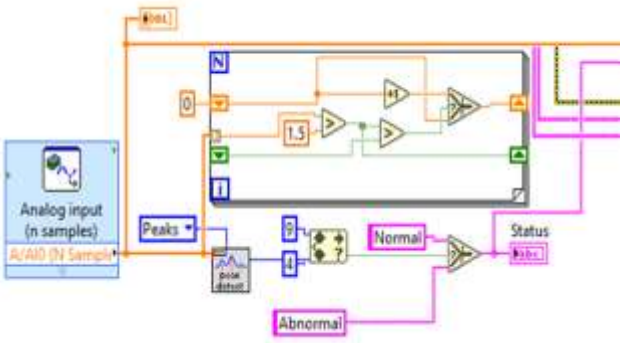



**Figure 5: Body Temperature program and its output**

Working of body temperature program:

- Input analog voice signal is converted into voltage form,
- With the help of comparators and standard formula (T = 1/ (a + b*(ln(R)) +c*pow(ln(R),3)) convert voltage into kelvin.
- Using comparators kelvin is converted into Fahrenheit.
- The output temperature data is displayed in degree Celsius.

### 7.2.2 ECG/EKG Program



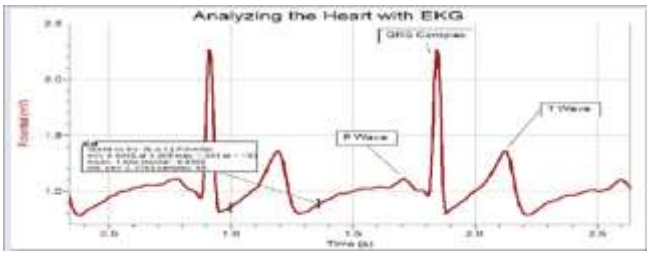
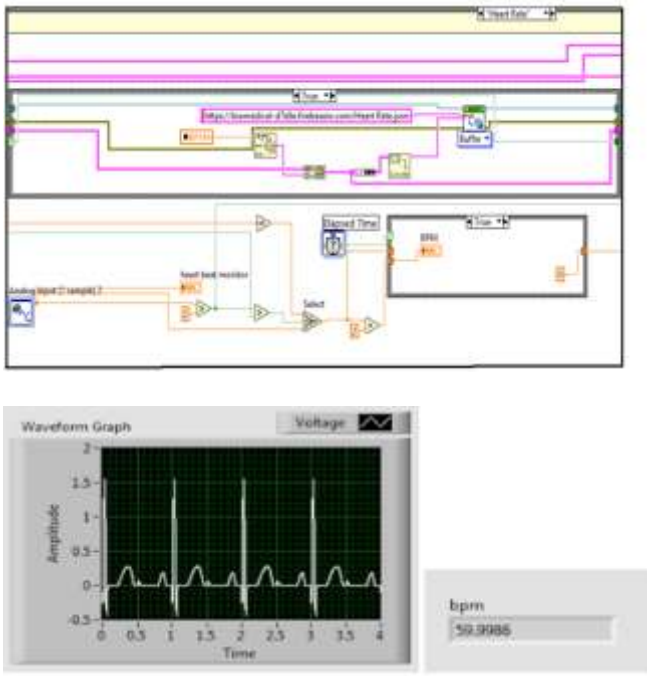



**Figure 6: ECG/EKG Program and its output graph.**

Working of ECG program:

- The analog input is converted into ECG graph using analog input function and DBL function.
- Analog input samples are converted to the peak values using wave form peak detection VI block.
- Using In range and coerce function voltage peak is detected.
- If voltage is in-between 4 to 9 then output status will be normal state or else it will be abnormal.
- Using select function output is displayed as normal or abnormal state.
- ECG data is displayed using another select function within a FOR loop.

### 7.2.3 Heart Rate Program




Working of Heart Rate program:

- From analog sensor input the output graph is displayed using DBL function.
- If the voltage peak is greater than 2 then a beat will be counted.
- Numbers of beats are counted for a given time.
- Output is displayed in digital form as beats per minute.

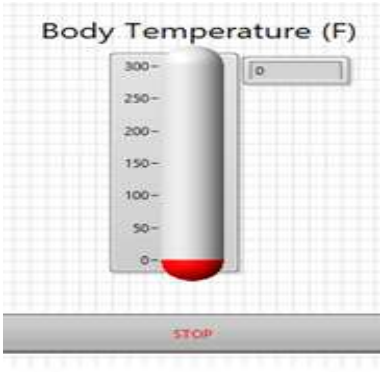
## 8. Methodology

- We used the speech recognition techniques to first recognize the speech commands given and later this was trained with the speech commands to which it's supposed to respond.
- We write the program in the LabVIEW and interface with MyRIO.

- We wrote the program in the LabVIEW to interface sensors.
- Compare speech command and sensors input.
- Display the output.
-

## 9. Results and Discussion

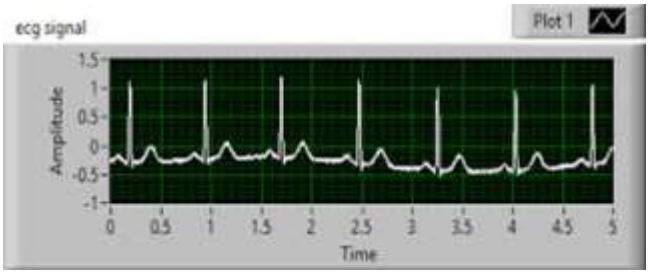
### 9.1 Output for the body temperature




- Using comparators kelvin is converted into Fahrenheit.
- The output temperature data is displayed in degree Celsius.

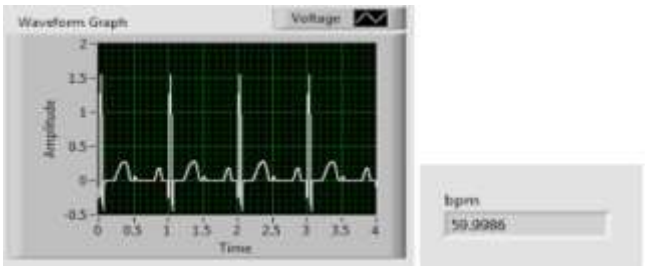
### 9.2 Output for ECG/EKG

The below wave shows the graphical form of ECG. In this we can observe the ECG of a human in a graph. As well as in the output screen it shows that observed person is normal or abnormal. These digital outputs of ECG can be stored and transfer.




### 9.3 Output for Heart Rate

The below figure shows the output of a heart rate in a graphical form as well as in a digital number. In which wave form of heart rate can be monitored and digital number, beats per minute can be monitored. These output data can be stored and transferred.



## 10. Advantages and Applications

Advantages
Fast response from voice control: Users can easily monitor devices by speaking with the assistance of the technology. Recognition of speech can allow faster because the program normally produces words as quickly as they are spoken, which is typically much faster than a human can type.

Accuracy of result: The results of all the sensors will be accurate. the actual output of sensors can be observed using LabVIEW. Patient can be observed from different location, by uploading data into the cloud.

Ease of programming: Changes in program can be done easily, LabVIEW allows to make changes in the program easily. the changes can be stored. Parallel processing LabVIEW programs this easily by dropping multiple parallel loops onto the block diagram.

Ease of data acquisition for DAQ: You can automate the capture and validate signals and take measurements with less effort than traditional programming environments. Of course, you can capture signals and make measurements with various body parameters.

Ease of interfacing with instrumentation: Many instruments can be interface with LabVIEW, provide an extensive library of instrument drivers for download directly in LabVIEW.

Better patient experience: By using LabVIEW monitoring system patients get more engaged in their treatment because doctors can observe patients' parameters in detail.

Human risk is minimized: As the sensors works on low power there will be no risk of Electrical shocks.

Time efficient: All the three biomedical parameters can be measured one after the other in the same room.

Applications
In operation theatres: Patient need to be observed continuously while operation, so this LabVIEW system help to observe properly without disconnection .to shift between the parameters to be observed should be without delay this can be fixed with voice command.
To analyze: Analyzing of human body parameters is very important before treatment, so this can be done with the help of our project. Proper analysis is important to decide which type of treatment should be given.
Observation of patient: In some conditions patient needs to be observed continually so this system helps to monitor a patient continually. Any changes in a patient can be observed in real time using this system. As well as patient's previous data can also be observed for any comparisons.
Treatment feedback: To check whether proper treatment is being given. Doctors observe that the present treatment is working properly or not, for this doctor can observe patient parameters while treatment using this system.
Remote patient monitoring benefits: with the increasing demands, most of the countries adopt this technology and use device to provide quality care and frequent check-up of the patient.

## 12. Conclusion and Future Scope

The voice-based patient monitoring system is presented in this project, which is able to track the patients' surface temperature, heart rate, and ECG parameters continuously. We suggested a continuous monitoring and control system to track the condition of the patient and store the patient data on the server using wireless communication based on the Wi-Fi module, we have introduced remote data collection for healthcare and an intelligent storage network.

The upgrade in the built device will be to attach more sensors to the controller and to the internet, which tests specific other safety parameters and would support patient tracking by connecting all items to the internet for fast and easy access. Establishment of a mesh-type network to increase in the communication range.

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