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Contents

PARKING ASSISTANCE SYSTEM BY MAPPING ULTRASONIC AND CAMERA DATA TO DETECT OBJECTS WITH DISTANCE

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ABSTRACT

With the increase in the number of cars and drivers, traffic accidents have become a major issue. This model makes use of sensing technology that captures the surrounding vehicles with the help of Ultrasonic sensor and camera data. It is also implemented by coordinating these sensors with a camera reducing the driver's burden by presenting the live display of rearview of the vehicle also with some additional aid when needed by the driver. This System features various numerous added-value functions that enhances convenience for the driver and thus goes beyond conventional products that provide safety only. This paper describes the new system's functions and configuration together with the specifications required and further discusses its utility as determined by effectiveness validation tests of the system on board of an actual vehicle.

Keywords - *Parking Assistant, Ultrasonic Sensors, Camera*

I. INTRODUCTION

Recent increase in the number of traffic accidents related to parking incidents has resulted from an increase in the number of vehicles and drivers is becoming a major problem. This parking assistance technology is attracting attention as a means of solving this problem.

This technology can be applied through the following components:

Ultrasonic sensors: Pulses of ultrasonic waves are sent out and it waits for the echoes to return. The time taken by these echoes to arrive is measured, ultrasonic sensors can identify the obstacles in the vehicle's path and the distance between the object and the vehicle is measured.

A massive improvement is provided by the backup cameras over rear-view mirrors, especially for vehicles that are bulkier with large blind spots. These cameras present a live video feed of the rear of the vehicle is presented by these cameras to a screen in the center console, giving the drivers a clear view of what's going on behind them as theyare parking in a spot.A prototype system has been developed that will be covered in this paper.

II. THE GOAL OF THIS PAPER

A. PURPOSE

The purpose of this paper is to implement a Parking Assistance System which utilizes Ultrasonic sensors and Cameras to assist a driver in parking.

B. OBJECTIVES

To increase the parking efficiency for square feet space and cubic feet space.

To reduce vehicle vandalism by using cameras.

To reduce majority of manual work done by the driver.

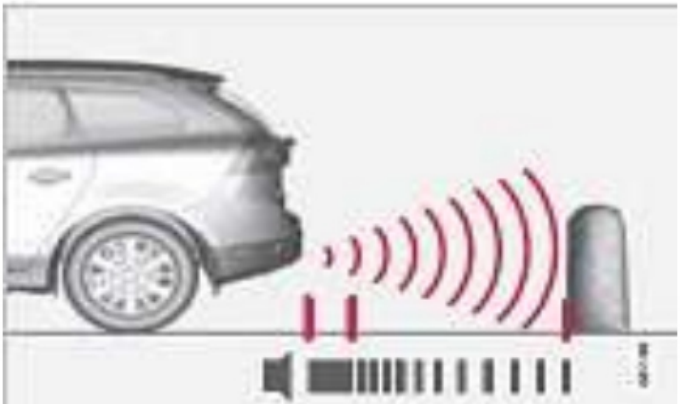
This assistance system is designed so that it becomes easy to supervise and manage the vehicle while parking.

III. OVERVIEW OF THE PARKING ASSIST SYSTEM FUNCTIONS

The Parking Assist System assists the driver in steering and checking the rear to ensure that the area is clear when backing the vehicle. When the driver takes a reverse, the system does the following things:

A live feed shown by the camera that includes views that cannot be seen by the driver when he turns around and looks toward the rear.

The distance between the vehicle and an object is calculated by the ultrasonic sensors and is displayed on the camera feed.



SYSTEM CONFIGURATION:

The Parking assist system consists of three main types of units as follows:

1) ULTRASONIC SENSORS:

These are acoustic sensors that are divided into three categories which are transmitters, receivers and transceivers.

Transmitters usually convert electrical signals into ultrasound. Ultrasound signals are converted to electronic signals by receivers. Transceivers can receive ultrasound signals and also transmit ultrasound signals.When in reverse gear, rear sensors are selected and as soon as another gear is selected the rear sensors are deactivated. These sensors help measure the distance between the vehicle and the object distance and calculate just for the driver's reference.

2) CAMERAS:

Cameras arebasically used to obtain a live feed of everything that is happening behind the vehicle primarily the rear bumper section. Camera also helps in providing the display of the measured distance of the object and the vehicle. This camera facility has made it easier for the drivers of both experienced

and learning drivers.

3) DISPLAY:

Since there are cameras used it is obvious to have a display for every move of the vehicle. The display is usually live feed, which also includes the distance measured by the sensors. Display makes it easy for the driver to be cautious while attempting to park about the surroundings. The feed is displayed on the screen the way it is shown in the figure,

CONCLUSION

This Application assists in automating the existing manual system. It can be monitored and controlled remotely. It reduces the man power required. This paper implements the parking assistance using Ultrasonic sensors and camera data that provides accurate and secure parking.In future, we shall endeavor to develop sensing systems that will not only satisfy requirements for enhanced safety but also the accuracy that will eventually lead to automatic driving systems.

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DEVELOPMENT OF SENSOR-BASED LIGHTING SYSTEM FOR SEWING MACHINE

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1,2Sastra University, Trichy,

ABSTRACT

It is the continuous effort of experts in this industry to help improve the productivity, increase the operator's efficiency and skill. While trying to achieve all these, we can't forget about the comfort of the operator. That's where ergonomics plays its role. It is important to ensure that proper working conditions are available to the operator. Amongst the working conditions, the less looked upon is the lighting of the production floor. It is crucial to help in the visual perception of the operator and to facilitate the sewing process. It has attracted the attention of ergonomists and garment technologists inthe recent years, where they have derived the relationship between illuminance levels and productivity. It has also shown to have a direct impact on the operator's general well-being. To guarantee proper lighting conditions to the operator at the sewing machine, "Sensor Based Lighting System" has been developed. It takes into account the intensity and color of light, so that optimum quantity and quality of illuminance are provided. It has combined the principles of color psychology and physics along with ergonomics to come up with a solution that would provide maximum comfort and least amount of strain to the operator's eyes. The system has tested the use of colored light in industrial environment.

I. INTRODUCTION

Light plays a very important role in our everyday life. It enables us to see and perceive the world around us. Our eye works as a camera, which transmits the scenes around us and then the brain processes it. Therods and cones present in the eyes are responsible for detecting the intensity of light and the distinct colors respectively. Sun is a natural source of light, and artificial sources simulate this light. To facilitate visibility there has to be some standard quantity and quality of light.

The Illuminating Engineering Society of North America (IESNA) defines light as "radiant energy that is capable of exciting the retina and producing a visual sensation." Light is a form of electromagnetic energy.Visible light lies in the range between 380-780 nanometers. The wavelength 400nm corresponds to violet color while 700nm corresponds to violet. Below 380 lies the ultraviolet radiation and above 780 lies the infrared radiation. White light when passed through a glass prism splits into the seven colors, namely, violet, indigo, blue, green, yellow, orange and red. Light has dual nature: it exhibits particle and wave properties.

II. LIGHTING CONDITION IN GARMENTINDUSTRY

Manufacturing industry has high dependency on artificial sources of light. Automated industries havelower dependency on humans than semi-automated industry. With tasks which are more human dependent and visually demanding, the lighting conditions play an even major role.

The more intricate the work, the more strain on the eyes, and thus, better should be the light available to the worker. Taking examples from various researches involving color psychology and fatigue, the use of colored light could be revolutionary in terms of ergonomics. This could be used in making a device

which emits lights of different colors to provide comfort to the operator who has long working hours and high visually demanding tasks.

III. OBJECTIVES

To develop a Sensor-Based Lighting System namely SBLS for the sewing machine to achieve the following:
a. To create optimized lighting conditions during garment stitching
b. Reduce the eye strain of sewing operator
c. Improve the productivity and quality of garment manufacturing.

IV. LITERATURE REVIEW

Faber Birren (1969) found that with softer surroundings, cooler hues (blue, green, turquoise) andlower brightness, there is less distraction and a personis better able to concentrate on difficult visual andmental tasks. Good inward orientation is furthered. Itis appropriate for sedentary occupations requiringsevere use of the eyes or brain- offices, study rooms,fine assembly in industry. Henri Juslen (2007) studied various researches contributed by various authors that have determined the relationship between illuminance levels and productivity. These researches tell us that increasing lighting levels increases productivity and hence profitability.

The graph shows the relationship between illuminance level and productivity increase. These studies have been done in different industrial environments. The results all show an increase in productivity when illuminance was improved.

Hossain, Ahmed (2012), found that poorly designed and maintained lighting can result in glare and flicker that may cause vision problems. According to their study, across job categories, sewing operators, finishing helpers and quality controllers were found to suffer most from the eye troubles. About 21~37% (0.21~0.373 out of 1) of the illumination condition has the causal effect on effective production capacity of the worker.

They have also suggested that illumination level at the work-plane of the workers should be within 600-800 lux (average 700lux) especially for Sewing Operators, Sewing Helper,Quality Controller and others.

V. PROPOSED SYSTEM FOR AUTOMATIC LIGHTING

Proposed system namely SBLS (Sensor Based Lighting System) is developed to achieve the real time adherence to change in intensity, color of light, fabric color and maintain optimized lighting condition at stitching machine during garment manufacturing.

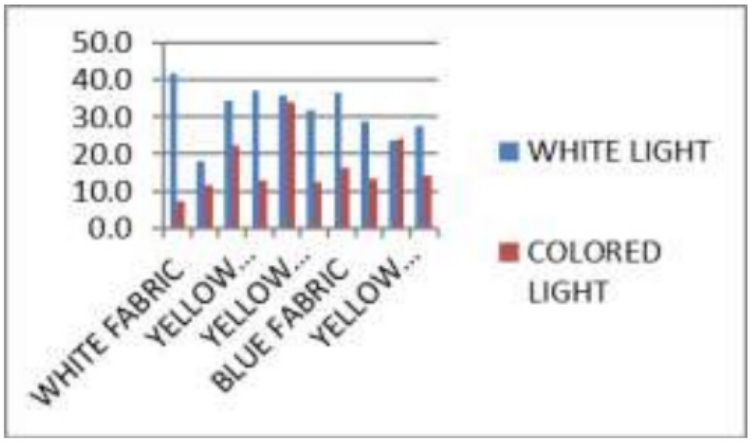
The following components are needed to make the required system:
1. Battery
2. Color Sensor
3. Voltage Regulator
4. Capacitor

5. LEDs (Light emitting diode)
6. Resistor
7. Wires
8. Perfboard
9. Microcontroller (Programmable)

A working prototype of SBLS has been made which delivers the output as proposed. SBLS has the following characteristics:
1. It has the ability to detect up to 7 colors
2. It involves high degree of reducing the eye fatigue of sewing operators
3. It increases the productivity of operators
4. It works on a 7 volt battery
5. The setup is portable and can be carried easily
6. The cost of the system encourages the garment industry to implement it The given characteristics of eye fatigue reduction and productivity increase has been proved in the next chapter where we have tested this systemin a live environment of garment factory.

RESULTS AND DISCUSSIONS

According to the results, white light showed an increase in eye strain more than colored lights. Theminimum percentage increase was with green light, which was claimed to be the most soothing. Percent increase in the productivity when colored light is used, against white light. According to the results, there is an increase in productivity from 0.2 to 4.1 percent when colored lights are used instead of white light. The highest increase is observed with the use of yellow light on blue fabric and green light on white fabric in comparison to white light.



CONCLUSION

The use of colored light at the sewing workstation has proved to reduce the eye strain of the operators andalso increased their productivity. A reduction in eye strain by 14.6% is observed when colored light instead of white light is used at sewing workstation.Overall increase of productivity is 2.2% by using thesystem. A fully automated system can help improveproductivity and reduce eye strain, enabling the wellbeing of the operator and providing ergonomiccomfort. This would also enable improvement of thequality of work being done, and thus reduce costs theorganization has to incur on rework or quality related problem.

SCOPE OF FUTURE WORK

The accessible technology was limited due to economic constraints. The time boundation of threemonths was also a constraint. The testing has beenrestricted to solid colors, with the complimentarycolors' combination restricted till the primary colors.Checks and stripes have not been tested, and thisremains to be a subject of further research. Thesystem can be made more compact and easy to attachto the sewing machine.

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INTEGRATED APPROACH IN QRS COMPLEX ANALYSIS OF ECG USING WAVELET TRANSFORM

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ABSTRACT

Over the last decades, a lot of progress have been made in QRS complex analysis. However, up to date analysis have been done visualy without any software due to the high cost of equipment which make it challenging to detect abrupt and abnormal changes which may be a sign of abnormal fonction of the heart. From the 80's with the work of different researcher's wavelet transform has found many applications in Engineering and Science which includes medical imaging, with continuous wavelet transform being used to solve the limitation of the Fourier transform to build a time-frequency representation of a signal that gives great frequency and time localization as an example. In this paper, we aim to show the applicability of wavelet transform to run QRS analysis to detect abnormal change which can be detected with naked eyes. We have run multiple analysis with different set of Electrocardiogram of patient with known and unknown cardiac problems using different types of integration kernels. The purpose of this work is to give a better understanding of the wavelet application in QRS complex analysis and to demonstrate how it can be applied to define identify the different problems that the heart may be subject to. We have collected different sets printed electrocardiogram and digitalize them using commercial software, a simpler approach would be to collect the ECG directly from the machine. After preparation of the data, we have used Mexican hat, Meyer, Haar, Daubechies, coiflets, symlets and morlet to analysis the different logs and we have compare the different scalograms. Morlet wavelet used on ECG from different patients has shown a great resolution on the identification of QRS abnormalities. While the gaus level 4 have demonstrated a good visual on detecting depolarization due to muscular contraction, Morlet shows even better resolution.

I. INTRODUCTION AND LITERATURE REVIEW

In the few last decades, a lot of progress have been made in the field of biomedical signal analysis including EMG,ECG, EEG, clinical sounds, respiratory patterns,blood pressure, etc using wavelet. Inthe medicalsector those signal are of very high importance as they provide very crucial information about abnormalities due to deviance of the normal trends repsonse of one's organ.In this paper we we will focus on ECG.

Electrocardiogram is a measure of eletrical activity happening in the heart, what we are looking at is depolarization which is electrical changes caused by muscular contraction. The main object is to retrieve those electrical changes caused by the activation of the two small chamber, the atria, and then of the two lager heart chambers, the left and right ventricules. Let break this down in terms of electrical signal and how they are represented.

The contraction of the atria is shown on the ECG as the P wave, the contraction of the ventricules which is what we will study further in this paper is represented as the QRS complex. With contraction comes also decontractions which is the process of the ventricular mass to return to a rest state which is known as repolarization which subsequently is represented here by the T wave(see figure 1).

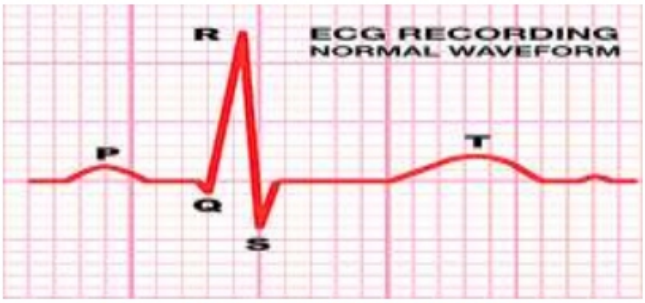


Figure 1.ECG RECORDING NORMAL WAVEFORM(Courtesy of mydr.com)

However, the so called repolarization of the atria is hidden within the QRS complex. Study the changes of the waveforms in respect to time is a technique used to diagnose patients with heart conditions.Different approach have been developed to isolate,extract and analyse those information and the most famous method used are Fourier transform and windowed fourier transform, this time localization techniques can be achieved by windowing the data at various times, say,using a windowing function g(t) then taking Fourier transform) Gf(w,t) short time Fourier transform.

$$Gf_{(\omega,t)} = \int_{-\infty}^{\infty} f(u)g(u-t)e^{-iwu}\,du \qquad (1)$$

$$= \int_{-\infty}^{\infty} f(u)g_{w,t}(u)du \qquad (2)$$

However, those methods fails to determine the exact location where the signal happens. From the 80's with the work morlet et al.,Grossmann(1) and Morlet and others(2) we have introduced a new method of analysis such signal with abrupt change called wavelet transform. More recent work from Meyer(3),Daubechies(4), Mallat(5) and others helped understanding and applying this methods further on different area.Wavelet transform are integral transforms using integration kernels*(basis functions) called wavelets and those kernel are used as a basis for representation or characterization of the process.One of the main properties of the wavelet is the time-frequency localization.**advantage of analyzing a signal with wavelet as the analyzing kernels is that it enables one to study features on a large scale and fine features on small scales. This is very useful for non-stationary signal or signal with different features at different scales. **Representation of the process using wavelet is provided by an infinite series expansion of dilated and translated versions of a mother wavelet,each multiplied by an appropriate coefficient.. In the present study, we have analyzed electrocardiogram using wavelet transformation determine the different abnormalities and provides a diagnose using wavelet transform.We have also analyze the optimum wavelet for such analysis.

II. PATIENT WITH HEART CONDITION CASE STUDY

This case study was performed using electrocardiogram from several patient from the Ivano-Frankivsk Regional clinical hospital(see figure 2).The patients from this case study were known with the following heart conditions:. Arrhythmia, Coronary oclusion, enlargement of the heart, poor blood supply, previous heart attack,Congenital heart defect, pericarditis and myocarditis. We have then compared the results and analysis with patients with no heart abnormal heart conditions. Before we proceed to the results of our study let see what are wavelet and why is it relevant to our study.

Figure 2. Ivano-frankivsk Regional Clinical Hospital

III. WAVELET ANALYSIS

A wavelet is a wave that occurs in a short period of time. The difference between wavelet and sine waves used for Fourier transform is that sine waves oscillate for an infinite amount of time. We have different type of analysis continuous wavelet transform,discret wavelet transform and Wavelet packet analysis. In this work we have used continuous wavelet analysis to analyze our set of data.

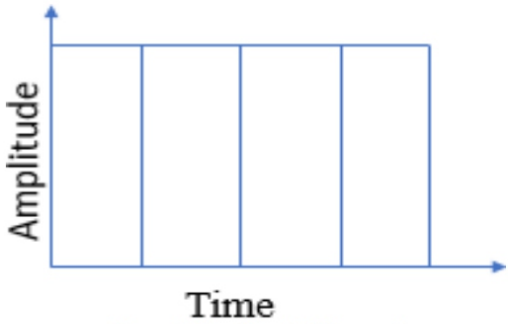


Figure 3.time Domain(Shannon)

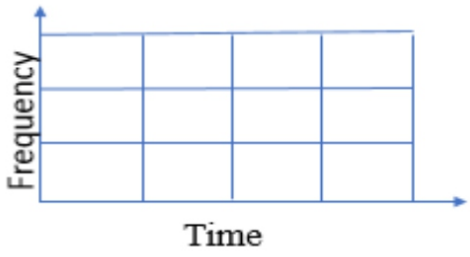


Figure 4.STFT(Gabor)

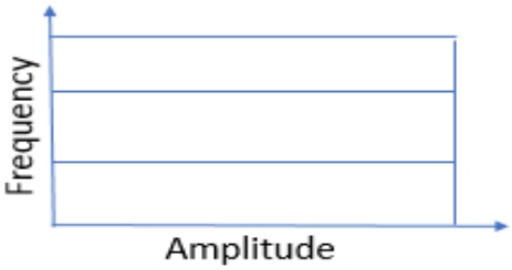


Figure 5.Frequency domain(Fourier)

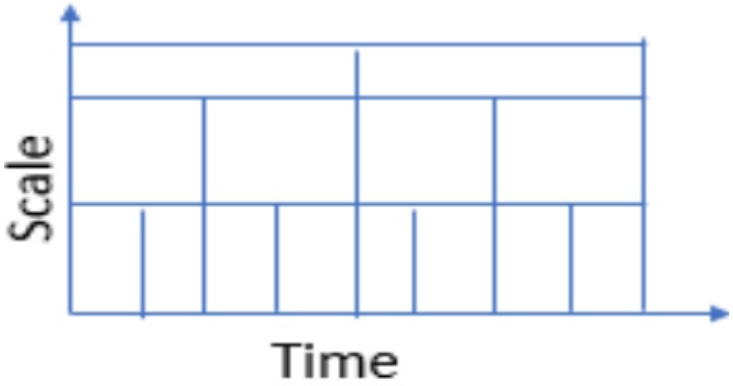


Figure 6.Wavelet analysis

IV. DISCRET WAVELET TRANSFROM (DWT)

Wavelet packet analysis.In this work we have used continuous wavelet analysis to analyse our set of data.

V. CONTINOUS WAVELET TRANSFORM (CWT)

Fourier transform represents the Fourier analysis and can be expressed mathematically by:

$$F(\omega) = \int_{-\infty}^{\infty} f(t) e^{-j\omega t} dt \qquad (3)$$

Which is the sum over all time of the signal f(t) multiplied by a complex exponential. Fourier coefficient are the results of Fourier coefficient f(w) which when multiplied by sinusoid of appropriate frequency w, yield the constituent sinusoidal components of the original signal. We can visualize the process by the diagram below:

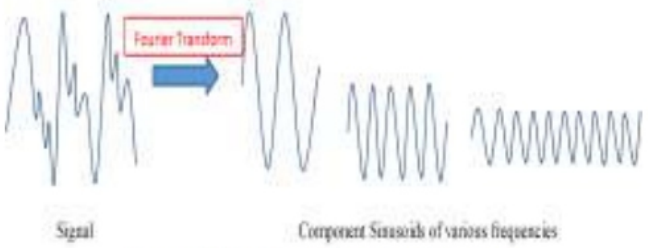


Figure 7.Fourier Transform Diagram

Continous wavelet transform works somehow the same way as it can be defined as the sum over all time of the signal multiplied by scaled,shifted versions of the wavelet function ψ:

$$C(\text{scale,positon}) = \int_{-\infty}^{\infty} f(t)\Psi(\text{scale,position},t)dt \qquad (3)$$

Likewise Fourier transform the results of CWT are many wavelet coefficient C, which are a function of scale and position. Multiplying each coefficient by the appropriate scaled and shifted wavelet yields the wavelet component of the original signal as shown below:

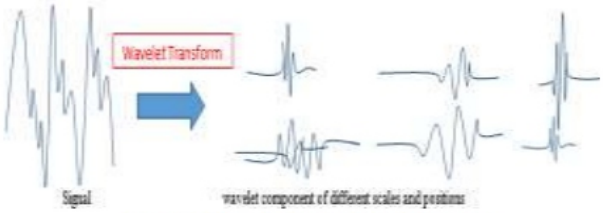


Figure 8.Wavelet Transform Diagram

SCALING

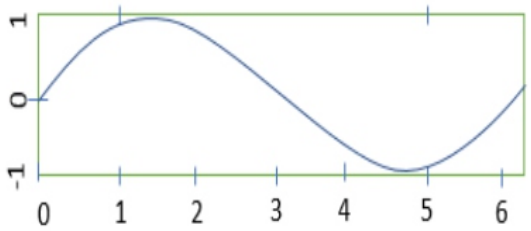


Figure 7.sin(t)

$$f(t) = \sin(t) \quad ; \quad a = 1 \quad (4)$$

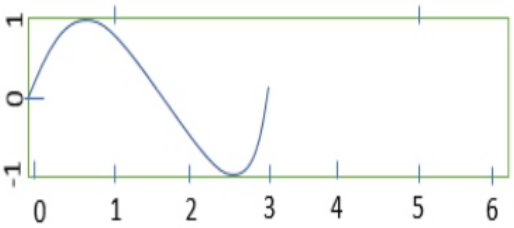


Figure 8.sin(2t)

$$f(t) = \sin(2t) \quad ; \quad a = \frac{1}{2} \quad (5)$$

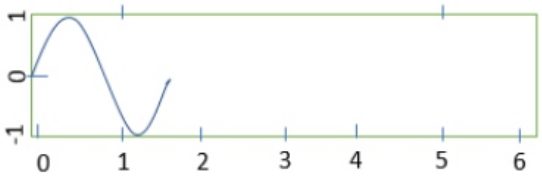
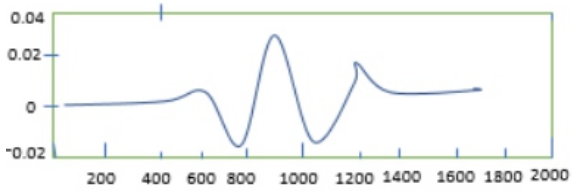
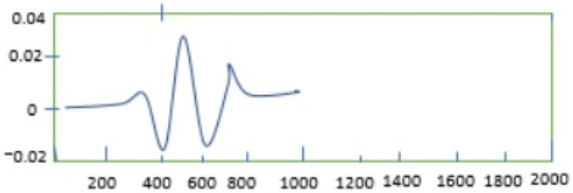


Figure 9.sin(4t)

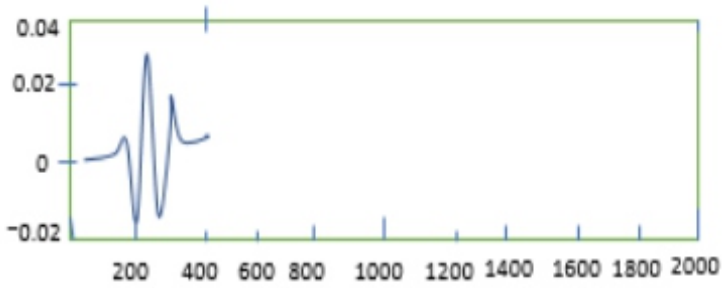
$$f(t) = \sin(4t) \quad ; a = \frac{1}{4} \quad (6)$$



$$f(t) = \psi(t) \quad ; \quad a = 1$$



$$f(t) = \psi(2t) \quad ; \quad a = \frac{1}{2}$$



$$f(t) = \psi(4t) \quad ; \quad a = \frac{1}{4}$$

SHIFTING

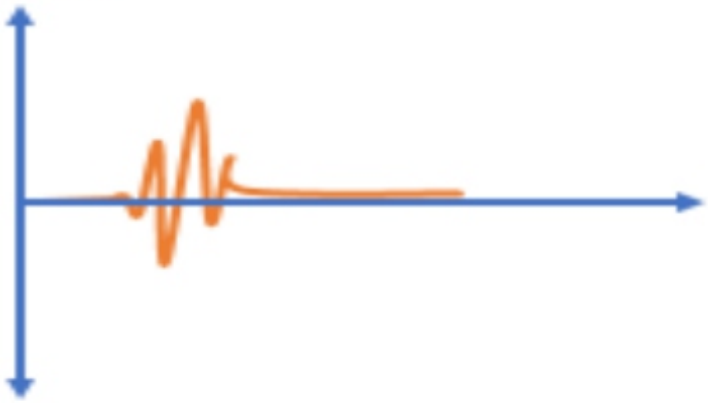


Figure 10.wavelet function $\psi(t)$

Figure 11.wavelet function$\psi(t-k)$

Haar wavelet

Haar wavelet is the simplest and the easiest and it ressembles to a step function.

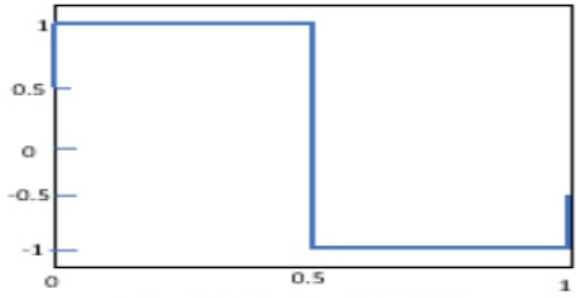


Figure 12.Haar wavelet function

$$\psi(t) = \begin{cases} 1 & 0 \le t < \frac{1}{2} \\ -1 & \frac{1}{2} \le t < 1 \\ 0 & \text{otherwise} \end{cases} \qquad (7)$$

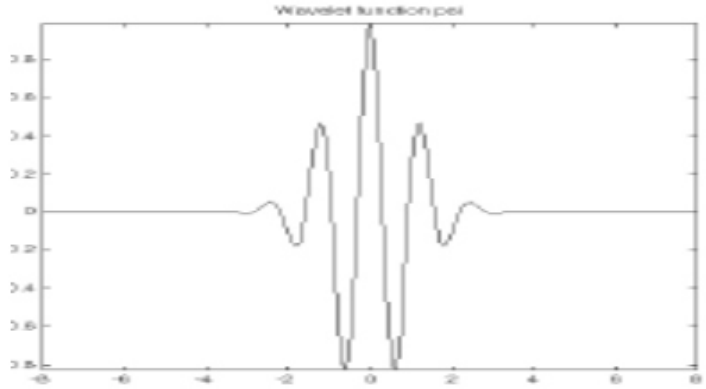
Morlet wavelet

The Morlet wavelet is given by

$$\psi(t) = \pi^{-1/4}(e^{-i\omega_0 t - e^{-\omega_0^2/2}})e^{-t^2/2}$$

Which is usually approximated as

$$\psi(t) = \pi^{-1/4} e^{-i\omega_0 t} e^{-t^2/2} \qquad \omega_0 \geq 5.$$



RESULTS AND DISCUSSION

Developing a code for recognition of the P,QRS complex and T wave in an ECG is a challenging issue because of the time change morphology of the waverform is subject to physiological conditions and the presence of noise. Using wavelet we were able to isolate each heart beat and provide and diagnose.

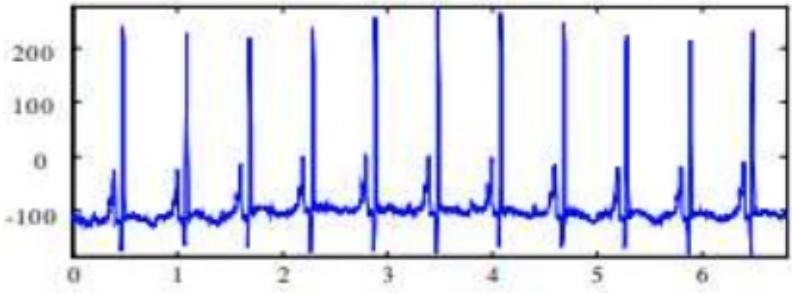


Figure 13.Electrocardiogram of Patient d

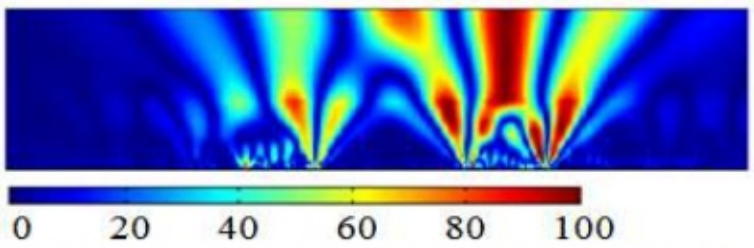


Fig.2 Scalogram of ECG patien 4 zoomed of gausian level 4

The Measures of the interval provides the position of the component in the ECG Which delineate the electrical activities of the patients heart. In this instance for example this shows a clear sign of arrythemia In patient 4.

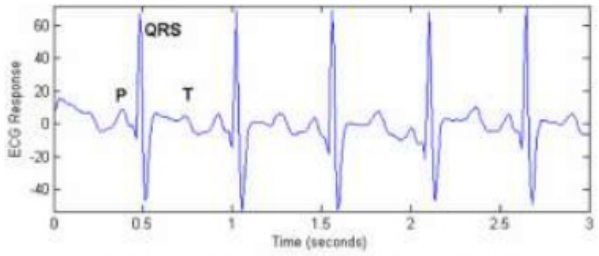


Figure 14.electro cardiogram patient d

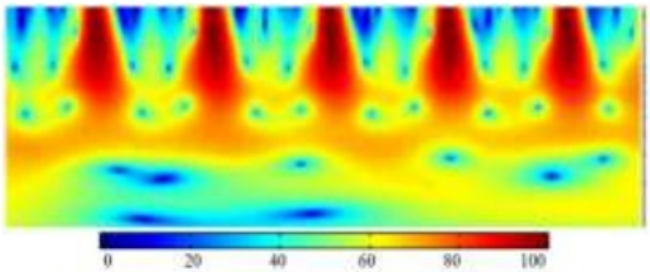


Fig.3 Scalogram ECG of Patient d using Morlet wavelet

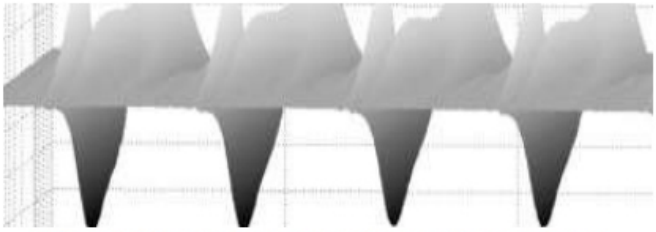


Figure 15.3D continuous wavelet transform patient d

In this 3D transform we can clearly see previous heart attack conditions.Using wavelet we were able to accurately provide diagnose to all the patient. Another advancete is that we were able to analyse T waveform without using the t wave end point. As for QRS complex it was clearly shown as very effective to diagnosed.

CONCLUSION

Since the we have been applying wavelet transform in ECG, researcher have made a lot of progress. This new approach of QRS allow us to reavulate the use of wavelet transform in this area of medical field. However, we would need more clinical tries until this methodology could be apply as a routine and help doctors better diagnosed and serves patients.

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UNDERWATER MODULAR SYSTEM FOR MONITORING THE OCEAN, TRAFFIC AND LIFE FORMS

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ABSTRACT

underwater monitoring systems have become a popular topic amongst those who share the same great interest in the health and the well-being of the sea and the things in it. Living here in the Pacific, the sea is of great importance is it is one of the main sources of livelihood. Therefore, in recent times, much research, time and resources have been invested in preserving the sea and its life forms for the generations to come. In this paper, we discuss the design and implementation anunderwater monitoring device that is traceable with easy access and retrieval to and from the sea water.

Index Terms - *Oceanographic data collection, sensor networks, underwater acoustic communication.*

I. INTRODUCTION

Underwater sensor networking in recent years has become a very promising revolutionary in many areas of science, industry and even with the government enabling further advancements in monitor the ocean activities. Many industrial applications like oil mining and its production lines use extensive instrumentation like SCADA systems, now more increasingly with rapidly deployed systems. Since these device can communicate with each other means that they are able to cooperate and relay data to remote users. These devices are also known to b energy efficient proving that they can last long periods of time unattended thus allowing them to observe their subjects and surroundings for long- term trends.

Sensor nodes at the bottom of the ocean have been deemed to enable applications for oceanographic data collection, for monitoring the pollution of the ocean, for offshore exploration, for disaster prevention measures, for surveillance and even for navigational applications [2]. Acoustic communications are the typical physical layer technology in underwater networks.

For long distance propagation, radio waves are preferable. However, they require a large antenna and high power transmission. On the other hand, optical waves do not suffer from high attenuation but suffers from scattering[3]. Optical signal transmission requires high precision for line of transmission. Therefore, links in underwater networks are based on acoustic wireless communications.

Acoustic communication waves enable long-range communication links because they suffer from fairly low absorption. That is why they are the most logical and efficient technology to develop reliable underwater networks [6], [7]. In this project, the characteristics of underwater acoustic communication and the difficulties of transmitting data underwater was identified. The findings were analyzed and thus have been discussed in this paper. In the next section we present a brief literature review.

II. BACKGROUND

Underwater sensor networks have both static and mobile sensor nodes which have high potential for monitoring the wellbeing and health of the underwater environment. Unlike on the surface, where radio waves are being used, underwater communication requires a more complex type of transmitted and received data [8]. Radio waves are able to communicate underwater but can only travel up to a few meters. Optical signals an also be used for underwater communication [4]. However it suffers from attenuation and does not propagate well beyond a few hundred meters. Therefore, the best wave for underwater information transmission is sound or acoustic waves. Sound propagates a pressure wave, thus allowing it to travel over hundreds of meters. If it is needed to travel further, lower frequencies will be needed. Underwater acoustic modems come different versions depending on the type of operation (Horizontal and Vertical transmission). Horizontal transmissions are normally used with omni-directional transducers, lower data rates and it is used in shallow waters. Whereas vertical transducers use directional transducers with high data rates and are more suitable in deep waters [10].

Communication in deep waters can be challenging due to the fluctuations of sound speed due to variations in temperature, hydrostatic pressure and chemical content which changes the propagation of sound. This is a phenomenon known as sound refraction. This often results in no transmission between two modems even though they are in range. Either enhanced transducers need to be used or the number of modems used need to be increased and to reduce the distance between the each modem. These are usually called shadow zones; shallow waters are less likely to encounter shadow zones but the received signals are usually much distorted and require specific signal processing.

Some challenges that the transmission may encounter are:

• Doppler spread (surface activity) – this limits the data rate and reliability
• Doppler shift (platform dynamics) – limits the acoustic modem performance when excessive

The current methods that have been utilized are very costly and difficult to implement. Apart from just focusing on the health of the underwater environment, this system will also be able to monitor other underwater aspects like turbidity, temperature, pollution, wave movements and other movements in water. These systems still have lingering issues associated with it. Some of these issues include power efficiency, deployment of sensors to and from the seabed, repair work on damages to the hydrophone.

Acoustic signal propagation is characterized by three factors:

1. Attenuation that is dependent on the frequency of the signal
2. Multipath propagation
3. Low speed of sound

Even though acoustic communication is only able to transmit small amounts of data at a time, it has a long-distance range over which the data can be sent. Since the depth at which the data needed is to be collected is reasonably deep, it was identified that acoustic signal transmission would be the best solution for this system and thus was implemented in this project. In the Pacific, surrounded completely by the ocean, livelihood is greatly dependent on the wellbeing of the sea and thus the system devised focused on the measures needed to protect and preserve the ocean. From observations only that were carried out, it was clear to see that in recent times, the sea has been intensely polluted and people in general have been ignorant towards the effect that this poses. In addition, due to the recent changes in the

weather patterns and conditions caused by climate change, an increased abnormality in tidal activity was noticed. Therefore, a need arises to monitor the sea and its wave patterns in order to set up a warning system in the future to warn people in the case of abnormal tidal activities. The proposed system is described next.

III. PROPOSED SYSTEM

The main aim of the proposed work is to develop and implement a remote release system for underwater monitoring device. This system should allow the release of a deployed hydrophone from the sea-bed, back to the surface of the ocean for retrieval. Therefore data recorded by the sensors embedded in the hydrophone could be easily retrieved for analysis. This is possible by using acoustic transmitter capable of transmitting coded data and thus to activate the release mechanism. The proposed system objectives can be summarized as follows:

1) The hydrophone is expected to be deployed at a distance from the surface of the water, instead of having someone going into the sea to retrieve the hydrophone, acoustic communication is to be used to release the recording device.
2) The hydrophone will be recording different types of data using various sensors. Obtained data isfiltered to separate useful information from added noise signals.
3) Generated acoustic coded signal is transmitted over the water channel to the hydrophone. The receiver would authenticate the received signal. It should then activate the release mechanism todisengage the hydrophone from the weighted block attached at the sea- bed and so to float back to the surface of the sea.

The system architectural design of the hydrophone is shown in figure 1 below. The hydrophone device embeds acoustic and other types of sensors.

Fig. 1 System architecture

Figure 2 shows a bloc diagram of the proposed hydrophone release mechanism system.

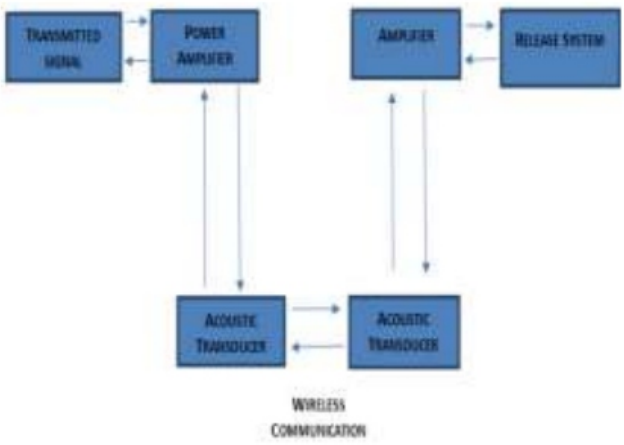

Fig. 2 The release mechanism

On the transmitting side, we have the generated coded signal that it amplified and sent wirelessly over a channel (water). Signal is received and decoded by the receiver module that is also checked for accuracy and then the system relays are activated to turn ON the release mechanism.

Acoustic transducers are used to transmit data underwater. One is used at the transmitting side and the other at the receiving side. A transducer at the transmitting end converts digital data into acoustic pulse waves where it is transmitted and received by another transducer attached to the hydrophone where it converts the acoustic waves into digital data.

The release link is a mechanical clip where the received signal from the transducers can be converted into electrical energy and then use that electrical energy into mechanical energy for it to able to release the hydrophone. The driving circuit is activated once the signal transmitted by the transducer is received and verified for accuracy.

One of the limitations is caused by the bandwidth of the transmitted signal in acoustic communication since it needs to be transmitted at a low frequency so that less attenuation is experienced and therefore causing the limited bandwidth. Signal strength attenuation is another constraint that was identified. Depending on the salinity and the depth of the sea water, and the signal transmission frequency, signal strength attenuation varies. Therefore, if the water is very saline and deep, the attenuation of the signal increases and thus causing the signal to take a longer time to be transmitted to the receiver that is attached to the hydrophone. In the next section we present the system model.

IV. SYSTEM MODEL

Use The overall system model consists of a modulator, an underwater acoustic communication channel, and a demodulator. The model is shown below in figure 3.

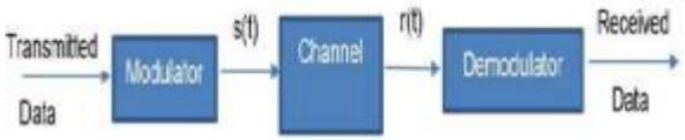

Fig. 3 System model

Function s(t) is the amplitude of the transmitted signal at time t (sec) and the function r(t) represents the amplitude of the received signal as a function of time. All attenuation, delays and noise are considered in the model. In this case, the transmitting and receiving ends are assumed to be stationary. The communication channel is the vital part of this model since it deals with all attenuation encountered by the signals. The channel consists of a fading model c(t) and an ambient noise model n(t). Multipath signal propagation is applied and ambient noise added to the signal. The equation below models the communication channel.

$$r(t) = s(t) * c(t) + n(t) \quad (1)$$

Figure 4 represents the underwater communication channel block diagram.

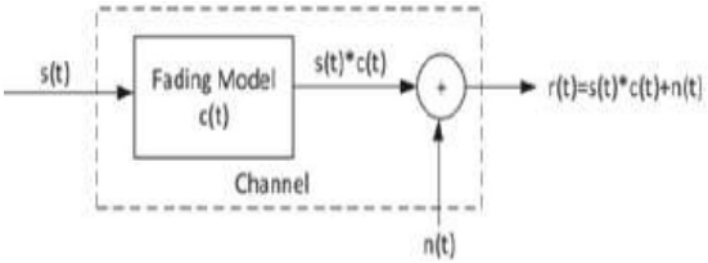

Fig. 4 Communication channel

where
s(t): amplitude of transmitted signal
r(t): amplitude of received signal
c(t): fading model
n(t): ambient noise
The fading signal model is represented by

$$\boldsymbol{c(t) = \sum_{k=1}^{L} a_k \delta(t - \tau_k)} \quad (2)$$

Constant L represents the number of multipath components and variable ak is the attenuation factor of the kth component. τk represents the time delay of the kth component. The Dirac delta function δ(t) is the unit impulse function. Since the convolution equation is defined as

$$\boldsymbol{s(t) * c(t) = \int_{-\infty}^{\infty} c(\tau) s(t - \tau)\, d\tau} \quad (3)$$

then the output of the fading model comes to be

$$\boldsymbol{S_{fad}(t) = \sum_{k=1}^{L} a_k s(t - \tau_k)} \quad (4)$$

The signals are assumed to be band-pass filtered; therefore the low-pass equivalent model of a signal can be represented as

$$\boldsymbol{s(t) = Re\left(s_l(t) e^{j2\pi f_c t}\right)} \quad (5)$$

Where sl(t) is the low-pass equivalent of the transmitted signal as a function of time t and fc is the signal center frequency. Which is equivalent to

$$\boldsymbol{s_{fad}(t) = Re\left(\left(\sum_{k=1}^{L} a_k s_l(t - \tau_k) e^{-j2\pi f_c \tau_K}\right) e^{j2\pi f_c t}\right)} \quad (6)$$

Using the low-pass equivalent model of a signal equation, we get the communication channel rl(t) model with added random ambient noise n(t) as

$$\boldsymbol{r_l(t) = \sum_{k=1}^{L} a_k s_l(t - \tau_k) e^{-j2\pi f c \tau_k} + n(t)} \quad (7)$$

In the next section we present the experimental results.

V. EXPERIMENTAL RESULTS

Computer Simulations was done in Matlab that provides a uniform, menu-based user interface for analyzing system models and plotting the results. It can also evaluate different models and compare results using multiple frequencies. Matlab is also used to manipulate collected data from the hydrophone to identify all activities going on at the deployment location.

The program is able to filter out wanted and unwanted frequencies to determine useful recorded data.We have also conducted outdoor experiments in 10 meters long, 3 meters wide, and 1 to 3 meters deep pool filled with sea water and a temperature varying between 15°and 31° Celsius. The transmitting transducer issubmerged in 0.25 meters depth from the water surface. The receiving transducer attached to the release mechanism of hydrophone via using an Arduino microcontroller board, is set at about 0.50 meters from bottom.

Figure 5 shows the output voltage in mVolts peak to peak of the receiving transducer as a function of thecommunication channel distance in meters between the transmitting and the receiving transducers in meters for an input signal voltage of 1 Volts peak to peak. Computer simulation data and experimental results are used to validate our proposed acoustic communication approach. Since we have conducted our experiments in an artificial pool with a flat bottom, obviously in a natural environment results may vary due to complex shape structure of the oceanand different transmission loss mathematical model.

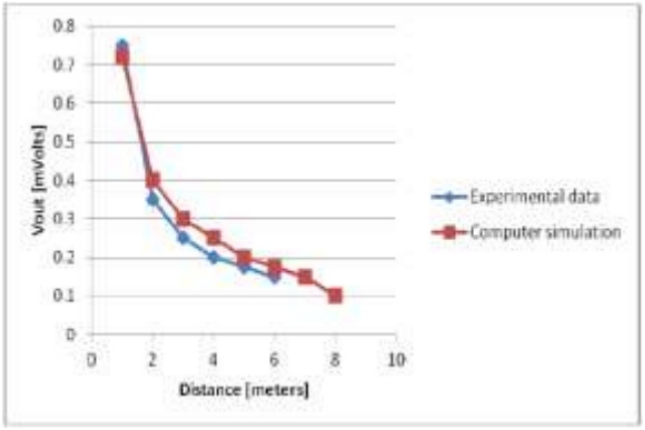

Fig. 5 Receiving transducer output voltage (Vin = 1 volts)

Figure 6 and 7 show the output voltage in mVolts peak to peak of the receiving transducer as a function of the communication channel distance in meters between the transmitting and the receiving transducers in meters for an input signal voltage of 2 Volts and 4 Volts peak to peak, respectively.

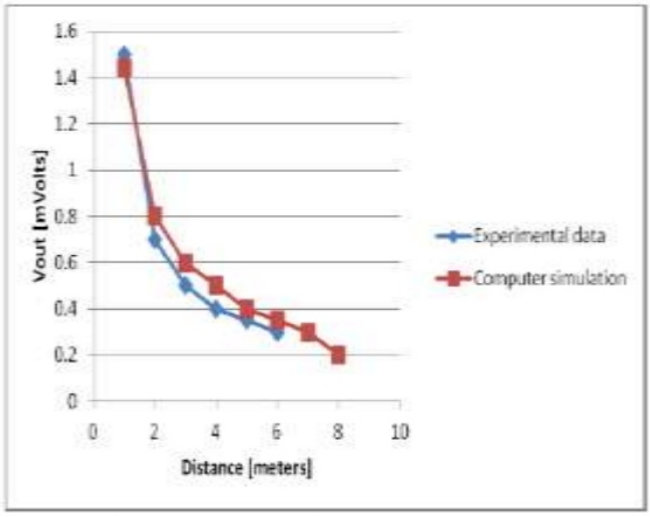

Fig. 6 Receiving transducer output voltage (Vin = 2 volts)

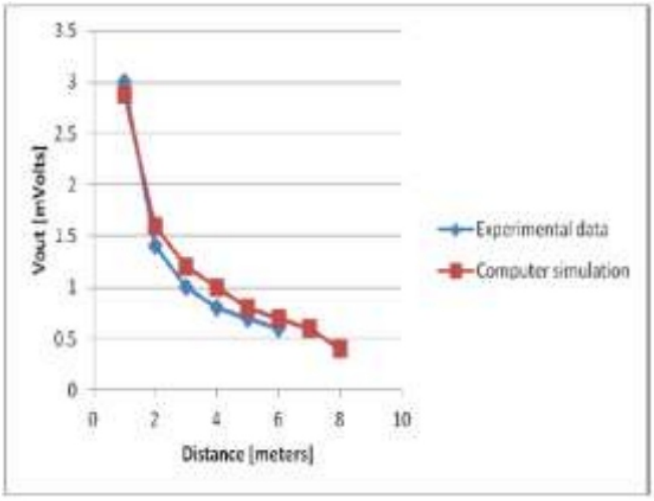

Fig. 7 Receiving transducer output voltage (Vin = 4 volts)

For the performance evaluation of the proposed underwater acoustic communication system, the output voltages of the receiving transducer is recorded by varying the distance between the transmitting and receiving transducer and the input voltage of the transmitting transducer. It is noticed that with the computer simulation results match experimental data with some exceptions. A summary of the paper is presented next.

CONCLUSION

In this paper, we have designed and implemented an underwater acoustic communication system for monitoring purposes. The proposed system was validated by comparing the computer simulation results with experimental data. The system's performance was verified outdoor in an artificial pool filled in with sea water. An Arduino microcontroller board was programmed to activate the release mechanism of the hydrophone recording device. In general, experimental data matched computer simulation results with small deviations between them. Transmitting transducer was able to wirelessly communicate error-free with the receiving transducer for up to 10 meters at low frequency.

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OPTION FOR OPTIMAL EXTRACTION TO INDICATE RECOGNITION OF GESTURES USING THE SELF-MPROVEMENT OF THE MICRO-GENETIC ALGORITHM

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ABSTRACT

The hearing-impaired community uses gestures to communicate. Gestures can also be used in interactions between man and computer. However, gestures become increasingly complicated in a comparatively complex environment. A recognition algorithm with a choice of function based on the improved genetic algorithm is proposed to improve the ability to identify gestures. The recognition process includes retailing, extraction, and feeding functions before classifying the neural network. After learning gestures, the proposed method is compared with traditional methods that use the classic genetic algorithm. The proposed method demonstrates the effect of optimization and sensitivity of the function.

Keywords - *Genetic Algorithm, Progressive Sampling, Feature Selection, Named Entity Recognition, Maximum Entropy.Area-efficient.*

I. INTRODUCTION

Sign language is used by people who suffer from hearing problems. However, people who suffer from hearing problems face uncertainty when communicating with people who can hear or who do not know sign language. Thus, language can be recognized instead through emotions. In this paper, we examine and distinguish the indicative language by proposing different parameters, such as noise removal using adjustment filter, dividing the growth algorithm zone, and extracting features by using genetic algorithm. A motion mechanism is evaluated and compared with seeded vector carrier. Communicating through gestures is the primary communication method used by people with hearing loss. Through gestures, people recognize the meaning of each movement, thereby facilitating communication. This subject is an important research hotspot. Hand movements, such as dynamic and static palm movement, are a common method of interacting with computers [1]. The phonetic visual communication structure for American sign language requires logic-time-fishing, coding, and disassembly from progress video to a cell tool for carriage across the cell framework in the United States. The processing power and battery life of cellphones have been constrained, forcing the multifaceted nature of coding and translation calculations [2].

The More orderly used mensuration is palm pattern / preface, appropriate fits violin preface, palm region, palm region expansion, palm - palm touch, hand -touch organism (Mostly certain region on the front part of a person's head from the forehead to the chin), the two fleshy parts that form the upper and lower edges of the opening of the mouth outgrowth, outer manifestation, center holder position while expansion. In addition, as a rule, touch the opener unusual properties Significance of sign. In any case, this condition does not naturally mean that dynamic accessories of gesture-instituted connections behave like the semantic portion of the influx in languages. Three requirements must be considered, particularly the sequential quality of one-dimensional speech [3].

II. MATERIALS AND METHODS

ToParszowska suggested a strong structure for sign language gesture learning and discrimination by using expedite gloves aside from its implementation in sign language. Basic data motion sensors and main lines of the receiving signal frame that expand motion have been proposed. Evaluating this method determines the results of the proposed method, which uses communication-based gesture suggestions with the technique, as shown in an illustration of the invisible Markov model and its equivalent approximation [4]. In a prevous work, the data of five superficies channels the electrostatic drawing and 3D acceleration of the dominant hand have been verified for use in automatic recognition of Greek color language-separated signs. A discriminatory test was used to distinguish between the successful and inherent sizes and the length of the pane for the account of the intrinsic mode entropy (IME) to append to the fruitful gathering from denoting one American sign language (ASL) indication. First, IME checks whether ASL alphabet narration to 61-word lexicon transfer ten dates by three native subscribers own specified extra than 92Thus isolated samples are isolated. It is then applied to prepare spatial temporal indicative and palm position workbooks. The search is then completed, followed by an evaluation of the implementation of the plan marker summary, hand position profiling, and temporal positioning. The time whit of the film-instituted movement is isolated from front to front, in reverse, and bi-directional outlook. Forecast errors are determined and collected in a single image, which shows the movement of the assembly [5]. With regard to the extraction plan, the collection procedures were completed by using Knearest neighbor and Bayesian probability ratio workbooks. The implementation of the set obtained recognition rates that range from 97 to 100 (one percent).

Our proposed method consists of four essential procedures. First, pre-processing involves noise removal, which can be achieved by using the adjustment first and then performing a hash operation according to the region in which the algorithm is growing. After fragmentation, the feature is extracted by using the speeded-up robust algorithm (SURF), taking dot quality into consideration.The evaluation uses a modified genetic algorithm. The result matches that of the power support device uptight network. Figure 1 shows the structure for sign gesture recognition.

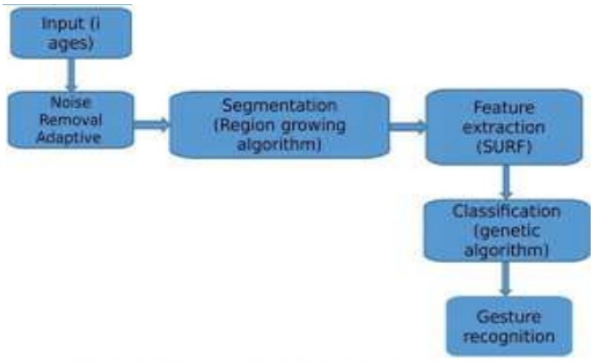

Figure 1: Structure for sign gesture recognition.

III. REMOVING NOISE WITH THE ADJUSTMENTCANDIDATE

The adjustment candidate is a multilateral candidate that has a longitudinal candidate weighted with a move task by changing parameters. In the optimal algorithm, a numerical is modified together with the move task shown in Figure 2.

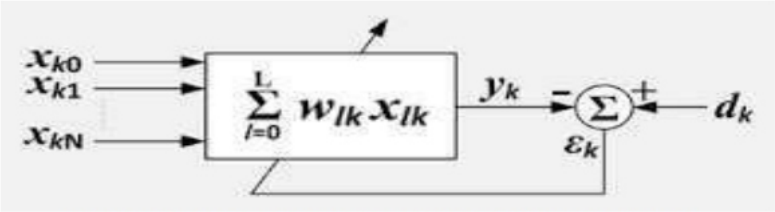

Figure 2: Noise elimination in a suitable candidate.

The adjustment filter proceeds as follows: (1) A color image of the datum is obtained. (2) The image is then transformed into a large-scale picture. (3) The noise on the picture is increased to increase the scale of the picture. (4) The noise is removed from the picture by using the Wiener equation (N = weiner2) (L, [K.K]).

IV. DIVIDING THE AREA WITH THE INCREASING ALGORITHM

Partitioning is the procedure of analyzing the picture and separating its pieces through its representation. Fragmentation can improve with universal labeling of the sample with its dominant energy (Leo, Sidocini).

Where the rim-instituted way You may seek to disclose the specific of the item and next your discovery the story himself by freight it in, the language the usual method is based on the reverse methodology. The growing region algorithm is the best method of processing picture fragmentation. In this method, the grain dot of the picture is first determined if the nearby illumination on a display screen has the same pixel rate. Then, the grain point will transfer to the nearer illumination on a display screen. This technique is used to find a large solid piece of a picture. The requisite form of the growing area of the algorithm is

$$U_j^n K_j = K \quad (1)$$

Where K is the area, and j is the illumination on a display screen point.

Choosing a grain dot is the key step in increasing the algorithm area on the basis of user criteria. The areas of these seed points are then grown to the neighboring dot count on the standard organism in the area. The resultant algorithm area produces a rich picture with features such as minimum threshold value space, better picture information, and similarity threshold value.

Expanding the area involves three steps, namely, girding, selecting the grain dot, and apply the growing area to a point. In girding, one image is distributed to several smaller ones; the images are drawn by a false network, that is, grades in the image change into many small network images. Networks are usually square shaped and network number which the new picture is split into elastic. For our initial assessment of the process, the actual picture was limited to 4, 19, and 25 nets. Retinal wares are used in small networks so that the examination can be transmitted easily. The illumination on a display screen should have the consistency rate $\mathbf{I_r}$, and the neighboring illumination on a display screen should have the value In. The consistency sill is set as $\mathbf{S_i}$. Then, if $\mathbf{I_r}$, and $\mathbf{S_i}$. then consistency chains is face and content.

V. GAINING ADVANTAGE THROUGH SPEEDED-UP ROBUST FEATURES

SDistinguished distinct from a group have different palm sizes, form sizes, tag markers, tag lines, and Citra, who demands formations when they move to express the same word. Good lineaments will have characteristics such as reliability, excellence, competence, local, and magnitude [6] The contradiction between the simulated and the actual results gives rise to poor implementation of the proposed method. This issue can be addressed by gathering sufficient information from different individuals as distinct from a group to prepare Si models. The SURF algorithm uses the Hessian template core to reveal advantages with regard to integrated picture (P) in the place (S, R) . Thus, the total pixel of the datum picture (S) is formulated with the original with p.

$$\mathrm{Isum}(\bar{P}) = \mathrm{sum}\bar{S}_i = \mathrm{sumj}R_j = X(i,j)\ (2)$$

The dimensions of the explain have a linear effect on arithmetic difficulty and match dot durability/thoroughness. A short explain may be more powerful against look but they may not provide enough recognition and result in numerous errors. A candidate of 9 9 area is approximated from Gauss with = 1.3 and act the less than level (Top locative a firm decision) of reply maps.

Points of interest requirement to be lead at various levels, especially to of seeking for correspondence they oftentimes require drawing an analogy in a picture that is viewed at various levels. The measured areas always contain a pyramidal picture. Pictures are rebooted over and over together with Gauss also samples at-order in request to realize the top scale ofthe he is getting on.

5.1 Categorization

Categorization is the main step in understanding gestures. The workbook provides an accurate classification of signal gestures that help improve the action or process of recognizing. In our proposed method, the genetic algorithm is improved and used to recognize gestures from a picture that has shown a good execute than present order. relating to genes algorithm is that essentially utilized to solve conflict relating at restrictive with unrestricted access. It depends essentially on more than two core procedures, such as selection, place of crossing from one side, and transformation Figure 3.

The problem-solving operations first look at the fragmented picture of event prior to the time procedure. It basically focuses on a high-quality picture with integer amount for illumination on a display picture. Suitability worth value will [7].

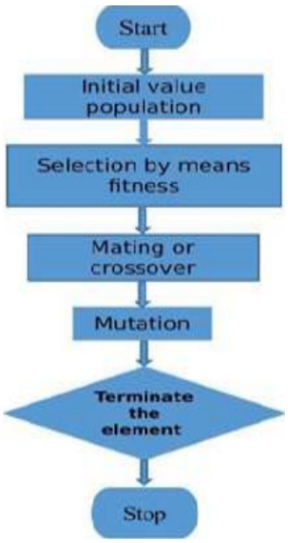

Figure 3 Gradual procedure of improving the genetic algorithm.

Suitability is a key objective and is estimated by using the following formula:

$$F_i = SUM_i^n = 1\frac{d}{n} \quad (4)$$

The express procedure can be performed with the help of two parents that carry genetic information in the form of genes. Level of qualities Will be selected by the child's recent carrying genetic information in the form of genes with crossbred rate [8]. suitable ability used the small convey relating to genes facts provided in shape of factor received recently after creation Another carrying genetic information in the form of genes. The convey relating to genes facts provided in shape of factor is used to calculate the hybrid rate as follows:

$$F_r = CO_g = C_i \quad (5)$$

Where $\mathbf{co_g}$ is the number of gene cross, $\mathbf{C_i}$ is the length of the genetic information presented in the form of genes [9].

Given to adaptation transformation procedure is the union of the adjustment is catalyzing. With the use of the transformation rate $\mathbf{M_r}$ the transformation procedure is conveyed [10].

$$M_r = M_s = M_i \quad (6)$$

where $\mathbf{M_p}$ is the transformation d $\mathbf{N_i}$ is the message related to gene facts provided in the shape of factor length.

Lastly, the message related to gene facts provided in the shape of factor will be selected by determining a system of methods used in an area of study [11], $\mathbf{N_p}$ and produces a message related to gene facts provided in the shape of factor the $\mathbf{N_p}$ new genetic information in the form of genes are in the selection gathering on the pattern of the state values [12]. The genetic information in the form of genes containing the big the state procedure the upper location of the gathering in the gathering of [13] choice. See Figure 4.

(a) (b) (c)

Figure: 4 Sign a movement of part of the body the action or process of recognizing for meat: (a) datum structure, (b) stir isolated, (c) split output.

VI. RESULTS AND DISCUSSION

The adjustment filter is the best numerical method of removing noise from one side of a picture to another. The increased grain dot in the algorithm area retains photo volatility. Recognizing sign gestures in pictures consists of many different tasks [14], thereby obtaining better results than the genetic algorithm and improving the recognition rate. Detailed information is shown in Table 1[15].

CONCLUSIONS

The gestures were successfully recorded in MATLAB. The recognition rate of our proposed technique matches that of current methods, such as neural network and backing device carriers. With the use of the genetic algorithm, the average fragmentation is progressively reduced for various film images. We used extraction along with fragmentation; this combination is an effective measurement procedure in the recognition process. Our proposed method is a better recognition method than the checkout ways. The results of our method indicate that it is more efficient than the methods proposed by existing works related to sign gesture recognition.

Table: 1 Recognition rate of the proposed method versus that of current methods

Average Recognition Rate	Neural Network	Proposed Method	Support Vector Machine
Recognition Rate scale1	30 %	58 %	30 %
Recognition Rate scale2	40 %	65 %	35 %
Recognition Rate scale3	50 %	70 %	40 %
Recognition Rate scale4	65 %	75 %	55 %
Recognition Rate scale5	70 %	80 %	65 %
Recognition Rate scale6	75 %	90 %	80 %
Recognition Rate (%)	79.0 %	80 %	60%)

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