International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887
Volume 5 Issue IX, September 2017- Available at www.ijraset.com

Digital Signal Processing Methods for Ultrasonic Echoes

Nagaroor Lohith[1]
[1]RYME COLLAGE BELLARY.

Abstract: Digital signal processing has changed into a central bit of information examination required in current applications. Specifically, for ultrasonic thickness estimations, the banner to-political agitation degree (SNR) expect an essential part in the correct count of the region time. Mentioned above design , a bandpass channel is didn't acceptable because turmoil levels cannot being in a general sense lessened with the veritable concentrate on a solid thickness estimation can be performed. This paper shows the reasons for containment of two regularization systems—display amassing (TV) and Tikhonov to channel acoustic and ultrasonic signs. Both of these systems are detached and rehash build isolating for deliberately gone in light of upgrades and furthermore hails made by ultrasonic transducers. This paper shows the farthest point of the TV and Tikhonov channels to unequivocally recuperate signals from wild acoustic standards snappier than a bandpass channel. In addition, the TV channel has been appeared to lessen the tumult of a banner on an extremely essential level for the signs with clear ultrasonic echoes. SNRs have been reached out more than 100% by utilizing focal parameter improvement.

I. INTRODUCTION

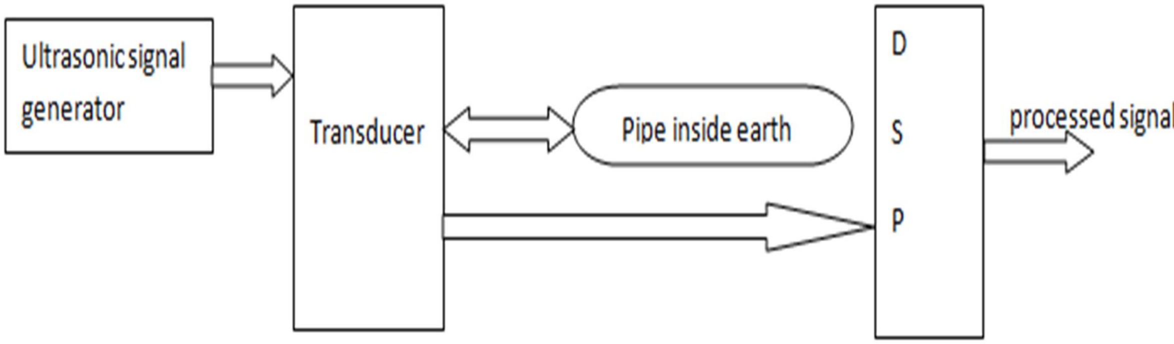
The target of this paper is to display regularization methodology for the electronic standard sorting out of acoustic signs. In the field of acoustics, the most altogether viewed affected flag organizing structures are rehash based. Repeat based pulling back has been the picked approach for forefront hail configuration, in light of the course that there is a key in each helpful sense indistinct system that was used before robotized standard supervising was open. Moreover, go over based separating is easily appreciated using main circuit examination. While go over based pulling back is competent at times, there are particular conditions where such a channel is not sufficient. The motivation for this paper starts from the longing to stretch out the pennant to-unsettling influence degree (SNR) of a ultrasonic standard passed on utilizing a shower on piezoelectric transducer. Transducers are routinely used to make thickness estimations for non-damaging assessment. Investigating the good 'ol fashioned objective to deal with the thickness of a case, the time of flight of a ultrasonic wave must be settled. putting aside a couple of minutes of flight, estimations are troublesome when the SNR is low. Moreover, shower on transducers are relied upon to work at high temperatures, which decrease the achievability of the transducers and enlargement the debilitating of the ultrasonic waves in a material. These working conditions have a tendency to reduce the SNR of a waveform. Affiliations that utilization non-dangerous testing. Techniques portray a standard minimum SNR for the collected data of 30 dB. With a particular exceptional fixation to finish this base SNR, a more solid transducer can be utilized, or electronic pennant regulating frameworks can be used. Changing from a sprinkle on transducer to a more liberal high-temperature transducer can grow the cost per transducer by as much as two offers of size. To tie costs, it is faultless to use pushed hail managing structures to twist up plainly the SNR of a standard. In this way, this paper will disengage go over based bandpass channels and regularization channels on the start of sensibility and speed.

II. METHODOLOGY

The block diagram of ultrasonic echoes signals detector consist of ultrasonic signal generator which generates ultrasonic signals which as frequency range from 2KHZ to 10MHZ and beyond a transducer used to transmit and receive to/from iron rod which is inserted under earth. This application is used to find faults or cracks of pipe which is located underground. When an ultrasonic signal is flush through the pipe when signal hits the crack or fault in pipe which reflects back with some echoes which is generated by the internal or external barriers is fed to directly to the digital signal processor for the de-noising of the signal for better performances.

A. The aim of this project is regularisation of signal by increasing the signal-to-noise ratio. Usually for De-noising of signal we will go with High-pass or Low-pass filter but, in this project we are introducing the two new De-noising mechanisms

1) Total Variation
2) Thikanov



In the field of acoustics, the most common digital signal processing techniques are frequency based. Frequency-based filtering has been the chosen method of digital signal processing, because there is an analog equivalent method that was used before digital signal processing was available. Furthermore, frequency-based filtering is easily understood using basic circuit analysis. While frequency-based filtering is effective in some cases, there are many cases where such a filter is not sufficient. The motivation for this paper stems from the desire to increase the signal-to-noise ratio (SNR) of an ultrasonic signal produced from a spray-on piezoelectric transducer

Regularisation methods are not new to the field of signal processing, and although they are very common in image restoration and have been shown to be extremely effective for de-noising digital signals , they have not been used in acoustics until now.

B. This project considers two classic regularisation methods that are famous for their powerful de-noising capabilities

1) Total variation

2) Thikanov

Although these two methods solve the ill-posed inverse problem of de-noising, they produce slightly different results , and therefore, the performances of both the methods in de-noising acoustic signals will be investigated.

C. Our results show that the proposed signal processing methods work on:

1) fabricated signal;

2) an ideal trivial experimental case.

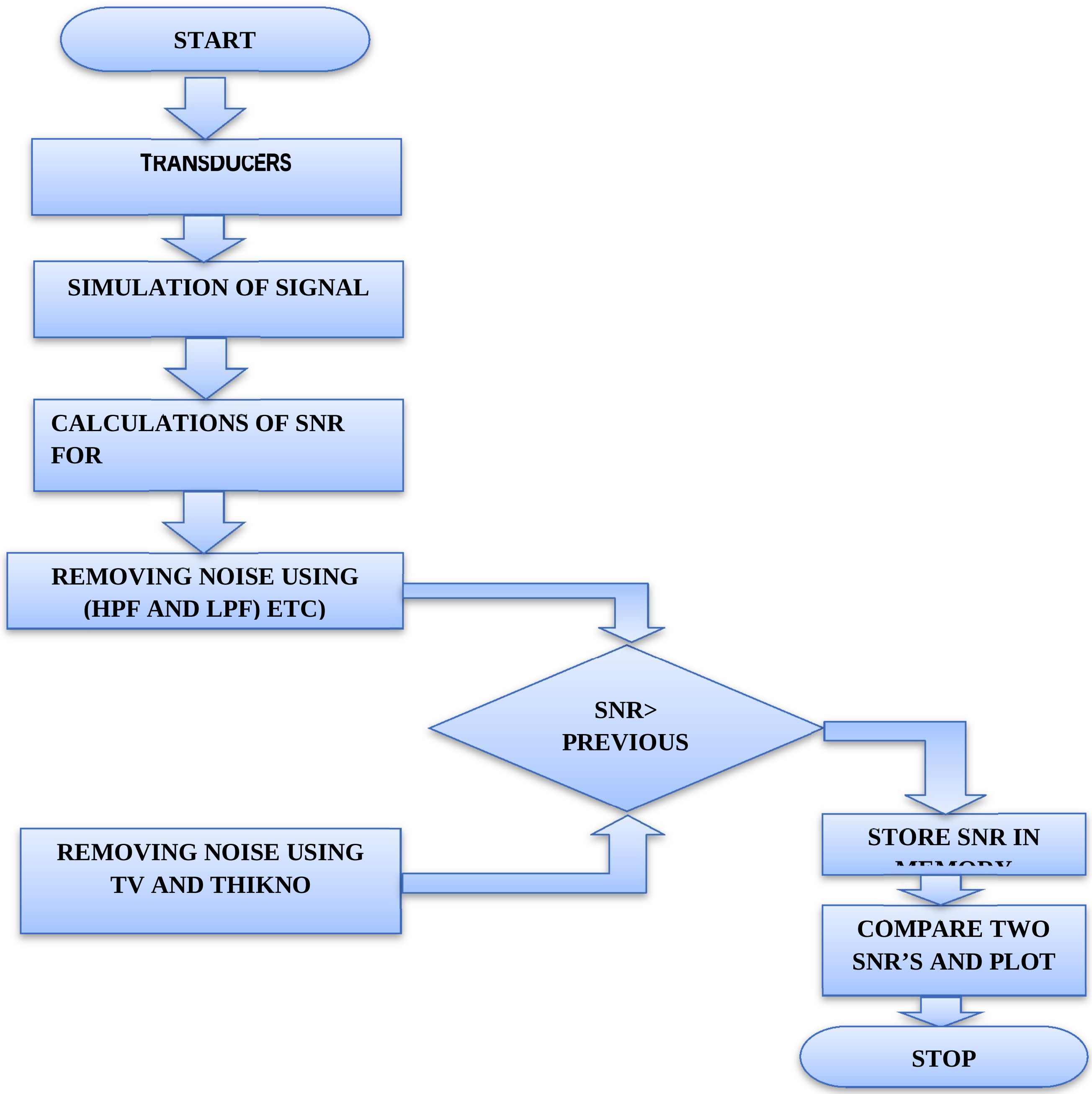
3) an experimental (wireless case) signal, which does not pass the industry standard of 30 dB. The results show that both the regularisation methods, TV and Tikhonov, are more effective in digital signal processing than conventional frequency-based filtering for increasing the SNR of a signal.

Every Digital signal processor we are going with Low -pass or High-pass filter for De-noising the signal as show below

The diagram below shows the ultrasonic signal echoes detector with Total variation and Thikonov filter as de-noising filters as shown below

III. FLOWCHART

The below flow charts shows the actual flow of the project, when we applied ultrasonic signal for finding of the flaw or defects in material when that is immolated inside ground, floor etc. When ultrasonic signal passed to hit the material, when it hit and comes backs to source, receive the reflected wave we used transducer. The received signal contains information signal as well as noise which is produced due to scattering or some impurities in material. To de-noise the signal we fed the received signal to the digital signal processer. For de-noising of signal we normally use the either LPF, HPF or BPF filter .In this project we are going to introduce two different filtering methods and this session deals with the how each step will flow. Transducer is used to send and receive the signal, once signal is received it has both noisy signal and original signal, we need take the SNR of received signal and should store it for feature use. The received signal is first fed to the DSP for de-noising using HPF or LPF, SNR is calculated for the signal which is produced by the these filters. In the next step instead of going with normal HPF or LPF we will go with TV and Tikhonov filters for de-noising the received signal and reaming process should be same. After this step we comparing which is the better filtering method for de-noising the ultrasonic signal and we will plot the SNR accordingly.



IV. CONCLUSION

In this paper, a banner isolating show based Bayesian filtering system (EKS6) has been appeared for ECG hail get ready and separation into its parts (P, Q, R, S and T waves), by using a striking dynamical model. In the proposed technique, the ECG parts are doubtlessly utilized as secured state segments, and meanwhile audited as a period procedure through an EKS. The entertainment happens showed that EKS6 has the point of confinement of appropriately taking after ECG distribute, on a beat-to-beat start.

There are some hypothetical purposes behind intrigue that EKS6 has over other late works in this emerge circumstance. As isolated and EKS2, that usages only two state factors, six state fragments are used, with the upside of permitting ECG parts separation(and not simply ECG filtering). Showed up particularly in association with EKS4, it at no time later on depends on upon the amplitudes of the Gaussian bits, so it can pull back the ECG sections, notwithstanding when surprising changes happens in the banner. In like way, the structure in EKS6 is not obvious in time, thusly enhancing it organized to demonstrate the nuances in the ECG signal. Finally, EKS linearizes the dynamical system at a working point by approximating the state show up through a first demand Taylor diagram estimation. The truncation of the Taylor approach is a poor figure for most non-sort out breaking points. Truly, the precision of the linearization depends on upon

The measure of neighbourhood nonlinearity in the purposes of repression being approximated. By then, the back mean and covariance estimations advance toward persuading the chance to be perceptibly flawed and indicate botches are shown. This can induce instability, particularly when the structure fragments are ardently nonlinear. The EDM proposed here for EKS6 was comprehended to lessened the nonlinearity of the state show up concerning past procedures.

REFERENCES

[1] K. Rosén, A. Dagbjartsson, B. Henriksson, H. Lagercrantz, and I.Kjellmer, "The relationship between circulating catecholamines andST waveform in the fetal lamb electrocardiogram during hypoxia,"Amer. J. Obstet. Gynecol., vol. 149, pp. 190–195, 1984.

[2] J. H. Becker, L. Bax, I. Amer-Wåhlin, K. Ojala, C. Vayssière, M. E.Westerhuis, B.-W. Mol, G. H. Visser, K. Maršál, A. Kwee, and K. G. M.Moons, "ST analysis of the fetal electrocardiogram in intrapartum fetalmonitoring: A meta-analysis," Obstet. Gynecol., vol. 119, pp. 145–154,2012.

[3] F. Censi, G. Calcagnini, C. Ricci, R. Ricci, M. Santini, A. Grammatico,and P. Bartolini, "P-wave morphology assessment by a Gaussian functions-based model in atrial fibrillation patients," IEEE Trans. Biomed.Eng., vol. 54, pp. 663–672, 2007.

[4] M. A. Colman, O. V. Aslanidi, J. Stott, V. Holden, and H. Zhang, "Correlationbetween P-wave morphology and origin of atrial focal tachycardia—Insights from realistic models of the human atria and torso,"IEEE Trans. Biomed. Eng., vol. 58, pp. 2952–2955, 2011.

[5] P. Kligfield, K. G. Lax, and P. M. Okin, "QT interval-heart rate relationduring exercise in normal men and women: Definition by linearregression analysis," JACC, vol. 28, pp. 1547–1555, 1996.

[6] M. Malik, P. Färbom, V. Batchvarov, K. Hnatkova, and A. J. Camm,"Relation between QT and RR intervals is highly individual amonghealthy subjects: Implications for heart rate correction of the QT interval,"Heart, vol. 87, no. 3, pp. 220–228, 2002

[7] R. L. Verrier, T. Klingenheben, M. Malik, N. El-Sherif, D. V. Exner,S. H. Hohnloser, T. Ikeda, J. P. Martínez, S. M. Narayan, T. Nieminen,and D. S. Rosenbaum, "Microvolt T-wave alternans: Physiologicalbasis, methods of measurement, clinical utility-consensus guidelineby ISHNE," J. Amer. Coll. Cardiol., vol. 58, pp. 1309–1324, 2011.

[8] G. D. Clifford, A. Shoeb, P. E. McSharry, and B. A. Janz, "Modelbasedfiltering, compression and classification of the ECG," Int. J. Bioelectromagn.,vol. 7, pp. 158–161, 2005.

[9] R. Sameni, M. B. Shamsollahi, C. Jutten, and G. D. Clifford, "A nonlinearBayesian filtering framework for ECG denoising," IEEE Trans.Biomed. Eng., vol. 54, pp. 2172–2185, 2007.

[10] R. Sameni, M. B. Shamsollahi, and C. Jutten, "Model-based Bayesianfiltering of cardiac contaminants from biomedical recordings," Physiol.Meas., vol. 29, pp. 595–613, 2008.

[11] R. Sameni, G. D. Clifford, C. Jutten, and M. B. Shamsollahi, "MultichannelECG and noise modeling: Application to maternal andfetal ECG signals," EURASIP J. Adv. Signal Process., 2007, pp. 043407:1-14.