FEASIBILITY OF BRAZING AS "JOINING PROCESS"

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ABSTRACT

Brazing is a joining process, which produces coalescence of materials by heating to a suitable temperature and by using a filler metal (often referred to as braze) having a liquids temperature above 4600C and below the solidus temperature of the base material. The filler metal is drawn into the gap between the closely fitted surfaces of the joint by capillary action. Brazing is a joining technique which is commonly used in many industrial applications.

This paper gives a general view of the feasible work carried out on brazing as:

- ✓ *Introduction to allied welding processes,*
- ✓ *Welding brazing comparative study,*
- ✓ *Different methods of brazing and machine tool,*
- ✓ *Defects and applications brazing.*

I. INTRODUCTION

Brazing doesn't melt the base metals. So the brazing temperatures are lower than the melting points of the base metals. Also, it will always be much lower than the welding temperatures for the same base metals. Brazing creates a metallurgical bond between the filler metal and the surfaces of the two metals being joined.

Some of the prominent types of brazing techniques are Torch brazing, Dip brazing, Induction brazing, Furnace brazing, Resistance brazing and Laser brazing.

1.1 Basic Steps in Brazing

The basic steps involved in brazing can be classified as follows. Proper care has to be taken in each of the steps to avoid a wrong joint upon brazing operation.

a) Ensure proper fit and clearance
b) Clean the metal
c) Flux prior to brazing
d) Fixture of parts
e) Brazing the assembly
f) Cleaning the new joint

II. BRAZING PROCEDURES

The metal needs to be cleaned by either chemical, mechanical or a combination of both methods to ensure good bonding. Edge preparation is essential in braze welding. The edges of the thick parts can be beveled by grinding, machining, or filing. It is not necessary to bevel the thin parts (one-fourth inch or less). The metal must be bright and clean on the underside as well as on the top of the joint. The two pieces must be fitted properly and supported to prevent voids in the joint or accidental movement during brazing and cooling operations.

2.1 Surface Preparation

The surfaces of the metal must be cleaned for capillary action to take place. When necessary, chemically clean the surface by dipping it in acid. Remove the acid by washing the surface with warm water. For mechanical cleaning, you can use steel wool, a file, or abrasive paper. Do not use an emery wheel or emery cloth, because abrasive particles or oil might become embedded in the metal.

2.2 Work Support

Mount the work in position on firebricks or other suitable means of support, and if necessary, clamp it. This is important because if the joint moves during the brazing process, the finished bond will be weak and subject to failure.

2.3 Fluxing

The method of application varies, depending upon the form of flux being used and the type of metal you are brazing. Refer to the material on fluxes previously described. It is extremely important that the flux is suitable for your job.

2.4 Brazing

This step is to heat the parts to the correct brazing temperature. The best way to determine the temperature of the joint, as you heat it, is by watching the behavior of the flux. The flux first dries out as the moisture (water) boils off at 212°F. Then the flux turns milky in color and starts to bubble at about 600°F. Finally, it turns into a clear liquid at about 1100°F. That is just short of the brazing temperature. The clear appearance of the flux indicates that it is time to start adding the filler metal. The heat of the joint, not the flame, should melt the filler metal. When the temperature and alignment are proper, the filler metal spreads over the metal surface and into the joint by capillary attraction. For good bonding, ensure the filler metal penetrates the complete thickness of the metal. Stop heating as soon as the filler metal has completely covered the surface of the joint, and let the joint cool slowly. Do not remove the supports or clamps or move the joint in any way until the surface is cool and the filler metal has completely solidified.

Finally, clean the joint after it has cooled sufficiently. This can be done with hot water. Be sure to remove all traces of the flux because it can corrode the metal. Excess metal left on the joint can be filed smooth.

The above described procedure is a general one, but it applies to the three major types of brazing: silver, copper alloy, and aluminum. The differences being the base metals joined and the composition of the filler metals.

III. KINDS OF BRAZING PROCESSES

3.1 Torch Brazing

In case of torch brazing, flux is applied to the part surfaces and a torch is used to focus flame against the work at the joint. A reducing flame is used to prevent the oxidation. Filler metal wire or rod is added to the joint. Torch uses mixture of two gases, oxygen and acetylene, as a fuel like gas welding.

3.2 Furnace Brazing

In this case, furnace is used to heat the work pieces to be joined by brazing operation. In medium production, usually in batches, the component parts and brazing metal are loaded into a furnace, heated to brazing temperature, and then cooled and removed. If high production rate is required all the parts and brazing material are loaded on a conveyer to pass through then into a furnace. A neutral or reducing atmosphere is desired to make a good quality joint.

3.3 Induction Brazing

Induction brazing uses electrical resistance of work piece and high frequency current induced into the same as a source of heat generation. The parts are pre-loaded with filler metal and placed in a high frequency AC field. Frequencies ranging from 5 to 5000 kHz are used. High frequency power source provides surface heating; however, low frequency causes deeper heating into the work pieces. Low frequency current is recommended for heavier and big sections (work pieces). Any production rate low to high can be achieved by this process.

3.4 Resistance Brazing

In case of resistance welding the work pieces are directly connected to electrical rather than induction of electric current line induction brazing. Heat to melt the filler metal is obtained by resistance to flow of electric current through the joint to be made. Equipment for resistance brazing is same that is used for resistance welding, only lower power ratings are used in this case. Filler metal into the joint is placed between the electrode before passing current through them. Rapid heating cycles can be achieved in resistance welding. It is recommended to make smaller joints.

3.5 Dip Brazing

In this case heating of the joint is done by immersing it into the molten soft bath or molten metal bath. In case of salt bath method, filler metal is pre-loaded to the joint and flux is contained in to the hot salt bath. The filler metal melts into the joint when it is submerged into the hot bath. Its solidification and formation of the joint takes place after taking out the work piece from the bath. In case of metal bath method, the bath contains molten filler metal. The joint is applied with flux and dipped to the bath. Molten filler metal, fills the joint through capillary action. The joint forms after its solidification after taking it out from molten metal bath. Fast heating is possible in this case. It is recommended for making multiple joints in a single work piece or joining multiple pairs of work pieces simultaneously.

3.6 Infrared Brazing

It uses infrared lamps. These lamps are capable of focused heating of very thin sections. They can generate up to 5000 watts of radiant heat energy. The generated heat is focused at the joint for brazing which are pre-loaded with filler metal and flux. The process is recommended and limited to join very thin sections.

3.7 Braze Welding

This process also resembles with welding so it is categorize as one of the welding process too. There is no capillary action between the faying surfaces of metal parts to fill the joint. The joint to be made is prepared as 'V' groove. a greater quantity of filler metal is deposited into the same as compared to other brazing processes. In this case entire 'V' groove is filled with filler metal, no base material melts. Major application of braze welding is in repair works.

IV. BRAZING MATERIALS

4.1 Selection of Filler Metal

The following factors must be considered when selecting a brazing filler metal Compatibility with base metal and joint design.

Service requirement for the brazed assembly Compositions should be selected to suit operating requirements, such as service temperature, thermal cycling, and stress loading, corrosive conditions and so on. Filler metals with narrow melting ranges less than 280C between solidi to liquids can be used with any heating method.

Filler metals used in brazing are nonferrous metals or alloys that have a melting temperature below the adjoining base metal, but above 800°F. Filler metals must have the ability to wet and bond with the base metal, have stability, and not be excessively volatile. The most commonly used filler metals are the silver- based alloys. Brazing filler metal is available in rod, wire, preformed, and powder form.

Brazing filler metals include the following eight groups:

Base Metal	Filler Metal
Aluminum	Aluminum and Silicon
Nickel-	Copper alloys Copper
Copper	Copper and phosphorus
Steel and cast iron	Copper and zinc
Stainless steel	Gold and silver

Silver-base alloys
Aluminum-silicon alloys
Copper
Copper-zinc (brass) alloys
Copper-phosphorus alloys
Gold alloys
Nickel alloys
Magnesium alloys

- ✓ Aluminum-silicon—used for brazing aluminum and aluminum alloys.
- ✓ Copper-phosphorus—used for joining copper, copper alloys, and other nonferrous metals.
- ✓ Silver—Used for joining almost all ferrous and nonferrous metals. The exceptions for use include aluminum and other metals with low melting points.

- ✓ Copper and copper-zinc—Suited for joining both ferrous and nonferrous metals. This compound is used in a 50/50 mixture for brazing copper. A64% copper/36% zinc compound is used for iron and steel.
- ✓ Nickel—Used when extreme heat and corrosion resistance is needed. Applications include food and chemical processing equipment, automobiles, cryogenics, and vacuum equipment. Flux.

4.2 Fluxes

Brazing processes require the use of a flux. Flux is the substance added to the metal surface to stop the formation of any oxides or similar contaminants that are formed during the brazing process. The flux increases both the flow of the brazing filler metal and its ability to stick to the base metal. It forms a strong joint by bringing the brazing filler metal into immediate contact with the adjoining base metals and permits the filler to penetrate the pores of the metal.

The following factors must be considered when you are using a flux:

Base metal or metals used
Brazing filler metal used
Source of heat used

Flux is available in powder, liquid, and paste form. One method of applying the flux in powdered form is to dip the heated end of a brazing rod into the container of the powdered flux, allowing the flux to stick to the brazing rod. Another method is to heat the base metal slightly and sprinkle the powdered flux over the joint, allowing the flux to partly melt and stick to the base metal. Sometimes, it is desirable to mix powdered flux with clean water (distilled water) to form a paste.

Flux in either the paste or liquid form can be applied with a brush to the joint. Better results occur when the filler metal is also given a coat.

The most common type of flux used is borax or a mixture of borax with other chemicals. Some of the commercial fluxes contain small amounts of phosphorus and halogen salts of either iodine, bromine, fluorine, chlorine, or astatine. When a prepared flux is not available, a mixture of 12 parts of borax and 1 part boric acid may be used.

V. BRAZING FLUXES, EQUIPMENTS AND FILLER METAL

Main property of brazing filler metal is its fluidity, its capability of penetration into the interface of surfaces. Melting point of filler metal must be compatible with work piece metal. Molten filler metal should also be chemically insensitive to the work piece metal. Filler metal can be sued in any form including powder or paste. Purpose of brazing flux is same it is in case of welding. It prevents formation of oxides and other unwanted by products making the joint weaker. Characteristics of a good flux are:

Low Melting Temperature,
Less Viscosity So That Filler Metal (Molten) Can Displace It, And'
Adhering To The Work piece. Common Fluxes Are Borax, Borates, Chlorides And Florides

VI. BRAZING JOINTS AND SURFACE PREPARATION

Common categorization of joint is butt joint and lap joint is also applicable to brazing joints. Normally a butt joint provides very limited area for brazing. We know the strength of the joint depends on the brazing area and so limited brazing area is responsible for week joint formation. To increase the brazing area the mating parts are often scarified or stepped by altering them through extra processing.

In case of lapped joints over lap of at least three times the thickness of the thinner part is recommended. An advantage of brazing over welding while making lap joints in that the filler metal is bonded to the work pieces throughout the entire interface area between the parts rather than only at the edges. Clearance between the mating surfaces should be large enough so that molten filler metal can flow throughout the entire overlapped area. At the same time clearance should be small enough so that capillary action can exists to facilitate the flow of molten filler metal between the overlapped area. Recommended clearance is up to 0.25 mm. Other important instruction for making brazing joint is cleanliness of mating surfaces. The mating surfaces should be free of oxides, oils, grease, etc. to make wetting and capillary action comfortable. Cleaning may be done using mechanical means or by chemical treatments depending on the situation.

6.1 Advantages of braze welding

This process requires less preheating, permits greater welding speed, demands a shorter cooling-off period, and is less likely to crack metals, such as cast iron, during the braze welding operation. There is no splash or weld spatter to worry about and low temperatures minimize distortion. The completed joint requires little or no finishing. Brazing technique does not require as much skill as the technique required for fusion welding. High variety of materials may be joined; Thin wall parts may be joined. Dissimilar materials may be joined.

6.2 Disadvantages of braze welding

If the joint is to be exposed to corrosive media, the filler metal must have the required corrosion-resistant characteristics. All brazing alloys lose strength at elevated temperatures.

If the joint is to be painted, all traces of the flux must be removed. E.g. Torch brazing.

The oxyacetylene flame is perhaps the most common method of heating the parts to be brazed.

VII. APPLICATION OF BRAZING

In Metal- Ceramic Joining

Metal-ceramic joints have wide applications in reactor power system (typically in spacecrafts), thermonuclear power reactors, and heat exchangers. Metal-ceramic joints are produced by two methods:

• Molybdenum-Manganese/Nickel plating method

• Active filler metal brazing

Molybdenum-Manganese/Nickel plating method

Molybdenum-Manganese/Nickel plating method is also known as Molly-Manganese metallization. Depicts various steps initially a coating of molybdenum and manganese particles mixed with glass additives and volatile carriers is applied to the ceramic surface to be brazed. Next, the coating is fired in a wet hydrogen environment leaving a glassy metallic coating. Further a layer of nickel is plated over the glassy metallic coating. Next, the nickel plating is sinter-fired in a dry hydrogen atmosphere leaving a finished metallic surface that can be readily brazed using Standard braze filler metals.

7.1 Active filler metal brazing

Active filler metal brazing is more famous than the Moly-Manganese metallization. The primary for this is that it is very material dependent, active filler metals display good wetting with most ceramic materials. Moreover, this method permits the use of standard brazing techniques when making metal-ceramic basements without the need to apply any metallization to the ceramic substrate. depicts various steps followed in this method to produce ceramic-metal joint. The metal and the ceramic substrates are cleaned, and the active filler metal perform or paste is applied between the faying surfaces of the basement. The brazing operation is usually performed in an inert or vacuum environment.

7.2 Brazing: Quality

It is important to have extremely clean surfaces for the brazed joint. Mechanical surface preparations such as grinding, sandblasting, wire brushing, filing, and machining can be used. The surface must be clean and removed from dust, oil, etc. Troubleshooting hints: If the brazing filler metal does not wet the surface: Increase the amount of flux used Roughen the surface Welding Technology Roughen the surface Change the work position so that the gravity will help the filler metal fill the joint If the brazing alloy does not flow through the joint: Allow more time for heating Heat to a higher temp Apply flux both the base metal and brazing filler metal. If the brazing filler metal melts but does not flow: Coat the filler metal with flux mechanically and chemically clean the filler metal if there are surface oxides present.

VIII. CONCLUSION

Brazing is a highly efficient method for joining and finds an important place in the current industrial scenario especially in aerospace and automotive applications. More methods of brazing are expected to be invented in the near future and this paper provides an insight into the existing brazing techniques and the test methods, so that the researchers can easily understand some of the overall developments.

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AUTOMATIC SPEECH RECOGNITION FOR NUMERIC DIGITS USING TIME NORMALIZATION AND ENERGY ENVELOPES

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ABSTRACT

In this paper 4 KHz band limited signal is sampled at a frequency rate of 8 KHz. The end points of the isolated words are recognized For this, the energy plot of the utterance is obtained and the end points are detected by cutting off the energy region that is less than 10% of the peak energy on either side. Then these data are time normalized and all the digits are set to same number of data. These samples are now segmented into 94 separate segments each 8ms duration. From each segment the zero crossing rate and energy are determined and the energy envelope plot is smoothened by using point average method. The information is then extracted from the above features. Then the energy peak level is classified as high, medium and low energy peak positions represented by number of segments and the zero crossing rate is obtained for each segment. The above information for each digit is identified and stored in the knowledge base.

Keywords: Data Acquisition, Filtering, Finding the Number of Peaks, Locating Starting and Ending Peaks, Plotting the Energy Envelope.

I INTRODUCTION

Speech recognition, often called automatic speech recognition, is the process by which a computer recognizes what a person said. If you are familiar with speech recognition, it's probably from applications based around the telephone. If you've ever called a company and a computer asked you to say the name of the person you want to talk to, the computer recognize the name you said through speech recognition. In speech applications such as dictation software, the application’s response to hearing a recognized word may be to write it in a word processor. In an interactive voice response system, the speech application might recognize a person's name and route a caller to that person’s phone.

Speech recognition is also different from voice recognition, though many people use the terms interchangeably. In a technical sense, voice recognition is strictly about trying to recognize individual voices, not what the speaker said. It is a form of biometrics, the process of identifying a specific individual, often used for security applications.

II SPEECH RECOGNITION BASICS

Speech recognition is the process by which a computer (or) other type of machine identifies spoken words. Basically, it means talking to a computer, and having it correctly recognizing what you are saying. The following definitions are the basics needed for understanding speech recognition technology.

2.1Utterance

An utterance is the vocalization (speaking) of a word or words that represent a single meaning to the computer. Utterances can be a single word, a few words, a sentence, or even multiple sentences.

2.2 Speaker Dependence

Speaker dependent systems are designed around a specific speaker. They generally are more accurate for the correct speaker, but much less accurate for other speakers. They assume the speaker will speak in a consistent voice and tempo. Speaker independent systems are designed for a variety of speakers. Adaptive systems usually start as speaker independent systems and utilize training techniques to adapt *to the* speaker to increase their recognition accuracy.

2.3 Vocabularies

Vocabularies (or dictionaries) are the list of words or utterances that can recognize by the SR system. Generally; smaller vocabularies are easier for a computer to recognize, while larger vocabularies are more difficult. Unlike normal dictionaries, each entry doesn't have to be a single word. They can be as long as a sentence or two. Smaller vocabularies can have as few as I or 2 recognized utterances (e.g.’ wake up"), while very large vocabularies can have a hundred thousand or more.

2.4 Accurate

The ability of a recognizer can be examined by measuring its accuracy or how well it recognizes utterances. This includes not only correctly identifying an utterance but also identifying if the spoken utterance is not in its vocabulary. Good ASR systems have an accuracy of 98%or more! The acceptable accuracy of a system really depends on the application.

2.5 Training

Some speech recognizers have the ability to adapt to a speaker. When the System has this ability; it may allow training to take place. An ASR system is trained by having the speaker repeat standard or common phrases and adjusting *its* comparison algorithms to match that particular speaker. Training a recognizer usually improves its accuracy. Training can also be used by speakers that have difficulty speaking or pronouncing certain words. As long as the speaker can consistently repeat an utterance. ASR systems with training should be able to adapt.

III DIGITAL SIGNAL PROCESSING

Digital signal processing (DSP) is the study of signals in a digital representation and the processing methods of these signals. DSP and analog signal processing are subfields of signal processing. DSP includes subfields like: audio and speech signal processing, sonar and radar signal processing, sensor array processing, spectral estimation, statistical signal processing, digital image processing, signal processing for communications, biomedical signal processing, seismic data processing, Etc.

Digital signals can be easily stored on magnetic media without loss of fidelity and can be processed off-line in a remote laboratory. The DSP allows us to implement sophisticated algorithms when compared to its analog counterpart. A DSP system can be easily reconfigured by changing the program. Reconfiguration of an analog system involves the redesign of system hardware.

Band limited signals can be sampled without information loss if the sampling rate is more than twice the bandwidth. Therefore, the signals having extremely wide bandwidths require fast sampling rate A/D converters and fast digital signal processors. But there practical implementation in the speed of operation of A/D converters and digital signal processors.

IV PROBLEM DEFINITION

The main aim of the present research work is to develop a system that can identify an isolated spoken digit by analyzing the digits. this can be achieved by Knowing the various parameters of the spoken signal and the parameters we consider are energy envelope, locating the starting and the end points, calculating zero crossing rates, calculating number of peaks and peak positions. matlab software will help to realize various parameters in the spoken audio signal.

Speech signal recognition has its importance in currently developing fields like voice activated calculator, speaker identification systems, automatic telephone dialing etc.

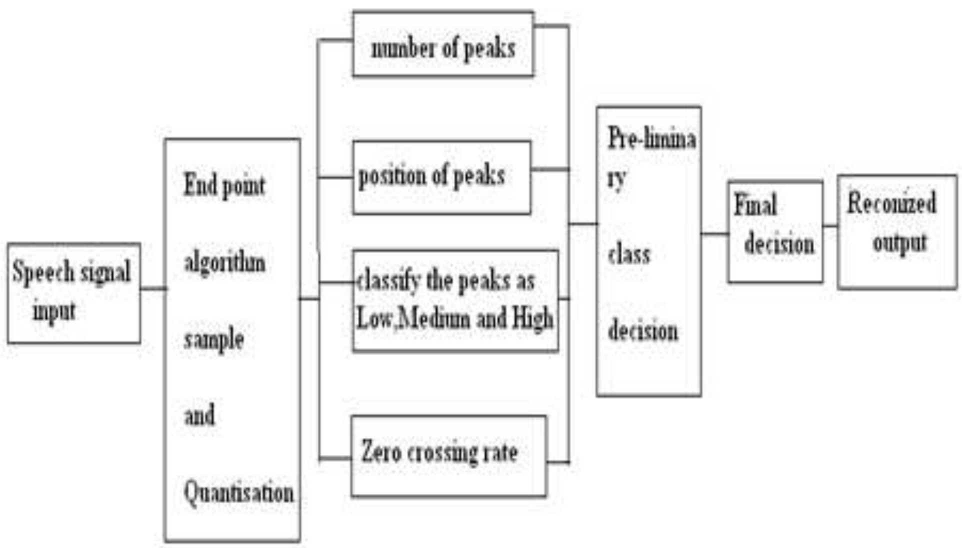
The various steps involved in recognition are,

- Audio recording and utterance detection
- Pre-filtering (pre-emphasis, normalization, banding, etc.)
- Framing and windowing (chopping the data into a usable format)

- Filtering (further filtering of each window/frame/frequency band)

- Comparison and matching (recognizing the utterance)

V BLOCK DIAGRAM



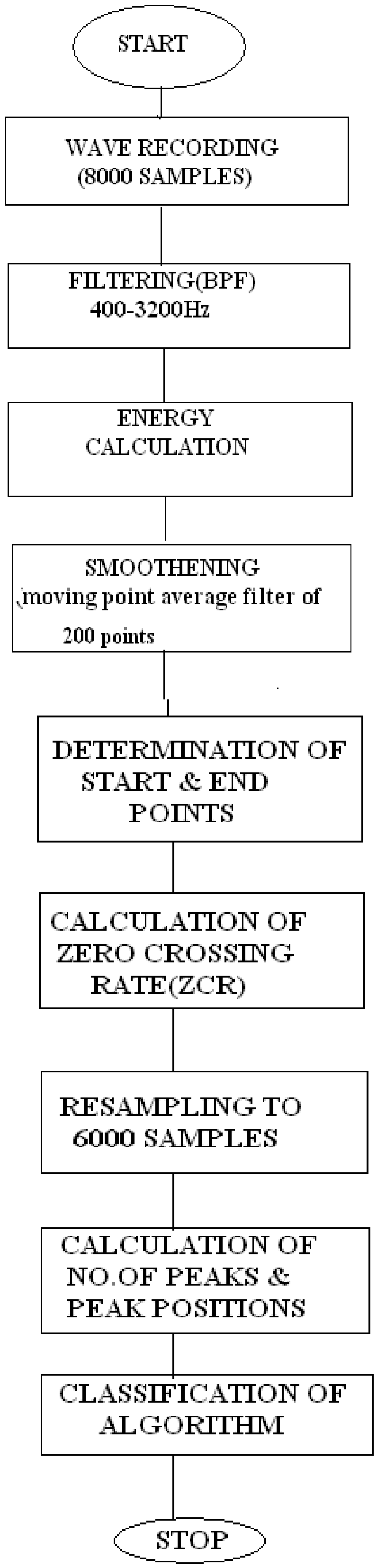
VI CLASSIFICATION

The classification procedure has a tree like structure counting the number of peaks in the energy does the first classification. The digits are classified into three groups. Digits having single peak, two peaks, three peaks. The experiments reveal that digits 1, 2, 4, 6, 9 are having single peak, whereas digits 0, 3, 7 and 8 are having two peaks.

In the group having single peak, next classification is done on the basics of peak position. If the peak position is less than 20 segments, then the digits are either 2 or 6. Information of zero crossing is used to distinguish between the other digits with single peak. For example, the digit 1 has its peak in a segment greater than 40th segment and its zero crossing rate value lies between 14 and 9. digit 9 has a ZCR greater than 14. thus the classification can be done to identify the exact digit among the digits with single peak.

In digits with double peaks, the difference in the peak positions is taken into consideration for classification. If the difference in the peak positions is less than 43 then the digit is either 7 or 3 or 0. so the second position is taken into consideration for classification. If the second peak is less than 60 and ZCR>10.5 then the digit is 7 and the ZCR<10.5 then the digit is 0. otherwise the digit is 3. further classification is done to identify the digit 8.

VII FLOW CHART



VIII HARDWARE REQUIREMENTS

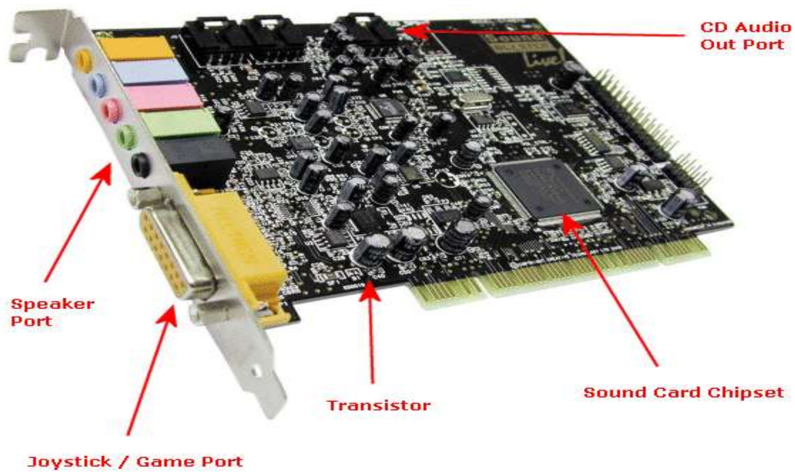
8.1 Microphone

A microphone was used to record the spoken digit. The capacitor or condenser microphone is closest to the ideal, with a Clinical purity of quality. Unlike the magnetic types, the capacitor microphone does not produce its own emf. A DC polarization voltage, somewhere in the 25-150 volts, is fed through a resistor to what is effectively a capacitor plate. A moving plate, which acts as a Diaphragm, forms a second plate of the capacitor and is frequently made of thin plastic Material. As the diaphragm moves, the capacitor changes its value, so varying the current Flow in the circuit. A current operated preamplifier in the body of the microphone then Steps up the signal and provides an output voltage.

Talkmic microphone (49 from iANSYST)- this is a high quality. Pressure gradient, which picks up close sound better than background noise and is attached to the head by means of a loop that fits over the users ear. It is generally very stable and comfortable. Andrea NC61- a good quality microphone which uses active noise canceling to reduce background noise. Less stable to wear than the tlakmic. At the same time as the software has been changing, computer prices have continued to drop and the power of typical desktop machine has grown to such an extent that SR software will run on almost any standard PC manufactured in the past couple of years, provided that it has sufficient memory. Nevertheless, it is important to pay attention to the recommended specification for a particular program. The latest versions of the continuous speech programs have been designed to take advantage of the increased processing power of Pentium IV computers and their equivalents.

8.2 Sound Cards

Sound functions within a PC are generally controlled by a sound card**.** At one time, the quality of sound input signal produced by some cards was not good enough for speech recognition, but this rarely a problem in desktop computers built over the past couple of years. There can still be problems with some laptops where components are closely packed, occasionally leading to electrical interferences.



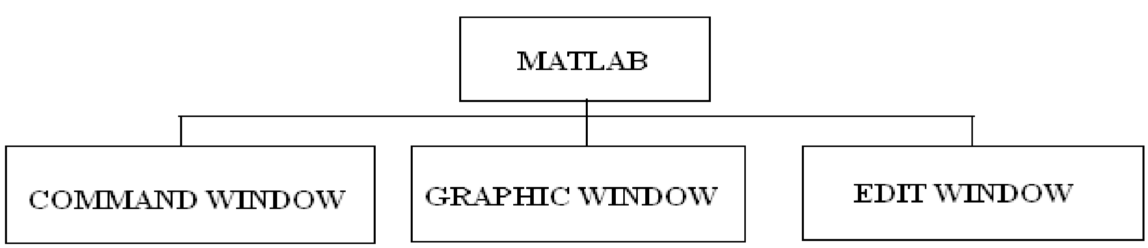
IX SOFTWARE REQUIREMENTS

Matlab is a numerical computing environment and programming language. Created by The Math Works, Matlab allows easy matrix manipulation, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with Programs in other languages. Although it specializes in numerical computing, an optional toolbox interfaces with the Maple symbolic engine, allowing it to be part of a full Computer algebra system. As of 2004, MATLAB was used by more than one million people in industry and academia. Matlab is required to execute the logic designed previously.

There are also several optional TOOLBOXES available from the developers of MATLAB. These toolboxes are collections of functions written for special applications as,

- Symbolic Computation
- Image Processing
- Statistics
- Control System Design
- Neural Networks

9.1 Matlab Windows



- Launch pad
- Work Space
- Command History
- Current Directory

9.2 Types of Files

- M-file: are standard ASCII text files, with a ".m" extension.
- Mat-file: are Binary Data files, with a ".mat" extension.
- Mex-file: are MATLAB callable C-programs, with a ".Mex" extension.

X MATLAB CODING AND RESULTS

Matlab coding is done for data acquisition, filtering of recording data, plotting of energy envelopes, location of starting and ending points, time normalization of data, segmentation, calculation of zero crossing rate, calculating the number of peak positions and detection of digits.

After the coding is done it is simulated in matlab and the following data is obtained in the graphical format for the digit zero and the similar waveforms are obtained for all the remaining digits i.e. from 1 to 9.

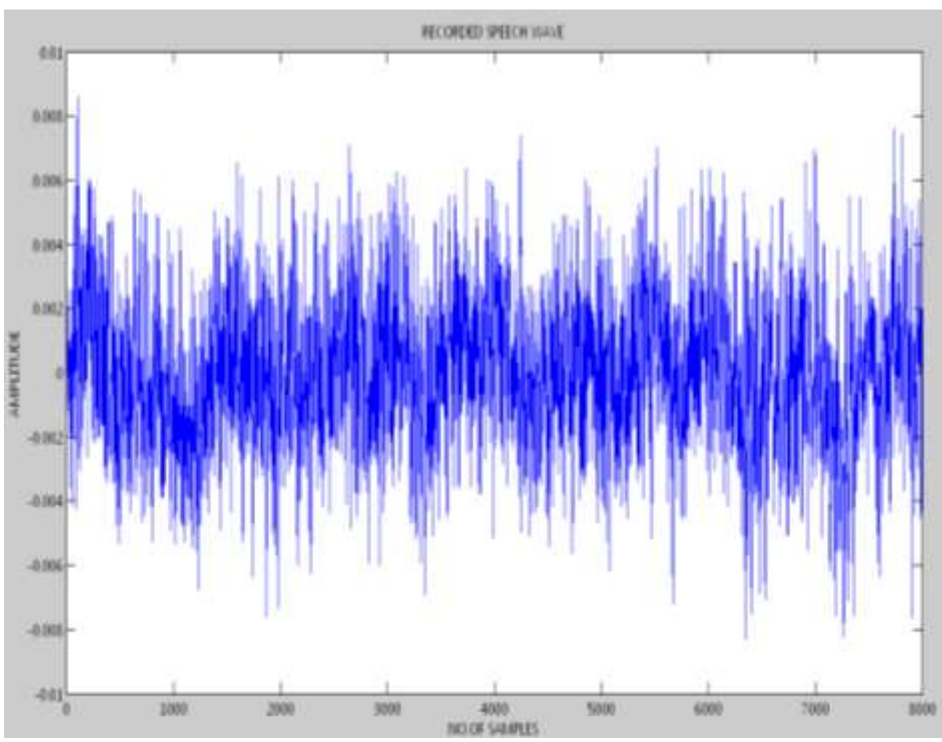


Fig. 10.1 Recorded waveform for digit zero

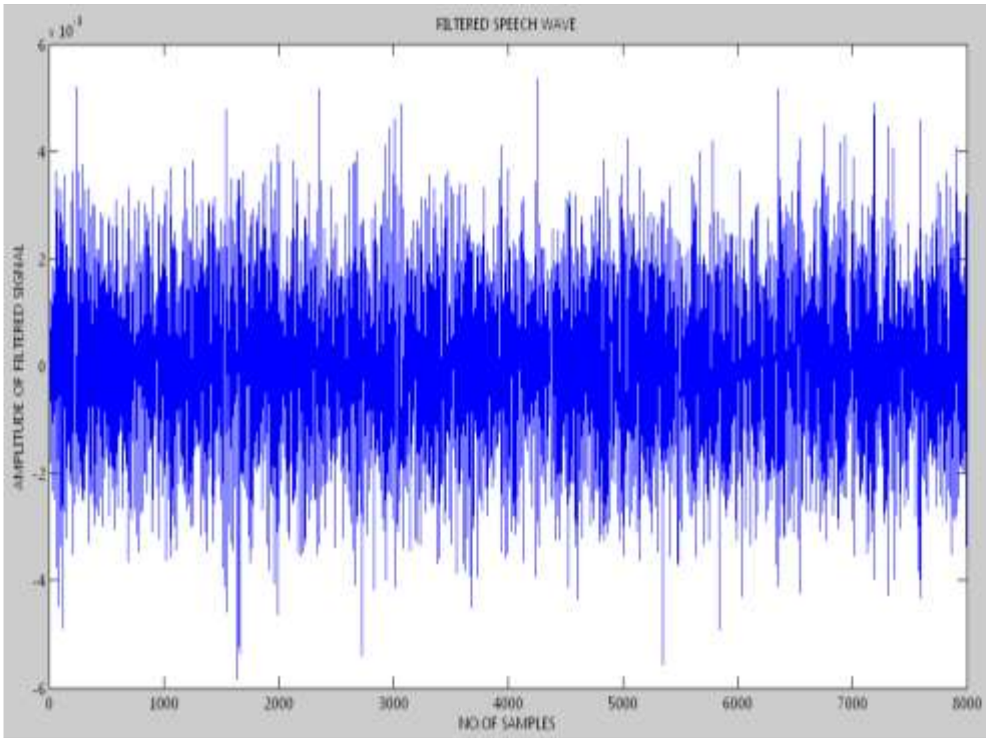


Fig. 10.2. Filtered Waveform for Digit Zero

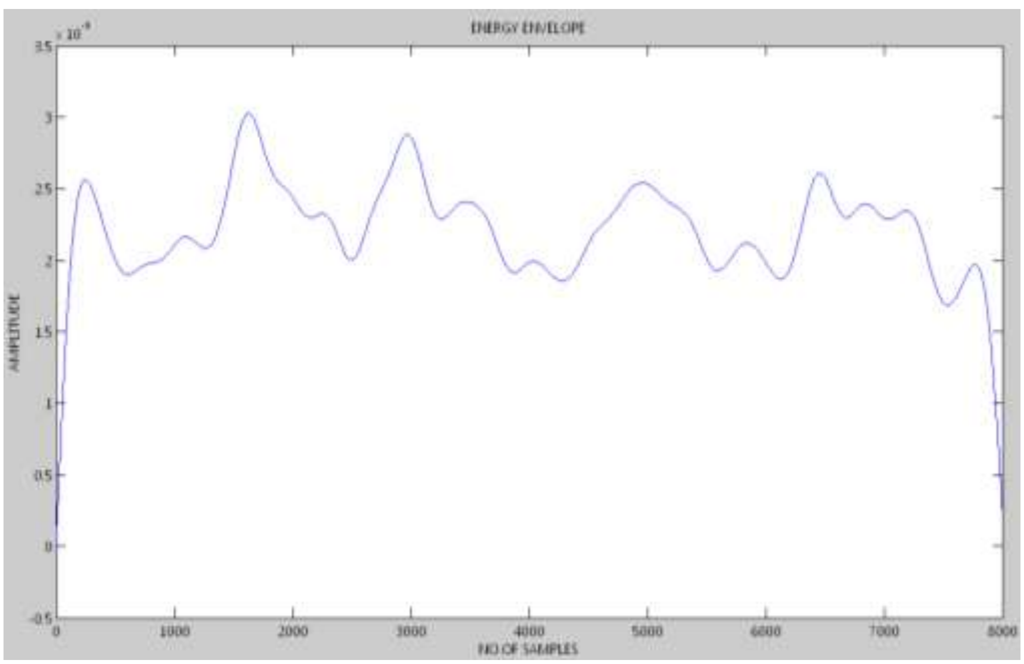


Fig. 10.3. Energy Envelope for the Digit Zero

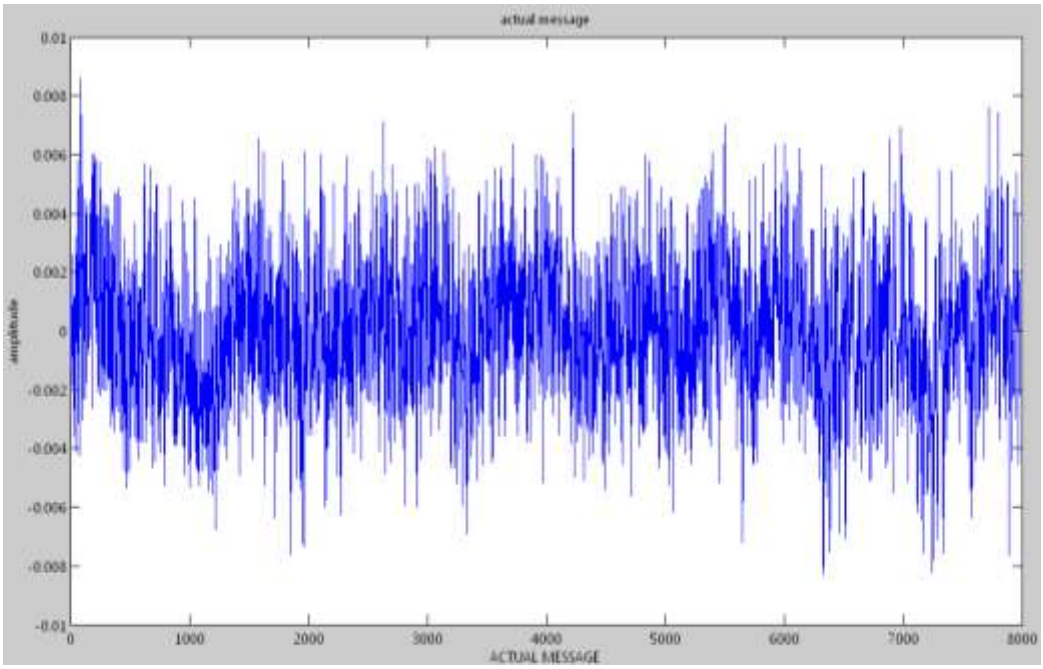


Fig. 10.4. Actual Wave Form for Digit Zero

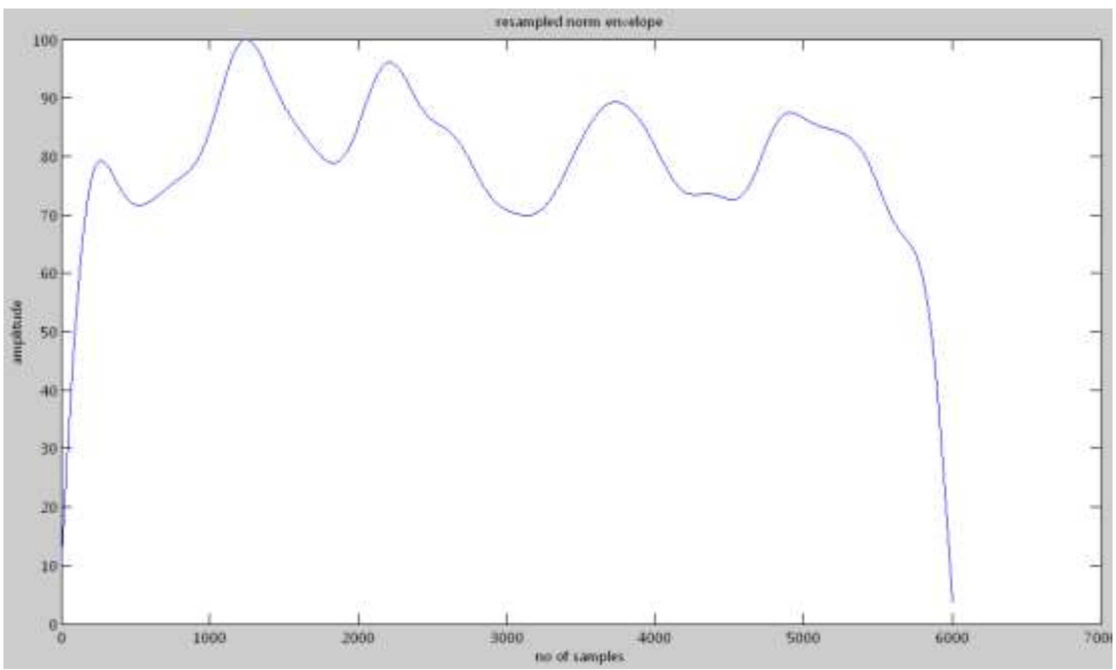


Fig. 10.5. Resampled Normalized Wave Form for Digit Zero

XI CONCLUSIONS

All the digits from '0' to '9' can be recognized using this speech recognition method which involves data acquisition, filtering, finding the number of peaks, locating starting and ending peaks, plotting the energy envelope, segmentation and time normalization. This approach was tested for different voices. A signal analysis package was built, which uses statistical analysis techniques in digital signal processing. The response time for the execution of this is 10 seconds and this can be reduced further by finding the better method for averaging the speech signal. The same approach can be utilized in development of sophisticated system which can recognize more number of isolated words or even continuous speech.

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ABNORMAL EVENT DETECTION IN VIDEO STREAMS USING HOFO

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ABSTRACT

The aim of this paper is to detect abnormal eventsin video streams, a challenging but important subject in videosurveillance.Recentlyincreasing concern over security problem of everywhere people assembling. The video surveillance a smart way of providing security in the place such as public areas, airports, railway stations, parking lots, and industrial plants are monitored by operators. A novel abnormal event classifier algorithm proposed for video surveillance. The algorithm is based on an image descriptor and a nonlinear classification method. Here, a histogram of optical flow orientation is used as a descriptor to encoding the moving information of each video frame. The nonlinear one-class support vector machine classifier is trained with features extracted from video, sequences of frames to classify abnormal events from normal one. The features provided in training and testing of classifier is histogram optical flow descriptor that describes objects in video frame movements efficiently.

Keywords: Abnormal Detection, Optical Flow, HOFO, One-Class SVM.

I.INTRODUCTION

Discovery of suspicious or anomalous events from videostreams is an interesting yet challenging problem for many video surveillance applications. By automatically finding suspicious events, it significantly reduces the cost to label and annotate the video streams of hundreds of thousands of hours. In many scenarios, the video camera is fixed and the site being monitored is mainly static. Abnormal event detection is a challenging problem in that it is difficult to define anomaly in an explicit manner. It is possible that we may need to identify an abnormal event when it appears, despite the fact that it had never occurred before. The more practical approach is to detect normal events first (as they follow some regular rules) and treat the rest as abnormal events. For abnormal event detection tasks in video, the descriptor used to encoding the movement information of the global frame. Moreover, the one-class support vector machine (SVM), used to distinguish the abnormal event from the reference model. The proposed descriptor, histogram of optical flow orientation (HOFO), is described to provide feature vectors for classification algorithm. The classifier is trained with features extracted from video, sequences of frames to classify abnormal events from normal one. The features provided in training and testing of classifier is histogram optical flow descriptor that describes objects in video frame movements efficiently

II. RELATED WORK

In abnormal detection approaches the behaviour patterns modelled by using optical flow In [12], eachframe was split into small blocks. Motion was detected by optical flow and represented by a semantic word. A histogram of optical flow was used to identify human beings, the derivatives of optical flow, *du*and *dv*, were considered. The two components, *u* and *v*of optical flow vector, are used to compute an angle of each pixel at a fixed resolution. The histogram of optical flow orientation (HOFO) descriptor applies a Gaussian down weightingcentred on the current block, and then makes votes weighted by the magnitude of the optical flow vector into orientation histograms. Each pixel voted into the orientation bins is multiplied by a weight coefficient. In this paper, abnormal events are detected by nonlinear one-class SVM classification methods. In general, a non-linear one-class SVM algorithm shows high performance results based on learning normal behaviour frames. The research in the machine learning field focusing on improving the effectiveness of pattern classification can be adapted to obtain more accurate abnormal detection results.

III.PROPOSED SYSTEM

In this section, a method for detecting abnormal events in video streams is described. The normal events are people walking in park and abnormal events are vehicles entered into the place. Assume that a set of frames [I_1....I_n] in which the persons are walking toward all the directions, are considered as normal events. The frames in which the vehicles are moving toward the same direction are considered as abnormal events. The definition represents that people are attracted by the particular event or escape from the dangerous zone. The general architecture of the abnormal detection method is presented in Fig**.** The original incoming frames are processed via Horn-Schunck (HS) optical flow method to get the moving features at every pixel.

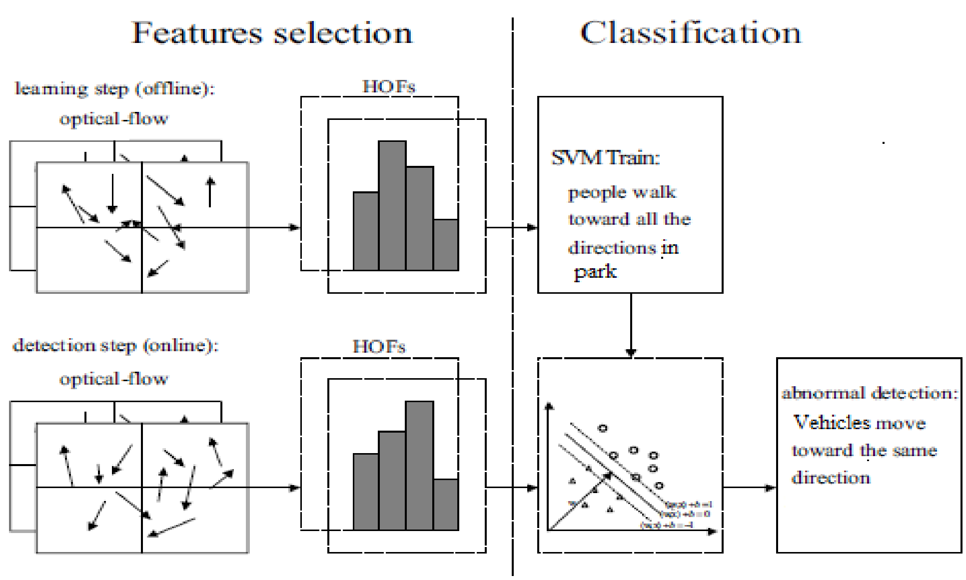

Fig 1 Major processing states of the proposed abnormal detection method

The optical flow features are computedat grey scale.Calculate the histograms of the orientation of optical flow (HOFs) on individual frames. One-class SVM is used to classify feature samples of incoming video frames. The abnormal events can be considered as false alarms if they just appear few frames intermittently in the long normal sequence, which can be adjusted to ’normal’. Similarly, it also works on short clips of normal events which are found in long abnormal sequence. The results are post-processed by presenting a threshold % on the number of detected frames. If negative predicted results (abnormal states) continue beyondthe threshold in positive results (normal states) stream, then change the state from ’normal’ to ’abnormal’.

IV.FEATURES SELECTION

Optical flow is the distribution of apparent velocities ofmovement of brightness patterns in an image. It can give important information about the spatial arrangement of the objects and the change rate of this arrangement. Abnormal action can be exhibited by the direction and the amplitude of the movement, optical flow is chosen for scene description. B.Horn and B. Schunck proposed the algorithm introducing a global constraint of smoothness to computer optical flow. The basic Horn-Schunck (HS) optical method is used in our work. The HS method combines a data term that assumes constancy of some image property with a spatial term that models how the flow is expected to vary across the image

The HOFO descriptor iscalculated at each block, and then accumulated into one global vector denoted as feature *Fk* for the *kth* frame. The computation of HOFO, it is a feature vector in *nblocks* ×*nbins*dimension. Horizontal and vertical optical flow (*u* and *v* fields). The decision hyperplane of the one-class SVM divides the data in the feature space. Aredistributedinto 9 orientation bins, over a horizon 0◦-360◦. The HOFO is computed with an overlapping proportion set as 50% of two contiguous blocks. A block contains *bh*×*bw* cells of *ch*×*cw* pixels, where *bh* and *bw* are the number of cells in *y* and *x* direction in Cartesian coordinates respectively, *ch* is the height of the cell, and *cw* is the width of the cell. Analysing jointly local HOFO blocks permits us to consider the behavior in the global frame. Put another way, concatenation of HOFO cells allows us to model the interaction between the motionsof the local blocks.

V.CLASSIFICATION

Support Vector Machine (SVM) is a method based onstatistical learning theory and risk minimization for classification and regression. The one-class SVM framework is then suitable to the specificity of the abnormal event detection where only normal scene data are available. In machine learning, support vector machine (SVM) is a method of statistical learning theory that analyses data and recognizes patterns, used for classification and regression analysis. By adopting a kernel trick, which implicitly maps inputs into high-dimensional feature space, SVM can effectively perform non-linear classification problems. The objective of non-linear one-class SVM is to determine a suitable region in the input data space *X* which includes most of thesamples drawn from an unknown probability distribution *P*.This objective can be achieved by searching for a decision hyperplane in the feature space, *H*, which maximizes its distance from the origin, while only a small fraction of data falls between the hyperplane and the origin.

V. RESULT AND DISCUSSSION

This section presents the results of experiments conducted to analyze the performance of the proposed method. UMN and PETS2009 datasets are adopted in our abnormal frame events detection experiments. Taking an HOFO of foreground imageand originalimageas a feature descriptor has similar abnormal detection results, we only show the results based on the original imageHOFO of the PETS2009 dataset.

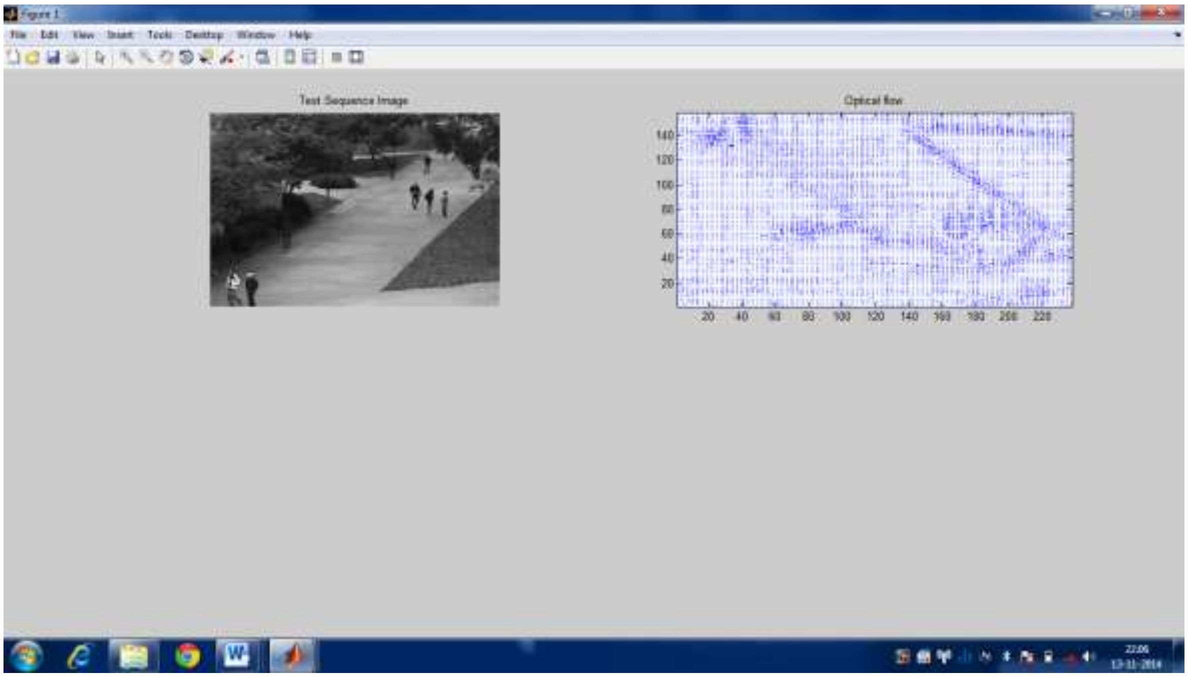

Fig 2 Optical Flow for Video Frame

The training samples and the normal testing samplesare extracted from theindividuals are walking in different directions. The abnormaltesting samples are the frames where the vehicles are movingin same direction. The accuracy of abnormal detectionresults before state transition post-processing is 90.00%. Fig 1 shows the optical flow for the given dataset.The HOFs descriptor can also deal with the abnormal scenesin which vehicles are moving toward the same directions. HOFs descriptor can represent not only the information of direction of optical flow, but also the magnitude of the optical flow. The normal scenes are in which the people walking toward all the directions, these frames are chosen as training samples and normal testing samples. The abnormal scenes are in which vehicles moving in the same direction, these frames are the abnormal testing frames. The detected results which are adjusted by the state transition restriction are shown in Fig. 11,the false negative predictions are at the first few frames of the testing normal data, so the state transition restriction method cannot delete them.

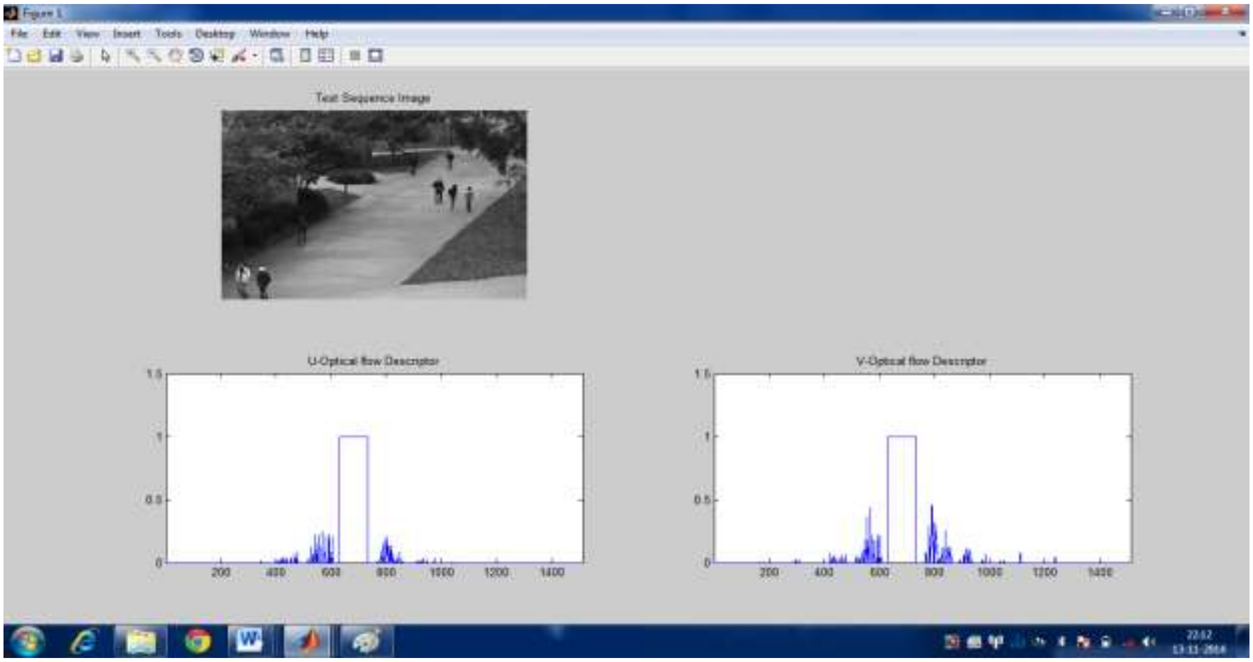

Fig 3 Histogram of Optical Flow Orientation

Figure 3 shows the histogram of optical flow orientation for given training and testing datasets. Normal events in the training dataset is shown in figure 4 and also abnormal event in testing dataset is shown in figure 5

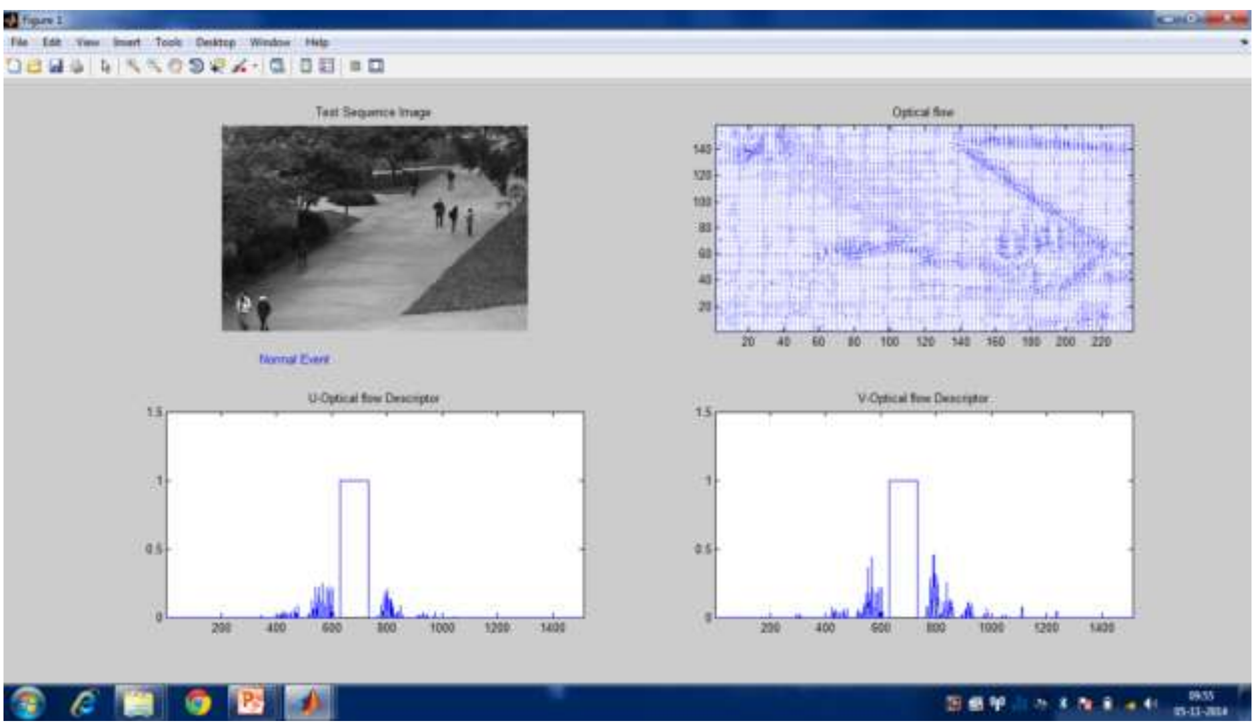

Fig 4 Normal Events for GivenTraining Dataset

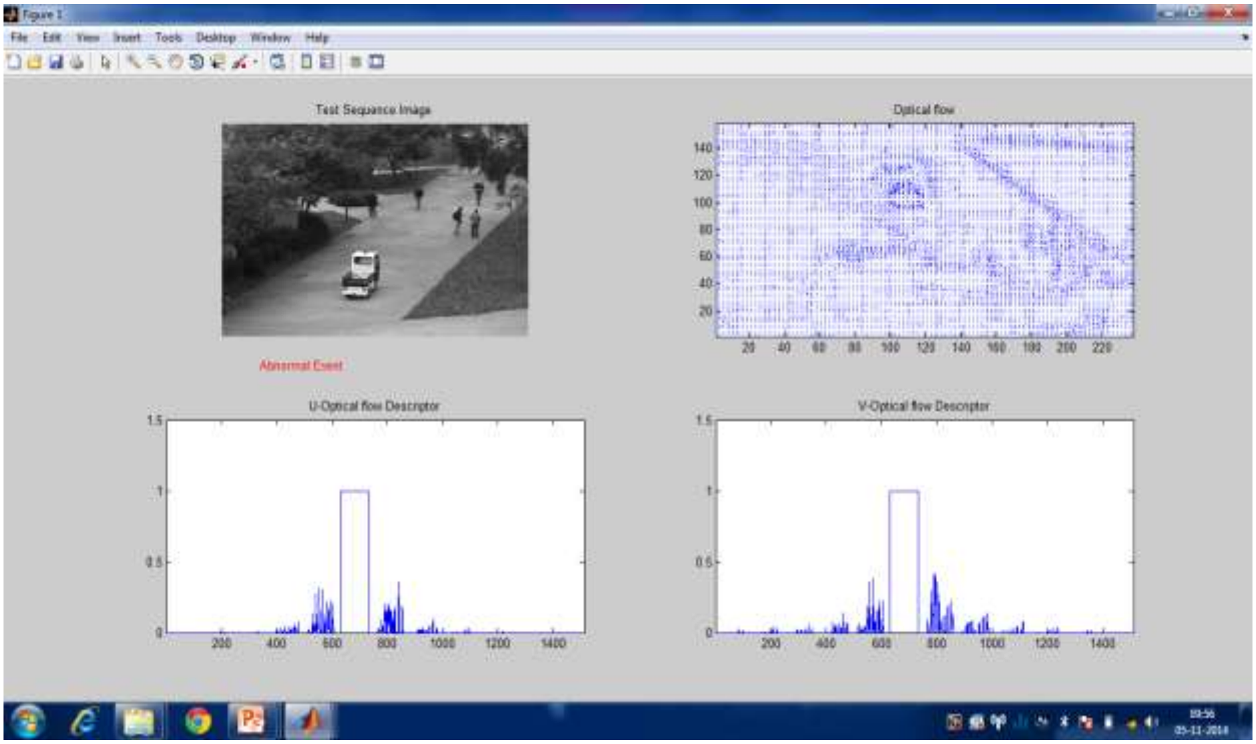

Fig 5 Abnormal Events Detected from testing Dataset

VII. CONCLUSION AND FUTUREWORK

A method for abnormal detection is proposed. The methodis based on two components, compute histograms of the orientation of optical flow (HOFs), and applying one-class SVM for classification. The HOFs features are for the monolithic frame. The resulting algorithm has been tested on several sequences and we have shown that the method is able to classify unexpected events, such as whether the object which moves toward the same direction or merely the velocity is changed. Future work will aim at reducing the wrong detections, and training the samples online. And also multiclass SVM classifier used for abnormal event classification method. Several solutions are under consideration: to capture more efficient features based on the optical flow, to replace the optical flow by other approaches which can also represent the information of the events. To train the SVM by an online approach is also urgent. For the normal examples is commonly in large amount, is hard to put all the normal events as training samples simultaneously.

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FINDING AN EMULATION ATTACK IN COGNITIVE RADIO

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ABSTRACT

Cognitive radio, the recent emerging software enabled radio system, which is capable of self-turning frequency band and setting suitable parameters for utilizing a channel freed or unused by licensed primary user . The cognitive radio which utilize unused channel, are called secondary user. The Secondary User detect whether a Primary User's channel is free or occupied at the time using spectrum sensing techniques. It is proved that single Secondary User free channel detection success ratio is comparatively low than cooperative sensing with other secondary user because of noisy wireless channel. The security concern arises when any of the cognitive radio selfish node is transmitting false detection report to fusion center which taken decision would be wrong and result of low free channel utilization. We propose model detect wrong information sent by cognitive radio and misbehaving cognitive radio in cognitive radio network. By using the advanced encryption standard find the authorized primary user.

Keywords: Cognitive Radio Network, Primary User Emulation Attack, DTV, AES-Encrypted, DSA, CR Networks

I.INTRODUCTION

Cognitive radio can be described as an intelligent and dynamically reconfigurable radio that can adaptively regulate its internal parameters as a response to the changes in the surrounding environment. Namely, its parameters can be reconfigured in order to accommodate the current needs of either the network operator, spectrum lessor, or the end-user. Although this doesn't necessarily need to be the case, Cognitive Radio (CR) is usually being defined as an upgraded and enhanced Software Defined Radio (SDR). Typically, full Cognitive Radios will have learning mechanisms based on some of the deployed machine learning techniques, and may potentially also be equipped with smart antennas, geolocation capabilities, biometrical identification, etc.However, the newly-introduced cognitive capabilities are exactly what make Cognitive Radios susceptible to a whole new set of possible security issues and breaches. Furthermore, the threats characteristic to Software Defined Radios, as well as those characteristic to "traditional" wireless networks also need to be taken into account.Cognitive Radio Network can be described as a network in which one or more users are Cognitive Radios. With the assumption of the potential attacker, as well as legitimate Secondary Users (SUs) always being CRs, the taxonomy of the threats within CRNs can be done with respect to the type of the Primary Users (PUs) considered.

II. RELATED WORK

It is desired to minimize spectrumsensing error that means sum of false alarm and miss detectionprobabilities since minimizing spectrum sensing error bothreduces collision probability with primary user and enhancesusage level of vacant spectrum. To provide reliable spectrumsensing performance (i.e., minimize spectrum sensing error),one of the great challenges is determining threshold levelsince spectrum sensing performance depends on thethreshold level. When determining threshold level, besidesspectrum sensing error, spectrum sensing constraint whichrequires false alarm and miss detection probabilities to bebelow target level should also be considered since itguarantees minimum required protection level of primaryuser and usage level of vacant spectrum.

III. PROPOSED SYSTEM

In the proposed system an Advanced Encryption Standardfor DTV is robust and reliable primary and secondary systemoperations. In the proposed system, At the Sending end primary user generatesa pseudo-random number AES-encrypted reference signal that is usedas the segment sync bits. The sync bits in the field sync segmentsremain unchanged for the channel estimation purposes at the receiving end, the reference signal is regenerated forthe detection of the primary user and malicious user. It shouldbe emphasized that synchronization is still guaranteed in theproposed scheme since the reference bits are also used forsynchronization purposes. For each Slot period check the correlation and the threshold value it will detect the Primary user emulation attack.

IV. BLOCK DIAGRAM AND DESCRIPTION OF THE PROPOSED SYSTEM:

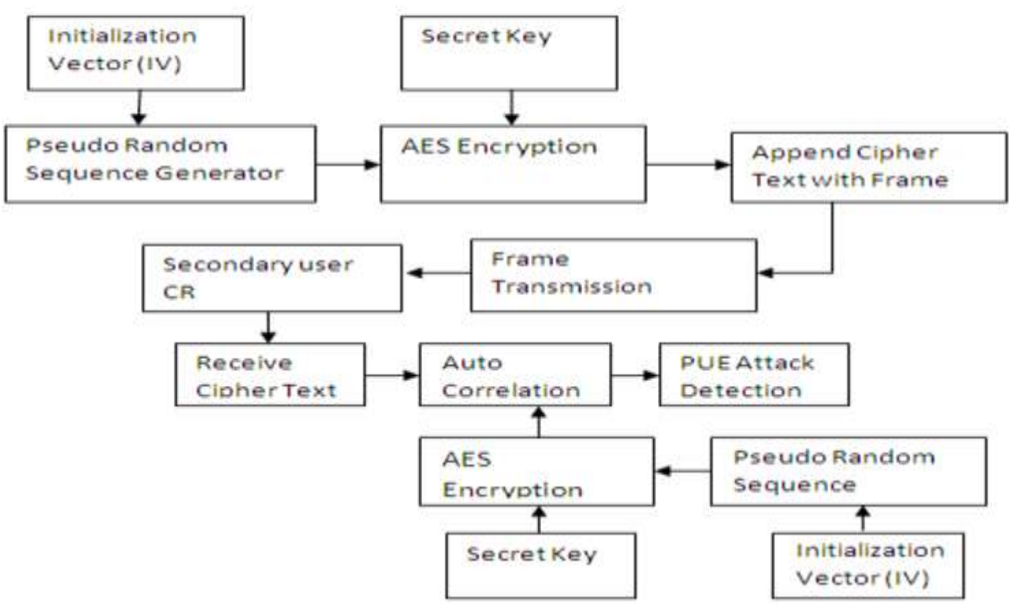

Fig 1 Block diagram cognitive radio using AES

Primary user is detected in its spectrum band immediately vacate that band and switch to a vacant one "vertical spectrum sharing" when another secondary.user is detected in its spectrum band When there are no better spectrum opportunities, it may choose to share the band with the detected secondary user"horizontal spectrum sharing" CR MAC protocol guarantees fair resource allocation among secondary usersPrimary signal transmitter localization is more challenging than the standard localization problem due to two reasons no modification should be made to primary users to accommodate the DSA of licensed spectrum. This requirement excludes the possibility of using localization Protocol that involves the interaction between a primary user and the localization device. PST localization problem is a non-interactive localization problem when a receiver is localized, one does not need to consider the existence of other receivers. However, the existence of multiple transmitters may add difficulty to transmitter localization.

V RESULT AND DISCUSSSION

In this section, we demonstrate the effectiveness of the AES-assisted DTV scheme through simulation. the impact of the noise level on the optimal thresholds we evaluate the false alarm rates and miss detection probabilities for both primary user and malicious user detection. In the simulations. By using the Matlab software we will find the miss detection probabilityBy using the Mask and Seed Value Primary User generates the Key. The number is generated by use AES Algorithm and the Key are encrypted as a reference Signal. Here consider the number of Primary user will be one. This simulation model is shown in the below fig.

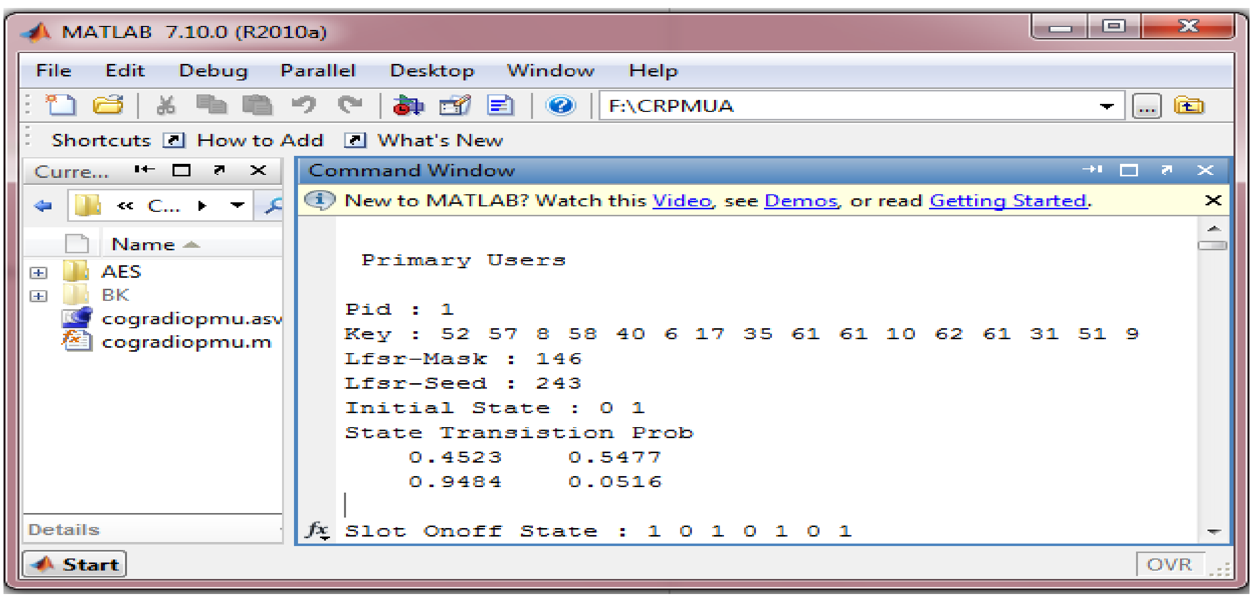

Fig 2: Generation of Slot by the Primary User

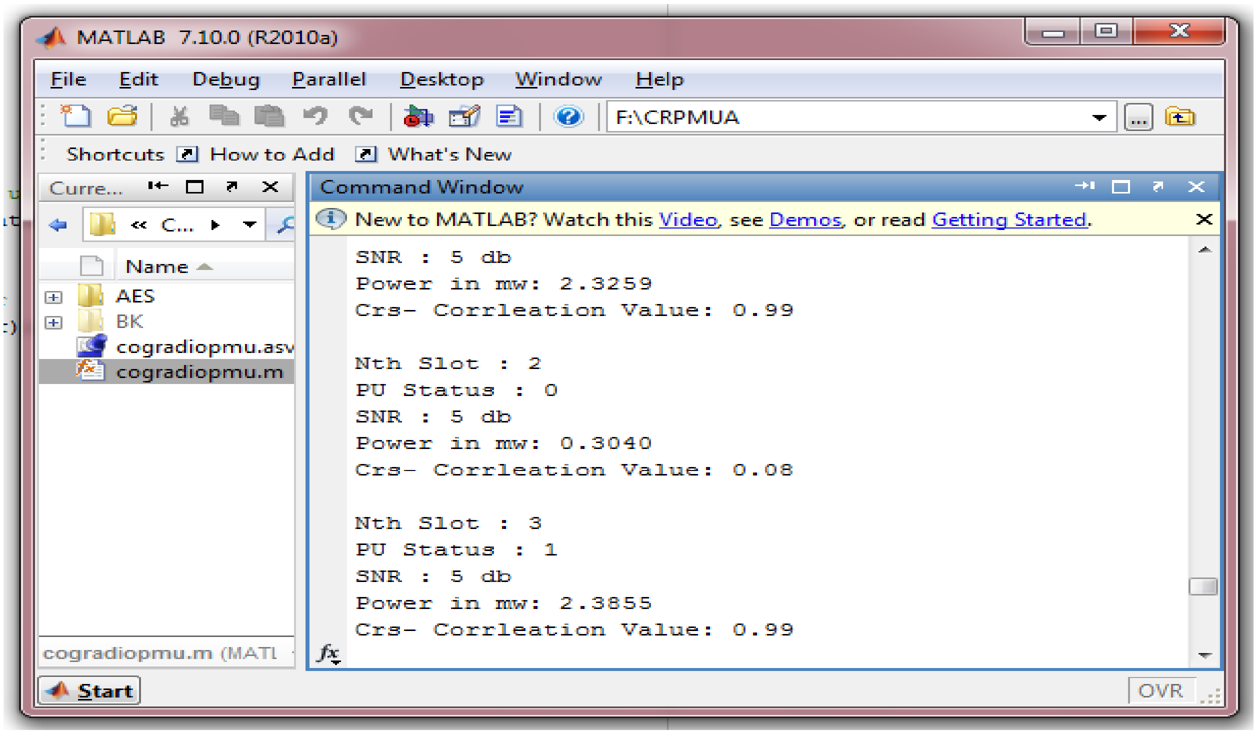

Fig:3 Checking of Correlation and Threshold by each slot

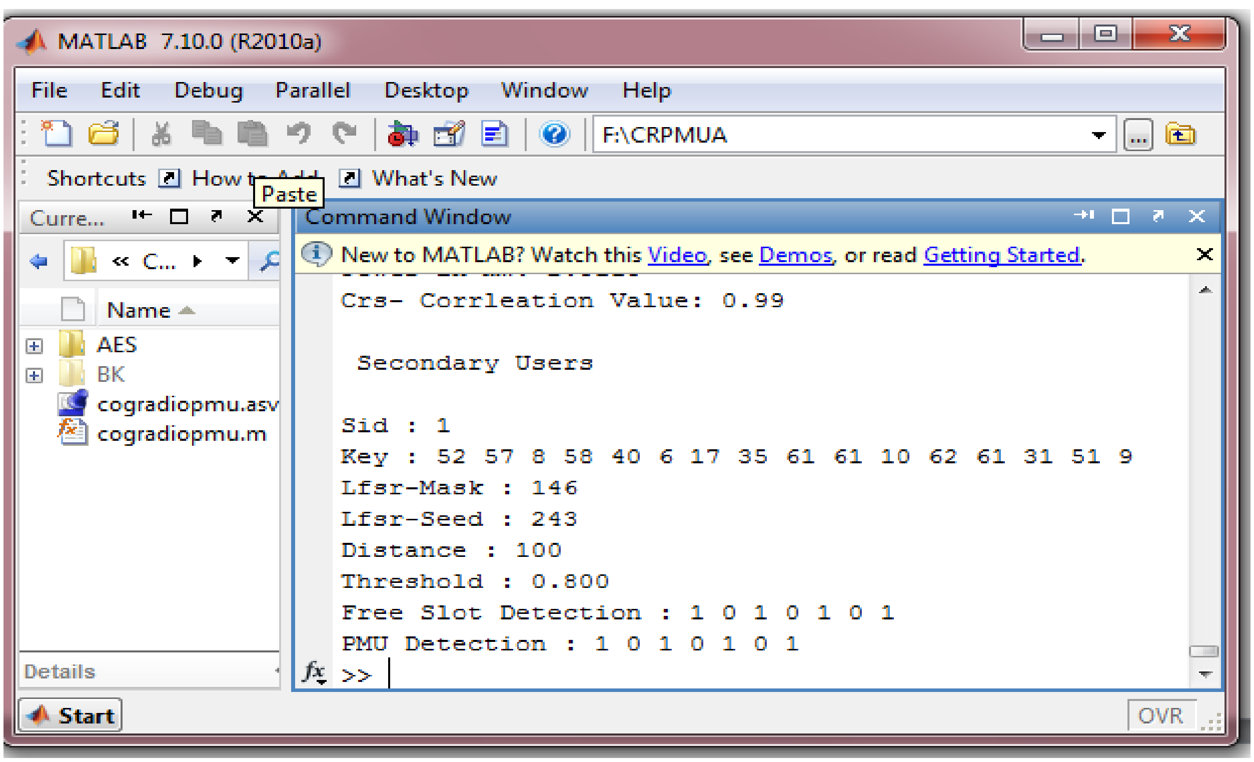

Fig4: Slot generate by the secondary User

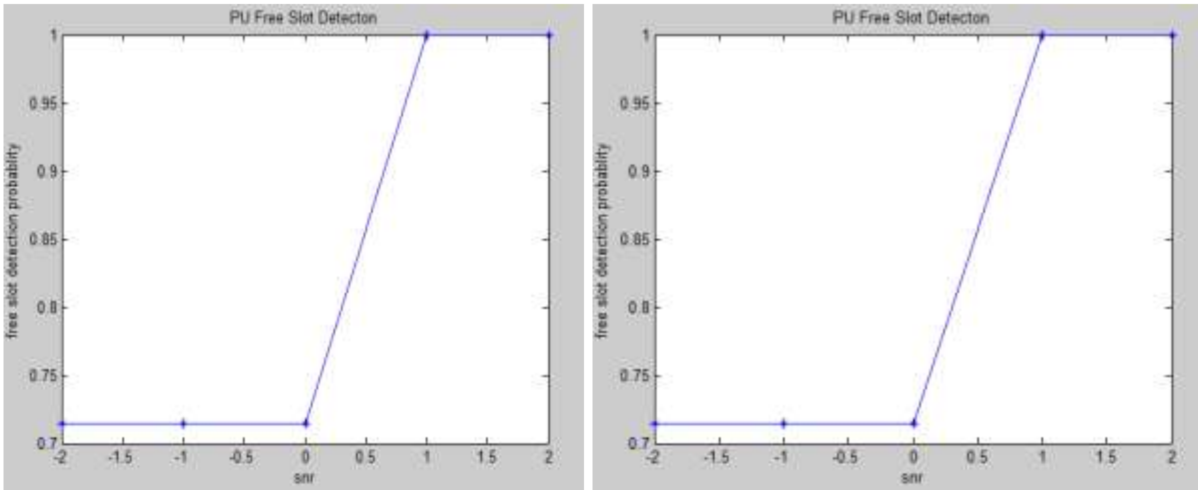

Fig5: Graphs for Different SNR Value

VI. ADVANTAGE AND APPLICATION

- Identification of Primary user and Malicious users are easy.
- If the Primary user and the second user are exchange the key means the data's are more secure
- This system is simple, convenient, time saving and high security..
- Because of the immediate decision making and interface provides an instant diagnosis based on limits.
- The focus of this project is to develop a system effective and robust, easy operation and mainly low cost which permits to manage the network security and improve quality.
- The protection and efficiency of the whole system is increased dramatically.
- These are mainly used where the security is most important.

VII. CONCLUSION AND FUTUREWORK

AES-assisted DTV scheme was proposed for robust primary and secondary system operations under primary user emulation attacks. An AES-encrypted reference signal is generated at the TV transmitter and used as the sync bits of the DTV data frames. By allowing a shared secret between the transmitter and the receiver, the reference signal can be regenerated at the receiver and be used to achieve accurate identification of authorized primary users. Moreover, when combined with the analysis on the auto-correlation of the received signal, the presence of the malicious user can be detected accurately no matter the primary user is present or not. This approach is practically feasible in the sense that it can effectively conflict PUEA with no change in hardware or system structure except of a plug-in AES chip. Potentially, it can be applied directly to today's HDTV systems for more robust spectrum sharing. It would be interesting to explore Primary User Emulation Attack detection over each sub-band in multi-carrier DTV systems.

In defense against primary user emulation attack in cognitive radio using advanced encryption standard technique the secret key is shared among Secondary users. No need of 3rd party reliable system. Because time consumption is high when the third party maintain the secret key. To avoid this future work secondary user maintains the secret key instead of third party.

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SUSTANABLE CONSTRUCTION MATERIALS AND TECHNOLOGY: GREEN CONCRETE

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ABSTRACT

GREEN CONCRETE is a type of concrete which resembles the conventional concrete but the production or usage of such concrete requires minimum amount of energy and causes least harm to the environment. Green concrete is very low energy & resource consumption, no environmental pollution & sustainable development. It can be developed and applied rapidly. It reduces the dead weight of a facade from 5 tons to about 3.5 tons & reduce crane age load, allow handling, lifting flexibility with lighter weight. It has good thermal and fire resistance, sound insulation than the traditional granite rock. It enhances speed of construction, shorten overall construction period. It enhances green building construction; It improves damping resistance of building. The focus of this technology is mainly based on co2 reduction.

Keywords*: *Green Concrete, Damping resistance, sustainable construction

I. INTRODUCTION

Concrete is one of the most widely used man-made building materials in the world. Compared to other building material concrete has numerous advantages such as abundant resources, easy operation, steady mechanical properties, durability, of production. These characteristics enable concrete to be widely employed in the field of civil bridges, roads, hydraulic structures, Underground Ocean and military engineering. Despite such advantages concrete has some disadvantages such as high energy and raw material consumption &environmental pollution etc. which tends to serious effects on the image of the concrete as a sustainable material. In this respect the concept of "GREEN CONCRETE" was introduced.

The aim of GREEN CONCRETE is to meet three requirements i.e. very low energy & resource consumption, no environmental pollution & sustainable development. After that 'GREEN CONCRETE' was developed and applied rapidly. In ceramic industries about 30% of the production goes as waste due to manufacturing flaws. This waste is not utilized in any form, adding up day by day and occupies more area of the industry. So industries are in pressure to find a disposal system for this waste. These ceramic wastes are durable, hard & almost inert to normal chemicals. The mechanical properties of the coarse aggregates from these wastes are well within the range of the properties of concrete-making aggregates. The concrete made with these industries waste is eco-friendly and so it is called as "Green Concrete".

II. WHAT IS GREEN CONCRETE

Green concrete is a type of concrete which resembles the conventional concrete but the production or usage of such concrete requires minimum amount of energy and causes least harm to the environment. There is considerable knowledge about how to produce concrete with lower environmental impact, the so-called green concrete.

III. CONCRETE AND CO2

Every 1 ton of cement produced leads to about 0.9 tons of co2 emissions and 0.7643 m3 of concrete contains about 10% by weight of cement. There have been a number of ways for reducing the co2 emissions from concrete primarily, through the use of lower amounts of cement and higher amounts of supplementary cementations material (SCM) such as fly ash and slag. Since, a co2 emission from 1 ton of concrete varies between 0.05 to 0.13 tons. Approximately 95% of all co2 emissions from a cubic yard of concrete is from cement manufacturing and so it is no wonder that much attention is paid to using greater amounts of SCM. Thus, environmental aspects are not only interesting from an ideological point of view, but also from an economic aspect.

IV. MAIN OBJECTIVES

- CO2 emissions shall be reduced by at least 30%.
- At least 20% of the concrete shall be residual products used as aggregate.
- Use of concrete industries own residual products.
- Use of new types of residual products, previously land-filled or disposed of in other ways.
- CO2 neutral waste-derived fuels shall replace at least 10% of the fossil fuels in cement production.

The technical goals are to obtain the same technical properties for the green concrete compared to conventional concrete. The comp. strength goals for the green concrete are:

- Aggressive environmental class (outdoor, horizontal): 28-days strength > 35 N/mm2and 56-days strength > 85% of the strength of a reference concrete.
- Passive environmental class (indoor): 28-days strength >12 N/mm2 and 56-days strength > 85% of the strength of a reference concrete.

V. PRODUCTION OF CONCRETE

To increase the use of conventional residual products, i.e. fly ash.High-volume fly ash concrete which requires far less fossil fuel to produce than conventional concrete. Fly ash is a byproduct of coal-burning power plants. The ash is created at high temperatures and becomes tiny, beady glass particles. Out of 60 million tons produced every year in this country, about 75 percent of fly ash is trucked off to landfills rather than converted into building material. But enthusiastic design and construction teams working on UC Berkeley seismic projects say that the high-volume fly ash concrete mixture reduces environmental impacts and can save money while producing more durable concrete structures

To use residual products from the concrete industry, i.e. stone dust Green concrete capable for sustainable development is characterized by application of industrial wastes to reduce consumption of natural resources and energy and pollution of the environment. Marble sludge powder can be used as filler and helps to reduce the total voids content in concrete. Natural sand in many parts of the country is not graded properly and has excessive silt on other hand quarry rock dust does not contain silt or organic impurities and can be produced to meet desired gradation and fineness as per requirement.

VI. PRODUCTION OF GREEN CEMENT

The manufacture of cement reactive ingredients in concrete is responsible for over 5% of world co2 emission .Cement already third largest manmade source of co2 more than 2 billion tone of it a year,60% of carbon emission from cement manufacture comes from chemical reaction required to make it. Calcium carbonate is heated until breaks into calcium oxide and by product is co2.

VII. MANUFACTURING PROCESS

First step is same as an ordinary cement, sand and gravels are loaded in a storage hopper then cliff, slag and fly ash are fed the activation is added the geo polymer concrete is then used exactly as an ordinary concrete.

1. To minimize the clinker content (i.e. by replacing cement with fly ash, micro silica in larger amounts are allowed today, or by using extended cement, i.e. lime stone filler cement)

2. To develop new green cements and binding materials (i.e. by increasing the use of alternative raw materials and alternative fuels, and by developing/improving cement with low energy consumption).

3. Concrete with inorganic residual products (stone dust, crushed concrete as aggregate in quantities and for areas that are not allowed today) and cement stabilized foundation with waste incinerator, slag and low quality fly ash.

VIII. IMPACTS OF GREEN CONCRETE

Concrete serves as a better alternative for the utilization or recycle of the solid hazardous waste materials. Properties of mixed concrete can be listed as follows:

- Strength: different solid hazardous waste materials used in mixed concrete. It shows 70-85% strength of pure concrete.
- Durability: concrete shows long-term durability by the use of mineral admixtures; many important structures are manufactured using the concrete with silica fume, which positively affects on durability aspects.
- Leaching: About 85-90% of heavy metals and other contaminants are solidified and stabilized in the concrete matrix. Mixed concrete named “Green concrete”. It is used as filling materials, pavements and roadbeds, etc. This concrete also affects the cost of construction comparable to pure concrete.
-

IX. SUITABILITY OF GREEN CONCRETE IN BUILDINGS:

The following advantages are concluded for using lightweight green concrete in Prefabrication in building;

- Reduce the dead weight of a facade from 5 tons to about 3.5 tons.
- Reduce crane age load, allow handling, lifting flexibility with lighter weight.
- Good thermal and fire resistance, sound insulation than the traditional granite rock.
- Allow design and construction flexibility for larger prefabrication modules.
- Allow maintenance flexibility with replaceable modules.
- Factory production of module enhances quality of product.
- Enhance speed of construction, shorten overall construction period.
- Enhance green building construction, minimize wet trade on site.
- Improve damping resistance of building.
- Utilization of PFA in aggregate production resolves the waste disposal problems of ash and reduce the production cost of concrete.

X. ADVANTAGES OF GREEN CONCRETE

- Reduction of the concrete industry's CO2 emission by 30 %.
- Increased concrete industry's use of waste products by 20%.
- No environmental pollution and sustainable development.
- Green concrete requires less maintenance and repairs.
- It is more durable & corrosion resistant.
- By using the light weight aggregates self weight of structures can be reduced.
- Energy saving material.
- Green concrete having better workability than conventional concrete.
- Flexural strength of green concrete is almost equal to that of conventional concrete.
- Use of concrete industries own residual products.
- Less expensive to produce it.
- At least 20% of the concrete shall be residual products used as aggregates.
- Good thermal resistant and fire resistant.
- Good sound insulation than traditional concrete.
- Improve damping resistant of buildings.

XI. LIMITATIONS OF GREEN CONCRETE

The focus of this technology is mainly based on co2 reduction, while whole environmental impact should be covered and accordingly investigations should not only make in the field of concrete but also structures build with it.

- The research & development works are solely based on environmental goals. While, some consideration need to be given to the market condition which limits the cost of the products in terms of technology.
- Green concrete does not fulfill the requirement of existing standards also according to structures of least importance.

XII. CONCLUSION

Green concrete having reduced environmental impact with reduction of the concrete industries co2 –emissions by 30%. By using 40% fly ash of powder and cement with reduced environmental impact. Therefore reduced environmental pollution. Green concrete is having good thermal and fire resistant. Also having good sound insulation in comparison with traditional concrete. In this concrete recycling use of waste material such as ceramic wastes, aggregates, so increased concrete industry's use of waste products by 20%.hence green concrete consumes less energy and becomes economical. Developing country like India second rank is given to construction development, which uses concrete in large amount & at the same time produces waste in the form of concrete material. So use of product like green concrete in future will not only reduce the emission of co2 in environment but also economical to produce.

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EFFECT OF SUPER DISINTEGRANTS ON SOLUBILITY AND DISSOLUTION RATE OF LAFUTIDINE

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ABSTRACT

The objective of the present work is to prepare solid dispersions of the Lafutidine with different pharmaceutical excipients (sodium starch glycolate, croscarmellose sodium, polyplasdone XL) and to study the effect of these excipients on the solubility and dissolution rate of lafutidine. Lafutidine is yellowish white crystalline powder practically insoluble in water. Due to very poor solubility, its bioavailability rate is limited by dissolution. In this study, an attempt has been made to enhance the solubility and dissolution rate of Lafutidine by solvent evaporation method, which is a solid dispersion technique by superdisintegrants (sodium starch glycolate, croscarmellose sodium, polyplasdone XL) as a carrier. Solid dispersions were prepared using different ratios of drug and carriers by solvent evaporation method and further evaluated for its drug content and rate of dissolution. Solid state characterization was carried out by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD) and Scanning electron microscopy (SEM). The dissolution rate of Lafutidine from solid dispersion was higher compared to pure drug. Among all the formulations, solid dispersion with sodium starch glycolate and croscarmellose sodium shown highest dissolution rate. This study concluded that the solubility and dissolution rate can be improved by these Superdisintegrants.

Keywords: Dissolution Rate, Lafutidine, Solubility, Solvent Evaporation, Super Disintegrants.

I INTRODUCTION

Bioavailability of drugs administered orally for systemic effect depends on two key phenomenon which occur post administration of that drug. First is dissolution of the drug in the gastrointestinal fluid to produce a solution of the drug and second, transportation of the dissolved drug across the gastrointestinal membrane. Each of these two steps can be a rate limiting factor. The Biopharmaceutical Classification System (BCS) divides drugs into one of four classes according to their solubility and permeability[1-2]. The focus of this study will concern itself with drugs in BCS Class II. Increasing the solubility of these APIs will also increase the bioavailability of the drug in the body. One important factor that affects the solubility of any chemical is its surface area or in other words the area that is presented for the process of solubilization. Surface area can be increased by reducing the particle size.

Solid dispersion is frequently used to improve the dissolution rate of poorly water-soluble compounds. By adsorbing drug molecules onto the surface of adsorbents with large surface areas, the total surface area of the drug is increased, and the drug may even be transformed from crystalline form to amorphous form. By adsorbing a surfactant onto the crystal surface of poorly water-soluble drugs, dissolution rate can also be enhanced. This technique also used to improve the bioavailability of poorly soluble compounds for enhancing the dissolution profiles of these compounds

Lafutidine (LAFT) a newly developed histamine H2-receptor antagonist, inhibits daytime (i.e., postprandial) as well as nighttime gastric acid secretion in clinical studies. It is practically insoluble in water and has low bioavailability. LAFT has a very low aqueous solubility, which impairs its dissolution in upper gastric fluid producing problems to prepared systems [1]. Overall, these characteristics hinder its therapeutic application by delaying the absorption rate and thereby onset of action or activity [2]. Together solubility, permeability and dissolution rate of a drug are essential factors for determining its oral bioavailability [3]. Literature reports generally revealed the fact that drug materials with a very low aqueous solubility will show dissolution rate limited absorption and hence poor bioavailability. Improvement of aqueous solubility in such a case is a valuable assignment to improve therapeutic efficacy [4]. However there is no literature on the enhancement of solubility of LAFT with superdisintegrans. Subsequently there is a need to deliver LAFT in formulation with increased solubility and improved dissolution profile. For the current study we selected sodium starch glycolate, croscarmellose sodium, polyplasdone XL. They act as Solubilizing Agent. The super disintegrants acts as hydrophilic carrier for poorly water insoluble drug. Superdisintegrant makes enough pressure in the pores of the tablets as to produce an efficient disintegration. Hydrophobic drugs can be improved by solid deposition of the drug upon hydrophilic, strongly swelling carriers like the super disintegrants sodium starch glycolate, Crosscarmellose, and crosspovidone. This increased in dissolution is because of micronized drug particles are fairly evenly distributed on relative large hydrophilic carrier particles prevent reagglomeration and increase the drug dissolution rate as on effect of the large effective surface for dissolution.

Thus, in this study dispersions of LAFT were prepared using sodium starch glycolate, croscarmellose sodium, polyplasdone XL as carriers by solvent evaporation method and the effect of these excipients on the solubility and dissolution rate were evaluated. Subsequently, prepared dispersions were characterized by scanning electron microscopy, fourier transform infrared spectroscopy and powder X-ray diffraction.

II MATERIALS AND METHODS

2.1. Materials

LAFT was obtained as a generous gift from Dr. Reddy's Laboratry, Hyd, India. croscarmellose sodium obtained from DFE Pharma, Germany, sodium starch glycolate obtaind from JRS Pharma,Germany, Polyplasdone XL obtained from BASF Corporation,Mumbai, India. Dichloromethane obtained from Qualikems, Mumbai, India, Methanol(hplc grade) from Sigma Aldrich, Mumbai, India. All other chemicals used were of analytical grade or equivalent quality.

2.2. Methods

2.2.1. (A). Construction of Calibration Curve of Lafutidine In Water

For the construction of calibration curve stock solution was prepared by dissolving 100 mg of accurately weighed drug dissolved in methanol (10ml) and make up with water (l mg/ml). 1mLof the stock solution was pipetted out into a 10mL volumetric flask and volume was made up with water (100µg/ml). From this working stock 10 µg/ml concentration was prepared and scanned in a range of 200-400 nm to find the absorption maxima. Based on the absorbance obtained λ_{max} would be fixed, remaining dilutions were made with water to get concentrations ranging from 4-20 µg/ml, was constructed at and a calibration curve absorption maxima obtained.

2.2.1. (B). Construction of Calibration Curve of Lafutidine in Methanol

For the construction of calibration curve stock solution was prepared by dissolving 100 mg of accurately weighed drug dissolved and make up with methanol (l mg/ml). 1ml of the stock solution was pipetted out into a 10ml volumetric flask and volume was made up with water (100µg/ml). From this working stock 10 µg/ml concentration was prepared and scanned in a range of 200-400 nm to find the absorption maxima. Based on the absorbance obtained λ_{max} would be fixed, remaining dilutions were made with methanol to get concentrations ranging from 4-20 µg/ml, was constructed at and a calibration curve absorption maxima obtained.

2.2.2. Solution Stability Studies for Lafutidine Using UV Spectrophotometry

Solution stability studies was performed by determining absorbance values of the prepared dilution from the above step at different time points such as 1, 3, and 6h after preparation of the solution. This was done to determine the stability of the method in conducting of dissolution studies or other studies over a period of 24 h.

2.2.3. Prepartion of Solid Dispersion by Solvent Evaporation Method

Solid dispersions of Lafutidine were prepared with Lafutidine: Carriers (Primojel (sodium starch glycolate), Ac-di-sol (croscarmellose sodium), and polyplasdone XL (cross linked polyvinyl pyrrolidone)) in 1:0.5 and 1:1 weight ratio by solvent evaporation method. Methanol and Dichloromethane 1:1 ratio used as solvent for solid dispersions. Briefly, required amounts of drug was dissolved in solvent then dispersed the carrier mixed thoroughly and evaporate the solvent by using rotary flash evaporator at 40°c with 50 rpm/1h. The obtained solid mass was dried in desiccator and pulverized and store in a screw-cap vial at room temperature until further use.

Table 1: Composition of solid dispersions prepared by solvent evaporation method

S.NO	SOLID DISPERSION SYSTEM	RATIO OF
1	Lafutidine : sodium starch glycolate (SD1)	1:0.5
2	Lafutidine : sodium starch glycolate (SD2)	1:1
3	Lafutidine : croscarmellose sodium (SD3)	1:0.5

4	Lafutidine : croscarmellose sodium (SD4)	1:1
5	Lafutidine : polyplasdone XL (SD5)	1:0.5
6	Lafutidine : polyplasdone XL (SD6)	1:1

2.2.4. Drug Content Determination

For the Lafutidine content determination of the powder, an amount of powder corresponding to equivalent to dose of drug was dissolved in 10 ml of methanol. Keep it for agitation for 1h.Then centrifuge supernant layer filtered. The samples were analyzed with UV spectroscopic method. Each content determination was performed in triplicate and the average and standard deviation were calculated.

2.2.5. In Vitro Dissolution Studies

Dissolution studies of pure Lafutidine, physical mixtures and solid dispersions were performed by using the U.S.Pharmacopeia(USP) XXIV type II apparatus (Electrolab, Mumbai, India) at the paddle rotation speed of 50 rpm in 900 ml of distilled water as dissolution media at 37±0.5°C. A sample equivalent to 10 mg of Lafutidine of the prepared systems was placed in dissolution medium. During the release studies, samples of 5 ml were collected after 2, 5, 10, 20, 30, 45 and 60 min using a syringe and were replaced with the same volume of release medium. The samples were subsequently analyzed by UV spectroscopic method. Experiments were performed in triplicate. The dissolution profile was examined and valuated for amount of drug released in initial 5min (Q5min),time taken to release 50% of the drug (T50%), Dissolution efficiency (DE%) afte01r 10and 60 min and mean dissolution time (MDT), mean dissolution rate (MDR), initial dissolution rate (IDR).

Dissolution efficiency (DE%) : DE% at 10 and 60 min were calculated out for all the batches for comparison. The dissolution efficiency (DE) is defined as the area under the dissolution curve up to a certain time(t), expressed as a percentage of the area of the rectangle described by 100% dissolution in the same time.[7]

$$D.E = \frac{\int_0^t y\,dt}{y_{100}\,t} \times 100 \qquad (1)$$

Mean dissolution time-MDT (min): In order to assess the comparative extent of the dissolution rate enhancement from SDs, mean dissolution time (MDT) was calculated. The dissolution data obtained of all the batches were treated according to Equation(2) where i is dissolution sample number, n is number of dissolution sample times, t_{mid} is time at midpoint between time t_i and t_{i-1}, and ΔM is the amount of Lafutidine dissolved between time t_i and t_{i-1}.[8]

$$MDT_{invitro} = \frac{\sum_{i=1}^{n} t_{mid}\,\Delta M}{\sum_{i=1}^{n} \Delta m} \qquad (2)$$

Mean dissolution rate (MDR) can be calculated according to the following equation:

$$MDR = \frac{\sum_{j=1}^{n} \Delta M_j/\Delta t}{n} \qquad (3)$$

Where n is number of dissolution sample times, Δt is the time at midpoint between t_i and t_{i-1} (easily calculated with $(t_i + t_{i-1})/2$) and ΔM_j is additional amount of the drug dissolved between tj and t-1.

Initial dissolution rate (IDR, %dissolved/min) was computed over the first 5 min of dissolution.

2.2.6. Solid State Characterization

Solid state study was performed for Lafutidine, carriers (sodium starch glycolate, croscarmellose sodium, polyplasdone XL), selected batch of solid dispersions and their physical mixtures.

2.2.6.1. X-Ray Diffraction (XRD)

Samples (Lafutidine, carriers (sodium starch glycolate, croscarmellose sodium)) physical mixtures and the solid dispersion in carriers were analyzed using an X' Pert PRO MPD diffractometer with a copper anode (Cu Kα radiation, λ =0.15406 nm, 40 kV, 35 mA).The diffraction pattern was measured with a step size of 0.020° and a dwell time of 32.8 s at each step between 3 and 50 2Θ at ambient temperature.

2.2.6.2fourier Transform Infrared Spectroscopy (FTIR)

Samples (Lafutidine, carriers (sodium starch glycolate, croscarmellose sodium)) physical mixtures and the solid dispersion in carriers were conducted using an FTIR Spectrophotometer which was employed to characterize the possible interactions between the drug and the carrier in the solid state. Samples were prepared using KBr (potassium bromide) disk method. Samples of 2mg were lightly ground and mixed with 200mg IR grade dry potassium bromide and then compressed at 10 tonnes in a hydraulic press to form disc. The spectrum was recorded in the range 4000-450 cm^{-1} at room temperature.

2.2.6.3. Scanning Electron Microscopy (SEM)

Samples (Lafutidine, carriers (sodium starch glycolate, croscarmellose sodium)) physical mixtures and the solid dispersion in carriers were examined by means of QUANTA 200 ESEM scanning electron microscope. The powders previously fixed on a brass stub using double-sided adhesive tape and then were made electrically conductive by coating, in a vacuum. The picture were taken at an excitation voltage of 20 Kv and different magnifications.

III RESULT AND DISCUSSION

3.1(a) Calibration Curve of Lafutidine in Distilled Water

The calibration curve of Lafutidine was plotted in water at wave length of 215 nm (which was obtained by scanning in the above step) in the concentration range of 1-20µg/ml which is shown in Fig1 and corresponding values are recorded in Table 2. A straight line was obtained with regression coefficient of 0.9915, with an equation of y=0.046x-0.0065 which is used for calculation of concentration of Lafutidine in unknown samples.

Table 2: Absorbance values of Lafutidine in water

Concentration(µg/ml)	Absorbance
0	0
4	0.1525
8	0.4183
12	0.5778
16	0.7569
20	0.8934

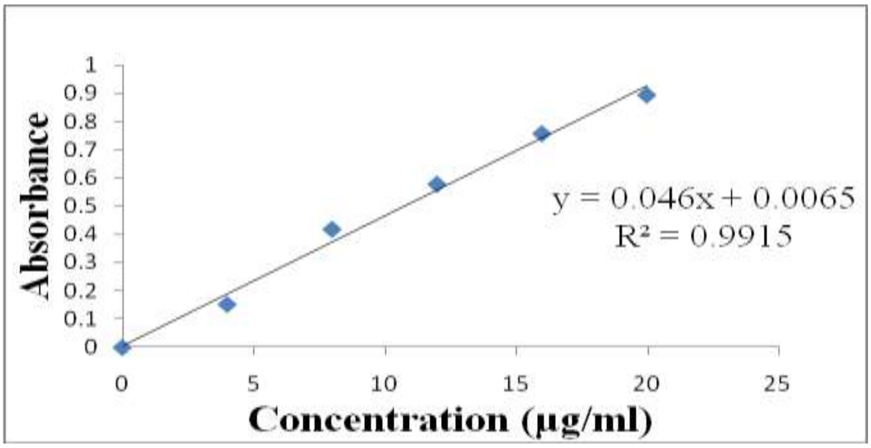


Figure 1: Calibration curve of lafutidine in water

3.1(b) Calibration Curve of Lafutidine in Methanol

The calibration curve of Lafutidine was plotted in methanol at wave length of 215 nm (which was obtained by scanning in the above step) in the concentration range of 4-20µg/ml which is shown in Fig2 and corresponding values are recorded in Table 3. A straight line was obtained with regression coefficient of 0.9958, with an equation of y=0.0455x-0.0172 which is used for calculation of concentration of Lafutidine in unknown samples.

Table 3: Absorbance values of Lafutidine in methanol

Concentration(µg/ml)	Absorbance
0	0
4	0.194
8	0.425
12	0.552
16	0.743
20	0.919

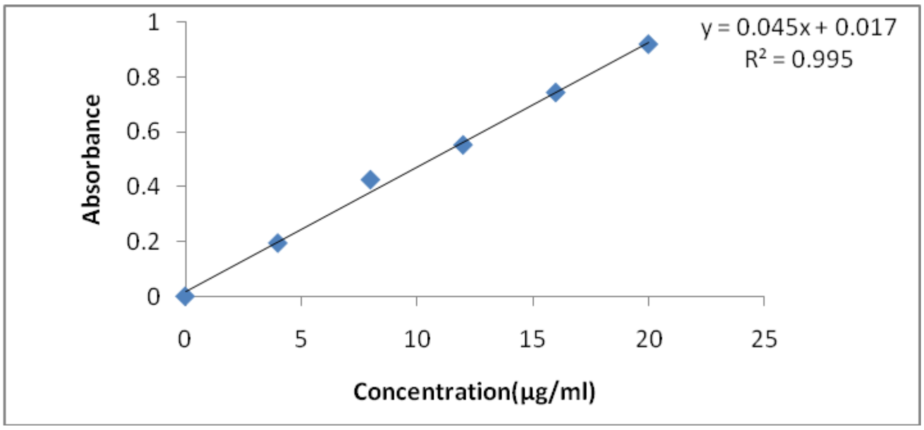


Figure 2: Calibration curve of lafutidine in methanol

3.2. Solution Stability Method of Lafutidine Estimation in UV Spectro Photometry

Absorbance of 12µg/ml concentrations which were used to prepare calibration curve were determined at various time intervals ranging from 1hr to 6hr. Standard deviations were determined for the absorbance values obtained which was less than 0.001 for all the absorbance values indicating stability of drug in the standard solution and stability of method in determining the concentration of unknown samples during dissolution studies. Standard deviations and absorbance values obtained were represented in Table. 4.

Table 4: Stability indicating absorbance values

Time(hr)	Absorbance
0	0.5703
1	0.5640
3	0.5610
6	0.5516

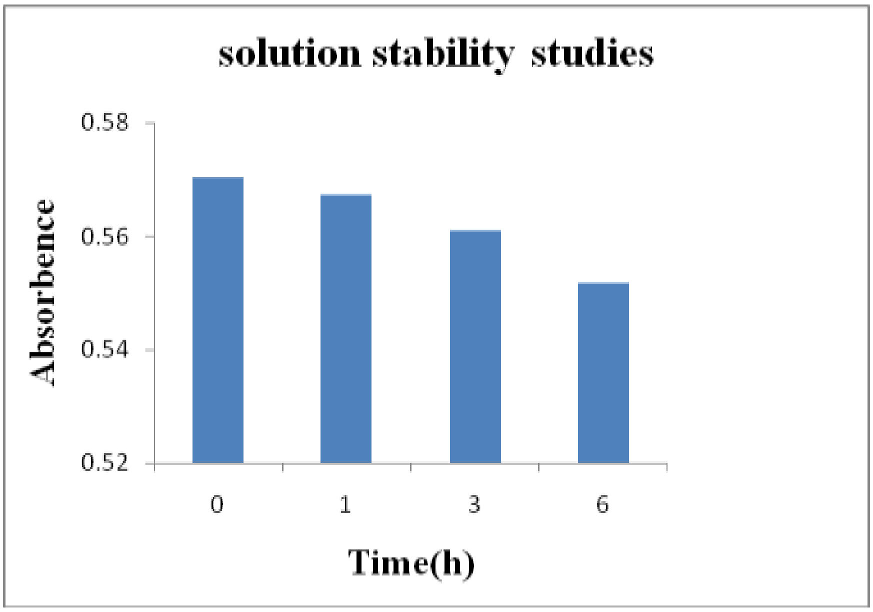


Figure 3: Solution stability study graph of lafutidine

3.3. Drug content

The percentage of drug content was determined for the physical mixture and solid dispersions. The value ranged from 95.30±0.863% to 101.54±0.927 % for physical mixtures and solid dispersions as shown in table .indicating high content uniformity of physical mixtures and solid dispersions.

Table 5: Drug content in percentage, each value represents mean ± S.D.(n=3)

Formulation code	Drug content (%)	Formulation code	Drug content (%)
SD1	97.94±0.289	SD5	95.80±0.348
SD2	99.31±0.498	SD6	97.30±0.863
SD3	91.46±0.691	PM1	92.48±0.830
SD4	101.54±0.927	PM2	93.87±0.491

3.4 In Vitro Dissolution Study

The dissolution behaviour of pure Lafutidine, physical mixtures and solid dispersions prepared with sodium starch glycolate, croscarmellose sodium, polyplasdone XL using solvent evaporation method fig 4 and Fig 5. It is clear that the pure lafutidine has lowest dissolution rate and all the studied physical mixtures and solid dispersion formulations had a higher dissolution rate where the fastest dissolution rate was obtained for the sample when the ratio of drug carrier was 1:1(w/w). The pure drug showed a release of 52.83% at the end of 1h, while SD showed 107.05% drug release in 1h. The percent drug dissolution increased with carriers. Physical mixture (PM) also showed an improved dissolution rate as compared with pure drug.

Table 6 and Table 7 in vitro release data and summarizes the percentage drug dissolved in 5 min (Q5) and 60 min (Q60), dissolution efficiency at 10 min (DE10) and 60 min (DE 60), MDT (mean dissolution time), MDR (mean dissolution rate), IDR (initial dissolution rate),and $t_{50\%(min)}$ (time taken to release 50% of the drug) for pure drug, physical mixtures and solid dispersions.

The pure drug showed 22.46% (Q5) and 52.83% (Q60) drug release. In solid dispersion, Q5and Q60 and DE% increased with an increase in ratio. The highest dissolution rate was exhibited by drug/carrier SD (1:1). However, slight enhancement in the dissolution rate with physical mixture was observed in comparison to pure drug.

The MDT for lafutidine profile was 14.56min, and MDT was decreasing to greater extent by all the solid dispersions with increasing carrier concentration while minimum MDT 8.92 min was seen in solid dispersion with sodium starch glycolate.

Time taken to release 50% of lafutidine from pure drug was found to be 48.5 min while from the solid dispersion (SD1& SD2 was found 2 min,SD3&SD4 was found 3,2 min)and the physical mixture(PM1,PM2 was 27.5,20min) was greater decreased with carriers.

To facilitate comparison between free drug, solid dispersions and physical mixture, IDR, MDR were calculated. From those values, release rates of lafutidine were always higher from solid dispersion compared with pure drug and physical mixtures.

The enhancement in the dissolution of lafutidine from solid dispersion can be attributed due to several factors, like reduced crystallinity, particle size reduction, increased wettability and solubility by hydrophilic carriers.

Table 6: Dissolution parameters for solid dispersions of lafutidine

PARAMETERS	Q5	DE10	DE60	MDT	MDR	IDR	t50%min
PURE DRUG	22.461±1.69	43.60±5.98	63.00±3.77	14.27±2.79	3.64±0.262	5.88±0.955	48.5
SSG (1:0.5) (SD1)	70.07±4.67	63.30±4.01	88.10±4.49	8.92±1.64	9.61±0.65	14.01±0.93	2
SSG (1:1) (SD2)	75.46±1.77	66.50±5.22	90.64±5.15	7.28±0.15	10.84±0.28	15.09±0.35	2
CCS (1:0.5) (SD3)	72.71±4.100	64.06±5.34	87.31±1.75	9.39±1.22	9.18±1.28	14.54±0.82	3
CCS (1:1) (SD4)	85.07±9.88	72.50±7.56	93.00±9.06	7.30±3.02	10.20±0.98	17.01±1.97	2
POLYPLASDONE (1:0.5) (SD5)	38.08±4.37	32.82±8.87	49.80±9.54	22.9±6.77	4.61±0.677	6.34±0.998	13.5
POLYPLASDONE (1:1) (SD6)	37.22±2.85	30.90±5.60	56.61±5.93	20.46±1.63	4.90±0.722	7.54±2.09	9.5
PM-CCS (1:1)	34..04±1.74	30.51±1.68	48.45±1.25	11.83±0.73	4.37±0.21	6.80±0.34	20
PMSSG(1:1)	35.26±2.20	30.29±1.34	54.19±1.94	12.72±0.96	4.49±0.19	7.05±0.44	27.5

Q: Percentage drug released at 5min.

DE: Dissolution efficiency at 10 and 60 min.

MDT: Mean dissolution time.

MDR: Mean dissolution rate.

IDR: Initial dissolution rate.

$T_{50\%}$ (min): time taken to release 50% of the drug.

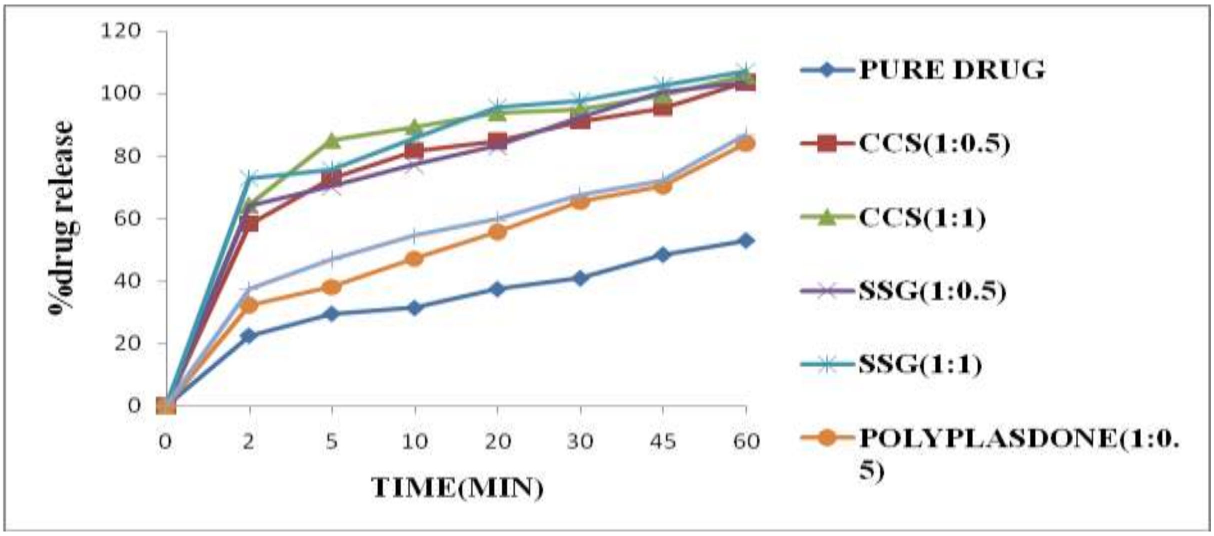


Figure 4: In vitro release profile of lafutidine solid dispersions

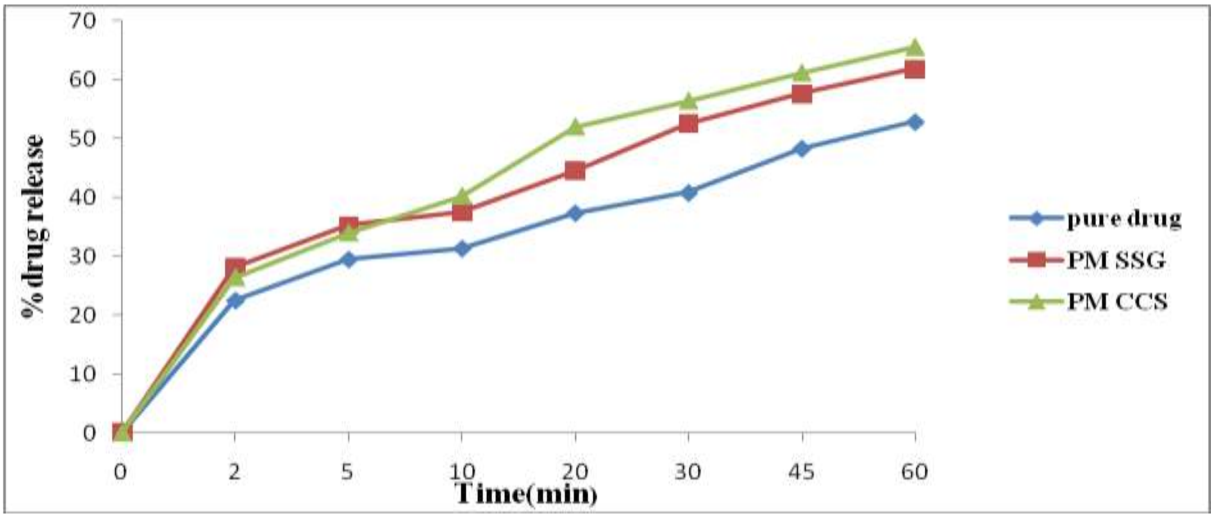


Figure 5: In vitro release profile of lafutidine physical mixtures

3.5. Solid State Characterization

3.5.1. Fourier Transform Infrared Spectroscopy

Drug excipient compatibility is an important parameter to be determined since they play a crucial role in stability of formulation. Drug excipient compatibility studies give the information of physical and chemical interaction which may be deterioration to the formulation and cause toxic reactions when consumed by the patient. Corresponding results shown in Fig.6.

FTIR spectra of pure Lafutidine characteristic sharp peaks of alkenes stretching (-C-H and CH2) vibration at 3324.32- 3016.48 cm^{-1} and alkane stretching (-CH_3, -CH_2 and -CH) vibration at 2853.73 cm^{-1}. Also exhibited C=O stretch at 1738.2 cm^{-1} due to saturated ketone and C=O-NH stretching at 1635.90 cm^{-1}. A selective stretching vibration at 1561.57 cm^{-1} and 1525.80 cm^{-1} for primary and secondary amine was also observed. For functional groups like S=O stretch and –C-S stretch showed vibrations at 1041.78 cm^{-1} and 729.57 cm^{-1} respectively.

The sodium starch glycolate spectrum showed a characteristic broad spectra of O-H stretching vibration from 3300 to 3600cm^{-1} , C-H stretching from 2800-2900 cm^{-1},and C-O stretching from 1000-1200cm^{-1}. Croscarmellose sodium 3429(broad), 3040 (broad), and 1106 (intense), 1410(intense) due to stretching of O-H, C-H, C-O groups, respectively. The IR spectrum of polyplasdone XL shows important bands at 1639 cm^{-1} and 1121 cm^{-1} respectively which are indicative of C=O stretching and =C-H bond stretching shows at 3367 cm^{-1}.

The characteristic peaks of Lafutidine and carriers sodium starch glycolate, croscarmellose sodium, polyplasdone XL were observed in both solid dispersions and physical mixture. This suggest that there is no significant interaction between the drug and carrier.

3.5.2. X-Ray Diffraction Analysis

The XRD pattern of pure Lafutidine, pure carriers (sodium starch glycolate, croscarmellose sodium, polyplasdone XL) ,SD(1:1) and corresponding PM was shown in Fig 7.

The diffraction pattern of Lafutidine showed high intensity peaks at 2 theta values of 7.134°, 20.567°, 21.215° and 23.102°. Sharp intense peaks may be due to presence of crystalline form of the drug. The diffraction pattern of sodium starch glycolate exhibited intensity peaks at 11.516°, 17.353° and 24.293°.croscarmellose sodium and exhibited intensity peaks at 32.00°, 34.134°, and 22.794 °. Whereas the XRD pattern of prepared physical mixtures and solid dispersions exhibited a reduction in both number and intensity of peaks compared to plain drug indicating the decrease in crystallinity or partial amorphization of the drug. The solid dispersion showed significant decline in the peaks suggesting that it more amorphous than the physical mixture.

Moreover, no other peaks than those that could be assigned to other to pure sodium starch glycolate, croscarmellose sodium were detected in the PMs and SDs, indicating that reduced chemical interaction in the solid state between the two entities. Results of this study imply that lafutidine is present in decreased crystallinity from in the solid dispersion.

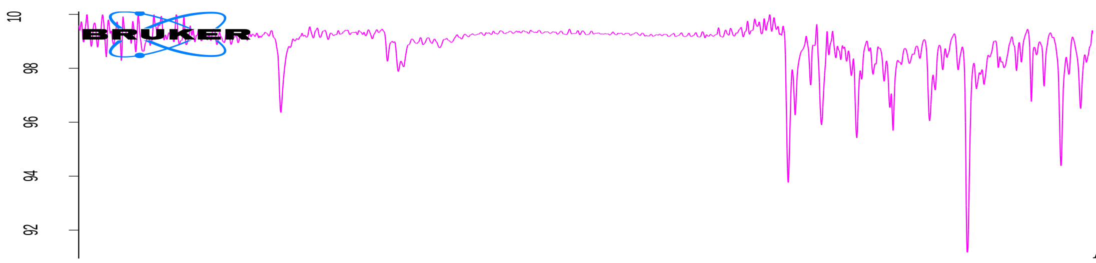
3.5.3. Scanning Electron Microscopy

The scanning electron micrographs of Lafutidine, pure carriers (SSG, CCS) SDs (1:1) and corresponding PM were shown in Fig 8.

Pure lafutidine appears crystals with smooth surface. SSG and CCS appears irregular shape and smooth surfaced particles.

The physical mixture of the drug and carrier weight ratio 1:1 showed clearly the adherence of lafutidine particles on the surface of SSG and CCS due to physical mixing. The solid dispersions of lafutidine with SSG and CCS appeared as a uniform and homogeneously mixed mass with wrinkled surface.

From SEM photomicrographs, it can be speculated that lafutidine existed in very fine crystalline form with reduced particle size, increased surface area and closer contact between the hydrophilic carriers would improve the wettability of the drug which may lead to enhanced drug solubility and dissolution rate.



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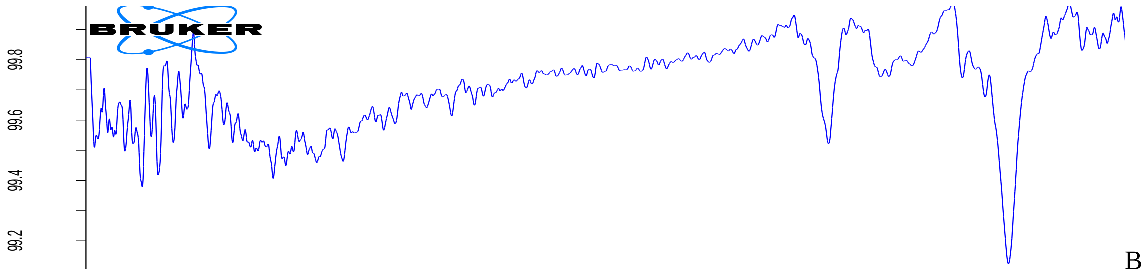

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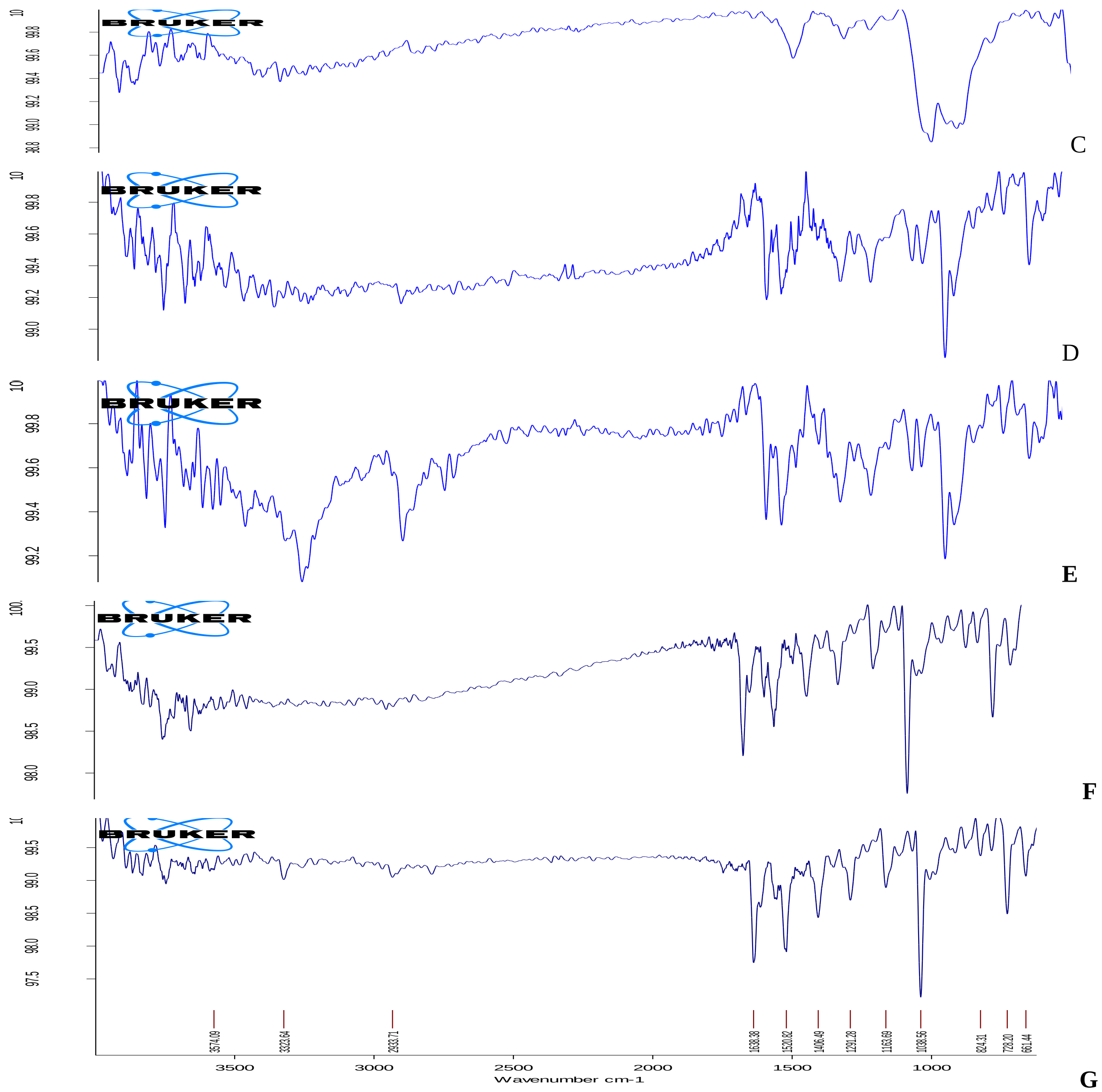
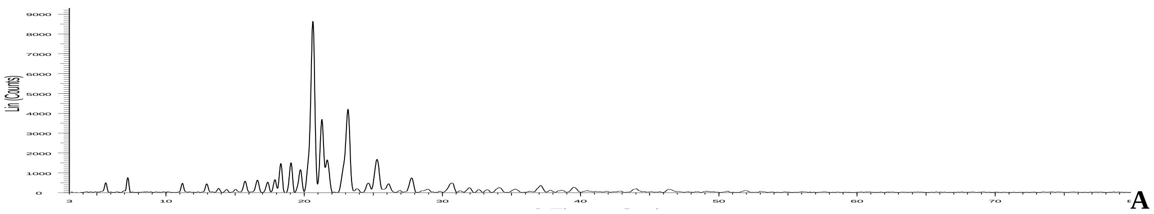


FIGURE 6: FTIR SPECTROGRAM OF (A) LAFUTIDINE, (B)SODIUM STARCH GLYCOLATE, (C) CROSCARMELLOSE SODIUM, (D) LAFUTIDINE WITH CROSCARMELLOSE SODIUM SOLID DISPERSION 1:1 (E) LAFUTIDINE WITH SODIUM STARCH GLYCOLATE SOLID DISPERSION 1:1, (F) PHYSICAL MIXTURE OF SODIUM STARCH GLYCOLATE(1:1), (G) PHYSICAL MIXTURE OF CROSCARMELLOSE SODIUM (1:1).



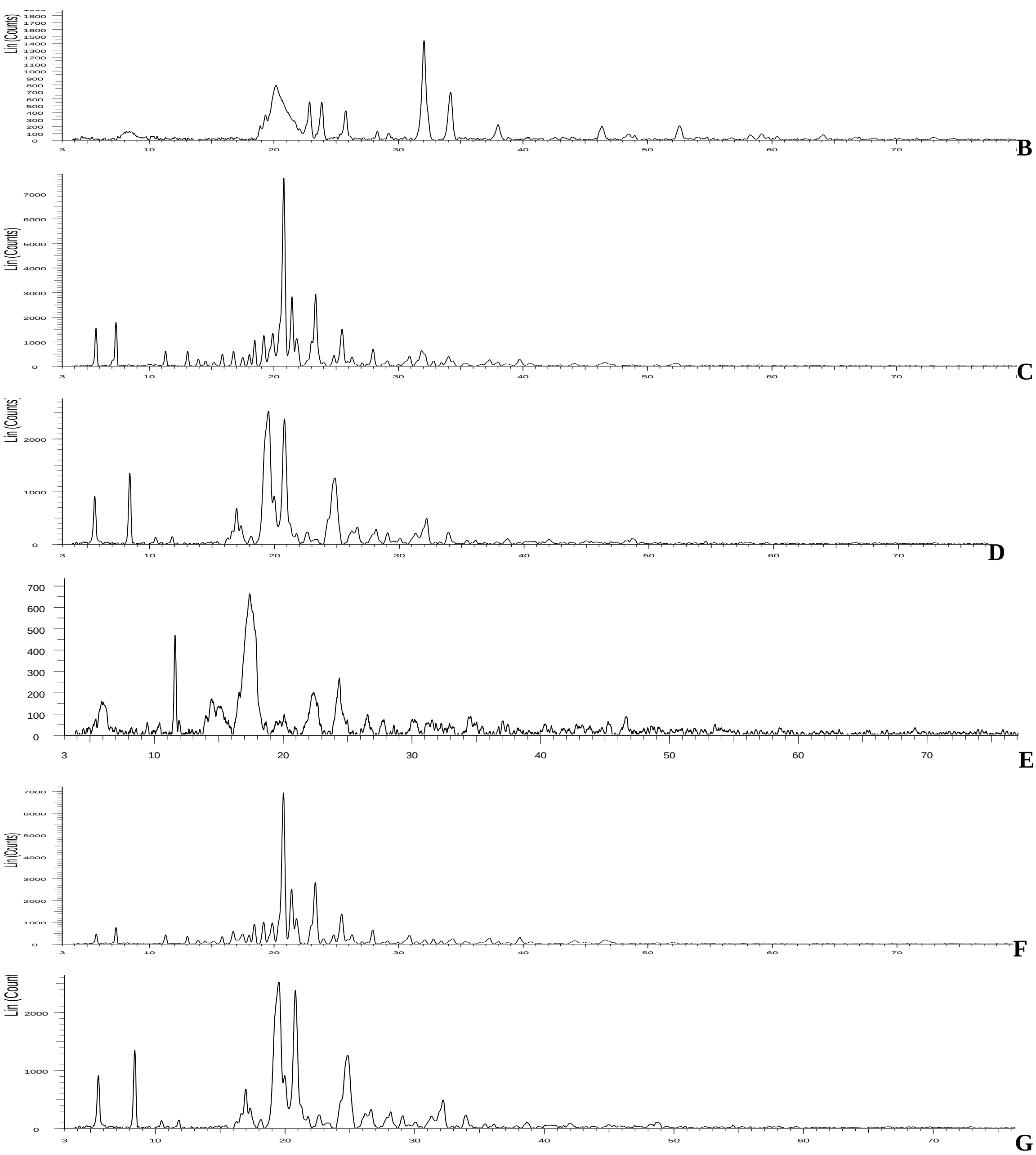
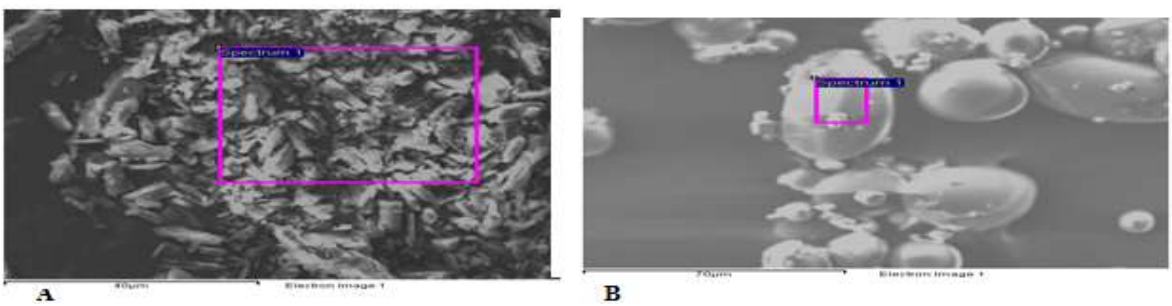


FIGURE 7: X-RAY DIFFRACT GRAMS OF (A) LAFUTIDINE, (B) CROSCARMELLOSE SODIUM, (C) LAFUTIDINE WITH CROSCARMELLOSE SODIUM PM 1:1, (D) SD OF LAFUTIDINE WITH CROSCARMELLOSE SODIUM 1:1,(E) SODIUM STARCH GLYCOLATE, (F) LAFUTIDINE WITH SODIUM STARCH GLYCOLATE SODIUM PM 1:1, (G) SD OF LAFUTIDINE WITH SODIUM STARCH GLYCOLATE 1:1.



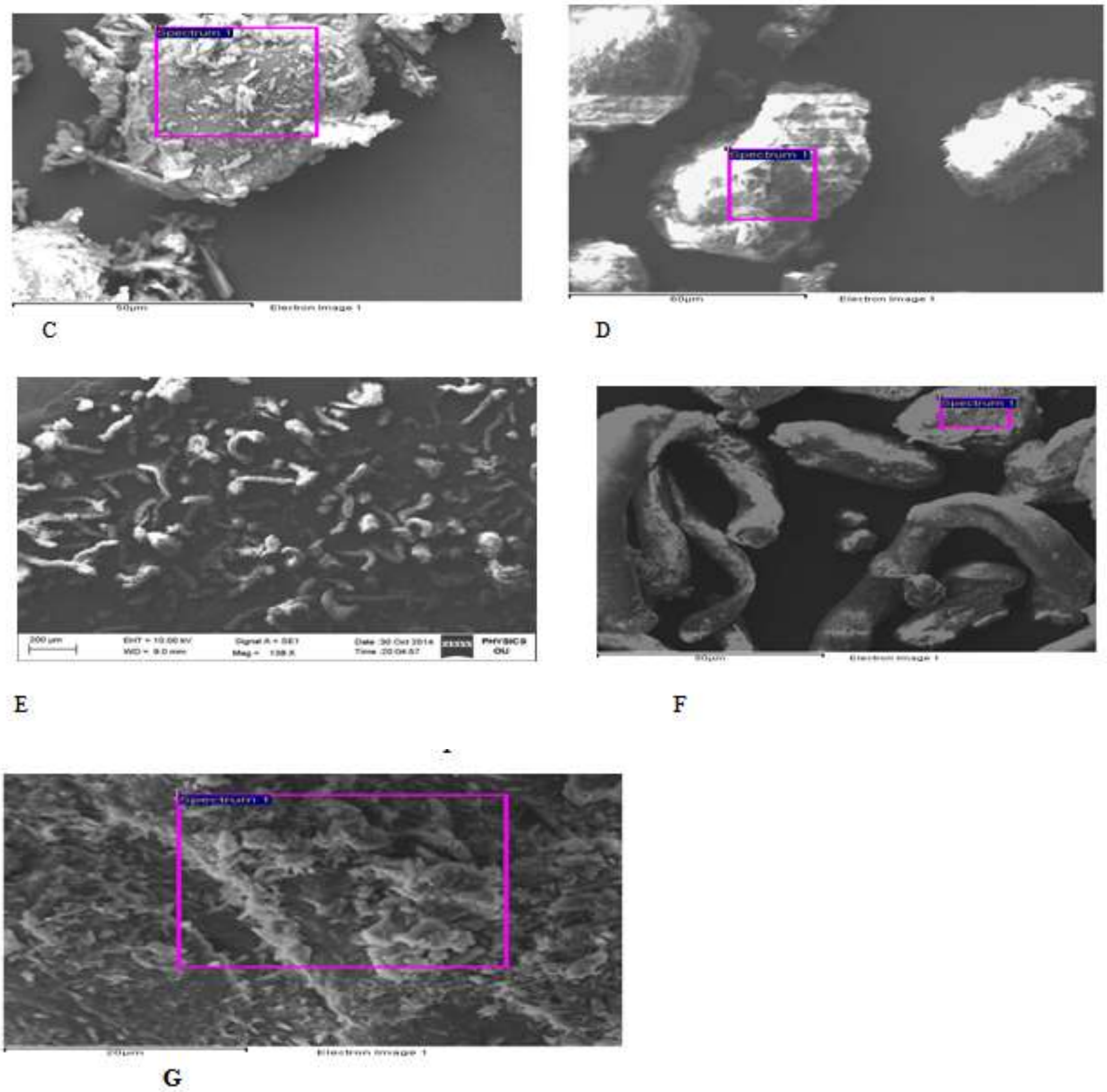


FIGURE 8: SEM PICTURES OF (A) LAFUTIDINE, (B)PURE SODIUM STARCH GLYCOLATE, (C) LAFUTIDINE-SSG PM AT 1:1 RATIO AND (D) LAFUTIDINE-SSG SDS AT 1:1 RATIO, (E) LAFUTIDINE-CCS PM AT 1:1 RATIO (F) PURE CROSCARMELLOSE SODIUM, AND (G) LAFUTIDINE-CCS SDS AT 1:1 RATIO.

IV CONCLUSION

The solid dispersion of Lafutidine were prepared by maintaining constant drug concentration and increasing carrier(SSG, CCS, Polyplasdone XL) concentration by solvent evaporation method. The drug content of solid dispersions and physical mixtures was obtained 95-101.2%. *In vitro* dissolution rate of drug from solid dispersions was higher compared to pure drug lafutidine. The pure drug showed a release of 52.83% at the end of 1 h, while SD showed 107% drug release in 1 h. The percent drug dissolution increased with an increase in the ratio of carriers. Physical mixture (PM) also showed an improved dissolution rate to a significant extent as compared with pure drug. The dissolution parameters MDT, MDR, IDR and $t_{50\%}$(min) was caluculated.IDR showed improved dissolution characteristics of solid dispersion compare to pure drug. Solid –state characterization (FTIR, DSC, SEM studies) indicated decrease in crystallinity of the drug with no interaction between drug and carriers. The solubility and dissolution rate of lafutidine can be enhanced by the use of solid dispersions of lafutidine with carriers. From the result of the present study, it can be concluded that the solubility and dissolution rate of the lafutidine was improved with the solid dispersions of croscarmellose sodium and sodium starch glycolate.

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VISION ALGORITHM FOR CAPSULE INSPECTION SYSTEM

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ABSTRACT

Inspection is a quality evaluation technique which is most widely used in industries to obtain best quality products with specified requirements. Traditionally manual inspection may lead to loss of material, labour, time for production and inaccuracy in measurement. Thus automated inspection technique can be effectively implemented to overcome the above discussed aspects. This paper presents the brief explanation about implementing automated inspection technique in quality control process of capsule tablets in pharmaceutical industry using machine vision. The capsules might have defects like different colour and broken cover. Thus each capsule is checked for perfectness in colour and dimension using machine vision. Machine vision technique includes capturing of image of the capsule, colour image processing, determination of area of capsule and actuation of ejector mechanism. Capsule will be eliminated either if it has different colour or different dimension. By machine vision technique defective capsule can be eliminated accurately and comparatively lesser time for inspection.

Keywords:Automatic inspection, Capsule, Image processing, Pharmaceutical industry, Timing belt

1. Introduction:

The main objective of every business enterprise is to maintain its product quality at its maximum by attaining zero defects [1]. Quality control helps in increasing the productivity and reducing the waste by eliminating the defective. Quality inspection may be manual or automatic. In case of large scale production it is very tedious to inspect [2] through human eyes and so it should be automated using computer vision. All the drawbacks of manual inspection can be overcome by automatic inspection in terms of time, efficiency, human effort and flexibility. Computer vision includes the method of acquiring the image followed by processing and analysing it in order to produce numerical data to make decision [3].Automatic inspection finds vast application in medical field [4]. It is a must to install this kind of methods in pharmaceutical industries as it directly deals with human health. Pharmaceutical industries are one of the largest developing industries in terms of production and consumption. An image based inspection technique (MACHINE VISION) is used to control the quality of capsule produced in pharmaceutical industries. The capsules should be perfect in shape, size, colour and fillings but due to some inconsistent manufacturing process the capsules are subjected to many flaws [5].Defects in capsules like any absence or misalignment of gelatine shell or colour variation between cap and body is detected and rejected. There are standard sizes for a two piece capsules, those deviating from it are also get rejected by this technique. Capsules with hole or small cracks should be prevented from packing. This kind of problems may lead to spilling out of capsule filling and entry of dust particles in to the hole causing some unsafe chemical reaction affecting the end user by means of health issues.

The method of inspection discussed in this paper integrates the application of camera, image processing software, controller and blower. The orientation position of capsules coming in the conveyor should be good enough to detect the defects.So timing belts are used for carrying the capsules. The image of the capsule is acquired, processed, compared with standards and the defect is classified. The defective capsules are rejected and avoided from packing. Detection of defects in capsules by this vision based inspection system not only helps the industries by raising their standards but also prevents the consumers from health hazards.

II PROPOSED DESIGN

Design of inspection of capsule depends on the concept of colour image processing using MATLAB (Image processing software). The image of the capsule moving over the conveyor is captured by the camera positioned above the moving conveyor. The captured image is processed by the image processing hardware (computer) sing image processing software (MATLAB). The processed image is subjected to sequence of operations which includes in determining the centroid, cropping the required area around the centroid and determining the hue value. The hue value is determined to differentiate between the colours. The determined hue value is passed to the controller where the value is compared with the standard hue value. If any defective capsule is identified then the controller triggers the pneumatic blower and eliminates it from the conveyor. The intensity of the blower must be controlled in such a way that the forth coming capsule remains undisturbed.

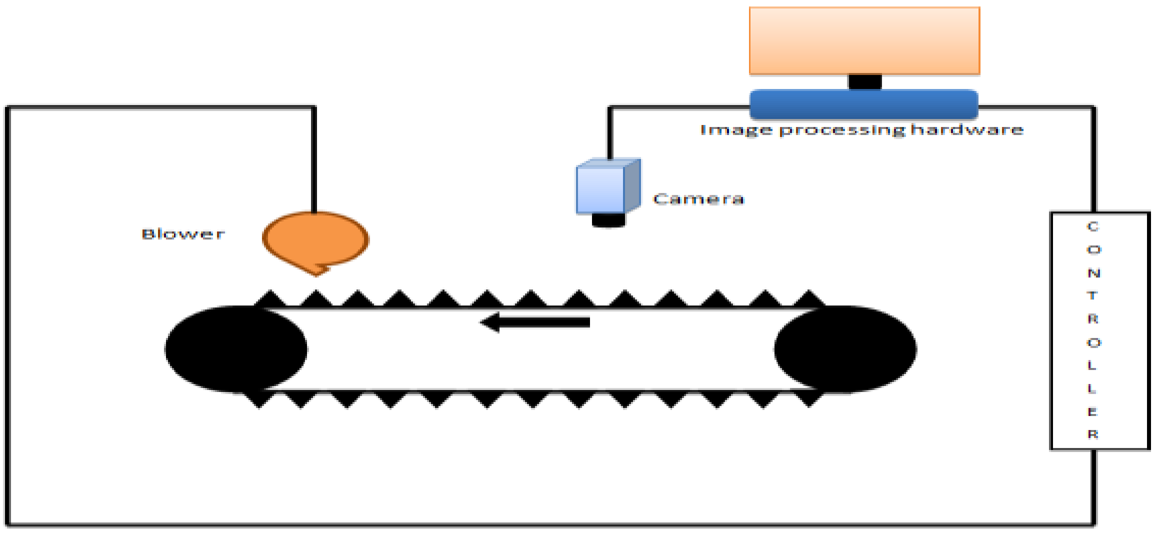


Fig.1: Design of capsule inspection

2.1 Components of the system

- Camera
- Conveyor

- Image processing hardware
- Controller
- Pneumatic Blower

2.1.1 Camera

Camera is the most important and primary component of inspection technique which is used to capture the image of the capsules moving over the conveyor and transmits it to the image processing hardware. Camera is positioned at the top of the conveyor such that the lens faces downwards as shown in Fig.1. The shutter speed of the camera depends on the speed of conveyor motor and the distance between twoconsecutive capsules. Focal length of the camera should be less (10 to 30mm). Wide and fixed lens camera is used for high accuracy image.

2.1.2 Conveyor

Conveyors are used to move object from one place to another in production line. The conveyor used in this process can be specified as timing belt. The capsules are made to move between the two corresponding teeth of the timing belt. The speed of the conveyor motor should be optimum so that there is a little time gap between the consecutive inspection and rejection.

2.1.3 Image Processing Hardware

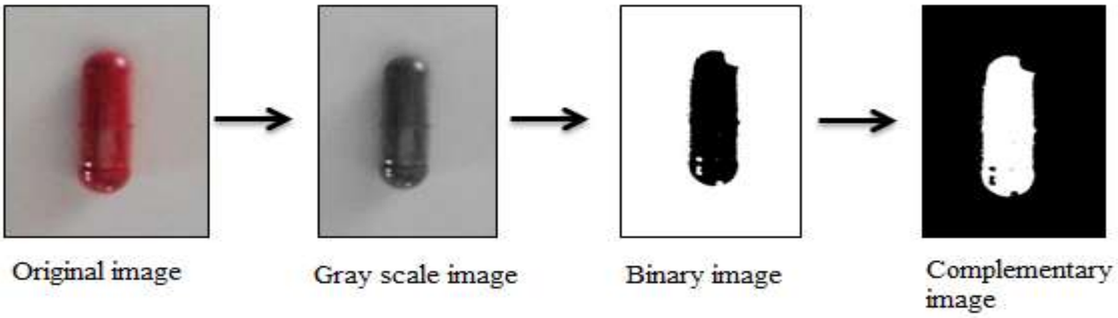
Image processing hardware is the personal computer in which has image processing software. The software used here is MATLAB. This software enables the comparison of image of the part to be inspected with the standard part image in terms of pixel areas. Data thus obtained after comparison is fed to the controller.

2.1.4 Controller

Controller forms the heart of this automatic inspection technique. They are used to control the action of entire system by means of program that is already stored in ROM (read only memory). By the nature of data obtained from the computer it controls the actuation of blower.

2.1.5 Pneumatic Blower

A blower used here is centrifugal fan to provide flow of air which is driven by a motor or turbine. It is connected to the output terminal of the controller. Blower motor is driven or actuated only if the inspected part is defective. Moreover the flow rate of these fans must be of very less cubic feet per minute so that only the defected part is blown off from the conveyor.



III WORKING ALGORITHM

The capsule after being manufactured is subjected to the proposed inspection mechanism. The camera that has been placed over the conveyor is controlled to capture the image of the specimen under it. Now the obtained image is processed using the programmed algorithm. If the specimen under inspection doesn't bound to the required criteria, the rejection mechanism is activated and elimination process is carried out.

The specimen under investigation is verified by a suitable colour image processing software. The various defects that have to be checked in a capsule are colour, size, structure and cracks. Rejection of the defective capsules is done once the evaluation process is done. The capsules are first checked for their size wherein they are compared with standard values. If the specimen size matchesthe standard value then it is checked for the colour. If the results are found to be positive the capsule is sent for outsourcing. Any aberrations in the parameters may result in rejection of the capsule. Series of processing is carried out over the capsule. If the result is positive the capsule is subjected to the next evaluation in sequence. Here the colour of the capsule is verified. The hue value of the capsule colour is generated. For every colour there is a measured and established hue andsaturation value. So the algorithm should be coded in such a way that it checks for the hue value of the capsule. So the hue and saturation value of the specimen should be checked .If the values doesn't coincide the standard value, the specimen is rejected. If the capsule doesn't pass the first test it is not further processed for the second condition. By this way standardization of the capsule is executed through this method.

IV CONCLUSION

The presence of undesirable defects in the pharmaceutical capsules is harmful to the end users causing unsafe impact on those consumers. Quality inspection is a must in this kind of industries. The vision based automatic inspection technique to detect the flaws in capsules manufactured in pharmaceutical industries made the inspection process more easy, flexible and fast. This inspection paves the way to the quality control. Image processing tools and techniques are used to find the capsule defects. The 2D algorithm used here to classify the defect is simpler and easily understandable. All kind of major possible defects are easily detected by this algorithm and methodology. The proposed method is a highly cost effective and quality guarantee to the consumers in this competitive market.

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LINE FOLLOWING ROBOT BASED ON VISION TECHNIQUES

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ABSTRACT

A line follower robot is automated device programed to follow a specific path. They have a vital role in industries and domestic application. Some of the existing techniques used in controlling line follower robot are by using microcontroller, guided tape method etc. This paper aims at providing a machine vision based line follower robot. Machine vision is an image processing technique where in pre-programing algorithm are used to process the obtained image. A camera is used to obtain the image of the track and the obtained image is processed using suitableimage processing software and depending on the results generated the robot is tracked. Thus by using machine vision technique the line follower robot is guided along their track.

***Key words:* Automated guided vehicle, Image based process, Line follower robot, Machine vision.**

I.INTRODUCTION

A line follower robot is a robot which follows a certain path controlled by a feedback mechanism. The path can be visible like a black line on a white surface (or vice versa) or it can be invisible like a magnetic field.Sensing a line and guiding the robot to stay on course, while constantly correcting.Some of the practical applications of a line follower are industrial applications were these robots can be used as automated equipment carriers in industries replacing traditional conveyer belts in automobile.Some recent development is of line follower is seen in applications such floor cleaning, guidance in public places, library assistance [1], entertainment [2], education [3] etc. Most commonly used technology in line following robot are done by using microcontrollers and without using microcontroller .The idea proposed in this paper is by using machine vision to guide the line following robot.

The field of machine vision or computer vision has been growing at a fast pace .Machine vision is the technology and method used to provide imaging-based automatic inspection and analysis. Machine vision applications can be divided into four types from a technical point of view. They can be used to locate, measure [4], inspect [5] and identify.The operation of machine vision can be described in the following steps: image acquisition system gathers images to be converted into digital format and placed into computer memory; image processing where various algorithms are used to enhance elements of the image that are of specific importance to the process followed by feature extraction where the processor identifies and quantifies critical features in the image and sends data to controller. The technology is used in a variety of industries to automate the production, increase production speed and yield, and to improve product quality .Some of fields where machine vision plays a major role are food packaging,robotics, Pharmaceutical industries etc. In this paper, a simple 2d vision algorithm is used to develop line following algorithm.

II.DESIGN OF SYSTEM

The line follower robot guided using machine vision consists of the following components

- Base
- DC motor
- Wheels
- Microcontroller
- Camera

These components are integrated together to form a line follower robot as shown in fig .1.

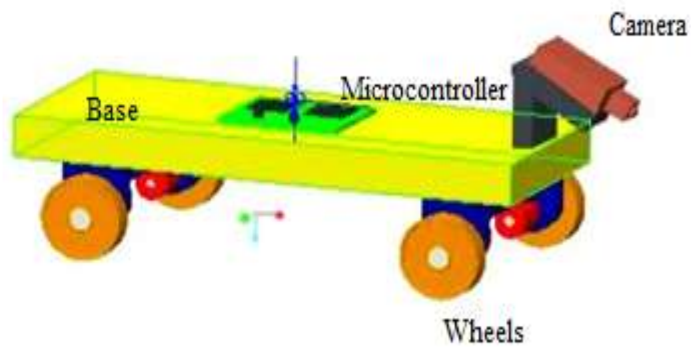


Fig.1: A 3D prototype of a line following robot with machine vision.

1. Base

It is the main frame of the robot which holds the microcontroller,Dc motor and the other components to be transported.It is usually made of low density materials so that they have low weight and high strength to suit the required needs. It is usually made of aluminium, inorder that overall weight of the robot is reduced.

2. DC motor

The ease in the movement of the line follower robot is achieved with the help of dc motor. Each wheel is driven by a separate dc motor and each of the dc motor is driven independent of each other.

3. Wheels

The movement of this robot is achieved with the help of wheels .There are a pair of front and rear wheels.

4. Microcontroller

It is the main component of the robot. It plays an intermediate role between the image processor and the motor.Each of the motor receive separate signal from the microcontroller depending on the signal received from the image processor.Now the obtained image is processed using the programmed algorithm.It converts the obtained image into its binary colour and its complement. Centroid and centre of the image is obtained and compared and depending on the result generated the robot is tracked.

5. Camera

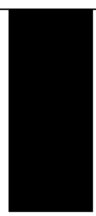
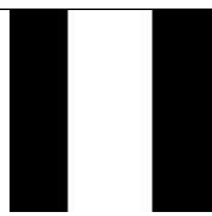
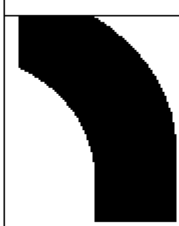
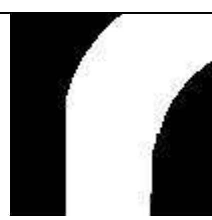
The camera is the basic requirement of the method because the movement of the line follower robot depends on the output of the camera.Resolution of the camera is not a problem in case of line tracking. Here only one camera is used which is placed in front of the robot at an tilt down position so as to capture the line track.

III.WORKING ALGORITHM

The line follower robot proposed in this paper is guided with the help of machine vision. The camera that is placed in front of the robot captures the track to be followed by the line followerrobot .Now the obtained image is processed in the image processing software using the programmed algorithm. The RGB image obtained from the camera is first converted into a gray scale image. Then the grey scale image is converted into its binary image and the complement of the binary image is taken. The complementary of the binary output is in such a way that the background is black in colour and the track is white in colour. Then the centroid of each image is calculated and is compared with the centre of the image. If the centroid of the image coincides with the centre of the image the line follower robot is programmed to go straight. If centroid of the image is shifted to the right of left from the centre of the image the robot is programmed to take a right or left turn. Thus the line follower robot is guided along its track.

IV.RESULT

Table 1.Captured and Processed images and their centroid and centre of various samples taken into study

Captured image	Final processed image	Centroid (x , y)	Centre (x , y)	Programmed output
		(50.5000,51.000)		Goes straight
		(45.9599,48.824)	(50.50,50.50)	Turns left
		(59.1700,47.6294)		Turns right

From the above results it is clear that the centroid for straight path coincides with the centre of the image. The centroid for the left curve is less than the centre of the image and the centroid of the right curve is greater. Thus depending on the position of the centroid with respect to the centre of the image the robot is made to move.

V.CONCLUSION

In this study, a novel algorithm for line tracking based on image processing was developed and tested. The 2D vision algorithm was implemented in a line following robot and was found to be an effective replacement for the existing sensor based image processing techniques.

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NEXT GENERATION OF IP COMMUNICATION

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ABSTRACT

Many enterprises have IPv6 adoption on their technology roadmap due to the exhaustion of the IPv4 address space. To help organizations understand how IPv6 may affect their network security strategy, we will look at some of the issues related to migrating to IPv6.

Keywords: IP4, Addresses, Communication, Network, Security, Support, IP6

I INTRODUCTION

Internet Protocol version 4 (IPv4) was the first version of the Internet Protocol (IP) that was widely accepted and deployed by organizations worldwide. Defense Advanced Research Projects Agency (DARPA), the research and development office of the US Department of Defense, initially created IP addressing over thirty years ago. Although once projected to be exhausted in the 1990s, the IPv4 address space was been extended several times over the last three decades. The last block of IPv4 addresses was allocated in 2011, necessitating the migration to IPv6.

IPv6, the next generation Internet communication protocol, was developed as the replacement protocol for IPv4. The US Government and many service providers have embraced this new protocol in their networks. The public, on the other hand, has not had much interaction with this new protocol, and there has been limited private-sector adoption of IPv6. Nonetheless, many enterprises have IPv6 adoption on their technology roadmap due to the exhaustion of the address space, and are looking to understand how IPv6 may affect their network security strategy. In this document, we will examine IPv6 and how it may affect you.

II THE BENEFITS OF IPV6

IPv6 was designed to improve upon some of the shortfalls and lessons learned from IPv4, which was originally designed in the late 1960s. The architecture of IPv6 includes a number of features and benefits that will address the future needs for global end-to-end communication [1]. Some of the significant improvements in IPv6 over IPv4 include

2.1 Addressing Capacity

Without any doubt, the most significant benefit of IPv6 is the drastic increase in addressing capacity over the existing IPv4 addressing space [1]. Changing from 32-bit address to 128-bit address scheme, IPv6 supports 340,282,366,920,938,463,463,374,607,431,768, 211,456 address [1]. That is 340 trillion trillion trillion addresses (compared to the 4 billion IPv4 addresses), enough to allocate billions of addresses per person [1].

2.2 Security

The other significant enhancement in IPv6 is the security incorporated into the protocol. IPsec is a proven standard for securing IP communications by encrypting the information contained in the IP datagram through encapsulation. IPsec provides data integrity, confidentiality, and authenticity to end to- end IP based communication. IPsec in IPv4 is optional and proprietary in some implementations, which leads to compatibility issues [2]. IPsec is required in IPv6 and it provides a standard-based security solution for devices, applications and services.

2.3 Quality of Service

Support for Quality of Service (QoS) in IPv4 networks is typically a “best level of effort” service, but there is no way for IPv4 protocol to differentiate time-sensitive packets from non-time-sensitive packets. IPv6 supports a more sophisticated approach to handle priority request and supports parameter adjustment to fit what the network can handle [2]. IPv6 also supports “flow label” filed in the headers whereby application flow-based resources reservation scheme can be added to complement the existing standard for IPv4 QoS [1].

2.4 Mobility

With the growing success of mobile devices such as smart phones and tablets, wireless broadband IP connectivity on mobile devices has become an essential service [3]. Mobile IP (MIP) is the most widely accepted solution to handle IP handover between wireless networks and cell towers. Although there are standards to support MIP on IPv4, mobility is integrated into IPv6 [3]. Mobile IPv6 (MIPv6) allows mobile devices to move from one network to another network and still maintain existing connections [3]. Built-in IPsec support in IPv6 enables secure signaling and communication between MIPv6 devices [7].

III SECURITY ISSUES RELATED TO IPV6

The transition from IPv4 to IPv6 is under way as more network and content providers embrace IPv6 [5]. As the amount of IPv6 traffic (and IPv6-based threats) increases in your network, it's essential that you deploy a network security solution that can deliver the same level of protection for IPv6 content as IPv4 [6].
Organizations of all sizes need to understand the security implications of IPv6, which include:

3.1 IPv4 security devices cannot inspect IPv6 traffic

Although there are work-around measures to enable IPv4 network and security devices to forward IPv6 packets, IPv4 devices cannot inspect those packets for malicious content. This lack of visibility enables a simple evasion technique to avoid detection by legacy security devices--send malicious content via IPv6 [7]. This allows old threats to bypass policies that may have been in place for years. And, as long as the victim system can process IPv6, the attack will reach its intended target.

3.2 IPv6 is likely in your network today, as many systems (such as Windows 7) natively support IPv6 and ship with IPv6 support enabled

Many systems ship today with IPv6 support enabled by default. And, unless that support is specifically disabled, these devices will be vulnerable to threats transported via IPv6 [4].

3.3 Some legacy security devices will never support IPv6 and will need to be replaced

Many network security devices require recently released versions of their operating systems to support IPv6. Unfortunately, not all devices can support the most recent releases due to lack of memory or other hardware-based limitations, requiring an upgrade to the latest hardware device. Without replacing the device, the network segments protected by these legacy systems will be blind to threats embedded within IPv6 traffic [11].

3.4 Many security vendors have limited support for IPv6 today, leading to potential gaps in protection

Supporting IPv6 with dual-stack architecture is not a trivial development exercise; it requires a significant allocation of development resources to build a new stack and incorporate it with the existing IPv4 stack [6]. Many vendors have only recently committed development resources to supporting IPv4, choosing to wait until demand for IPv6 support increased before allocating the necessary resources. One result of the delayed investment is that they will not be able to offer feature parity with their IPv4 devices, which has the potential to lead to years of gaps in IPv6 policy enforcement, as these vendors will struggle to make all key IPv4 features functional in IPv6 [10].

3.5 IPv6 support is often at much slower performance

In addition to reduced functionality in their IPv6 support, many vendors rely on software only to filter traffic to detect threats. As stated above, the implementation of IPv6 support in a network security device is not a trivial exercise [12]. It requires significant investment and, like any other new technology, several product releases to deliver stable, mature functionality [11]. One way to accelerate the speed with which they can bring IPv6 support to market, vendors of devices that utilize custom processors will release IPv6 support in software only. The advantage is that a software-only approach reduces the amount engineering effort required to bring the functionality to market. The disadvantage is that the performance of a software-only approach is significantly slower than a hardware-accelerated approach.

IV IPV6 AROUND THE WORLD

NTT Research in Japan started one of the world's largest IPv6 trial networks in 1996 and NTT Communication began its IPv6 tunneling trial services with more then 200 subscribers in 1999. By the end of 2003, IPv6 services were offered in NTT Europe, Korea, Taiwan, NTT Com Asia and Australia. Since 2009, NTT has offered a Service Level Agreement (SLA) guaranteeing 100% network availability with latency and packet loss levels to customers using IPv6 services on their global Tier 1 IP network [18].

In Europe, the growth of IPv6 implementation isn't quite as rapid. An IPv6 implementation survey based on the response from the RIPE community, the Regional Internet Registry that consists mainly of ISPs, telecommunications organizations and large corporations in Europe, the Middle East and parts of Central Asia, in 2009 has shown a slow deployment amongst its members. Although 80% of the respondents have an IPv6 presence in their network, the majority of them indicated that the IPv6 traffic was insignificant. To jumpstart adoption of IPv6, there are pilot projects in many EU countries (such as the IPv6 pilot GEN6, for public agencies) [19].

In the U.S., the Office of Management and Budget (OMB) set a deadline for all federal agencies to upgrade public/external facing servers and services (e.g. web, email, DNS, ISP services, etc) to operationally use native IPv6 by the end of FY 2012 (the agencies can continue to use IPv4 in their internal network until Sept. 30, 2014) [17]. Elements of the US government have embraced IPv6, such as the Department of Defense (DOD), which set IPv6 as the mandatory standard in 2005. Migrating to IPv6 enables ubiquitous security services for end-to-end network communication, which will provide the foundation for the future security of federal IT systems.

On the service and content provider side in the US, many of the largest service providers have permanently enabled IPv6:

- AT&T
- Comcast
- Free Telecom
- Internode
- KDDI
- Time Warner Cable
- XS4ALL

Many large content providers have also permanently enabled IPv6 traffic, including:

- Facebook
- Google
- Microsoft Bing
- Yahoo!

Clearly, the deployment of IPv6 is occurring across the world in both public and private sectors. While the transition from IPv4 to IPv6 may not have happened as rapidly as some IPv6 proponents had wished, IPv6 is certainly gaining ground as the next generation communication protocol [20].

V CONCLUSION

The deployment of IPv6 enables worldwide IP–based devices to seamlessly communicate and interoperate much more efficiently. Global communication networks have begun a major transition period from IPv4 to IPv6 that will last for years. With comprehensive global security threat research team in-house, we need continuous updates to its security platforms, delivering real-time protection for agency, migrating to migrate to an IPv6 network.

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SOUND EVENT DETECTION USING WIRELESS SENSOR NETWORKS

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ABSTRACT

The development of wireless technologies has influenced the applications of sensor networks. Using sound recognition for home automation or smart homes in our daily lives has become a new research issue. This work focuses on the capturing and processing of sound signals in a WSN. In a real living setting, sounds rarely occur isolated from one another. We consider the capturing and processing of sounds of interest that are mixed with other sounds. Sound event classification can provide significant help in home environmental monitoring. Predefined home automation services can be triggered with associated sound classes. The system can monitor home events by detecting kettle whistling, glass breaking, and doorbell/telephone ringing. After further sound verification, the system subsequently activates that procedures like switching off the oven, cleaning the floor, or alerting residents while simultaneously lowering the volume of television/radio. Here a convolutive blind source separation system with source number estimation using time-frequency clustering. An accurate mixing matrix can be estimated by the proposed phase compensation technique and used for reconstructing the separated sound sources. In the verification phase, Nuero fuzzy from the wavelet packet decomposition of signals are used as features for support vector machines. Finally, a sound of interest can be selected for triggering automated services according to the verification result.

KEY WORDS: Fuzzy, Nuero Fuzzy, Doa

I INTRODUCTION

The development of wireless technologies has influenced the applications of sensor networks. The capturing and processing of sounds of interest that are mixed with other sounds. Here we using two methods sound separation and sound verification. In sound separation phase fuzzy classifier is used. Sound verification phase SVM training is used. Database mainly for the purpose of storing multiple sounds. The system is designed to select the sensor node with maximum average DAO difference. The separated signals corresponding to that sensor node are utilized to perform sound verification. The sound verification is performed using Fuzzy classifier. For estimating the directions of arrival (DOA) of unknown signals that are received from each sensor node the operations are carried out in the sink. Our observations indicate that the proposed CBSS method exhibits better separation performance as the DOA difference increases. Based on such findings, the system is designed to select the sensor node with the maximum average DOA difference, and the separated signals that correspond to this sensor node are utilized to perform sound verification. A mixed signal received by sensor node 3 is chosen to perform sound separation and verification.

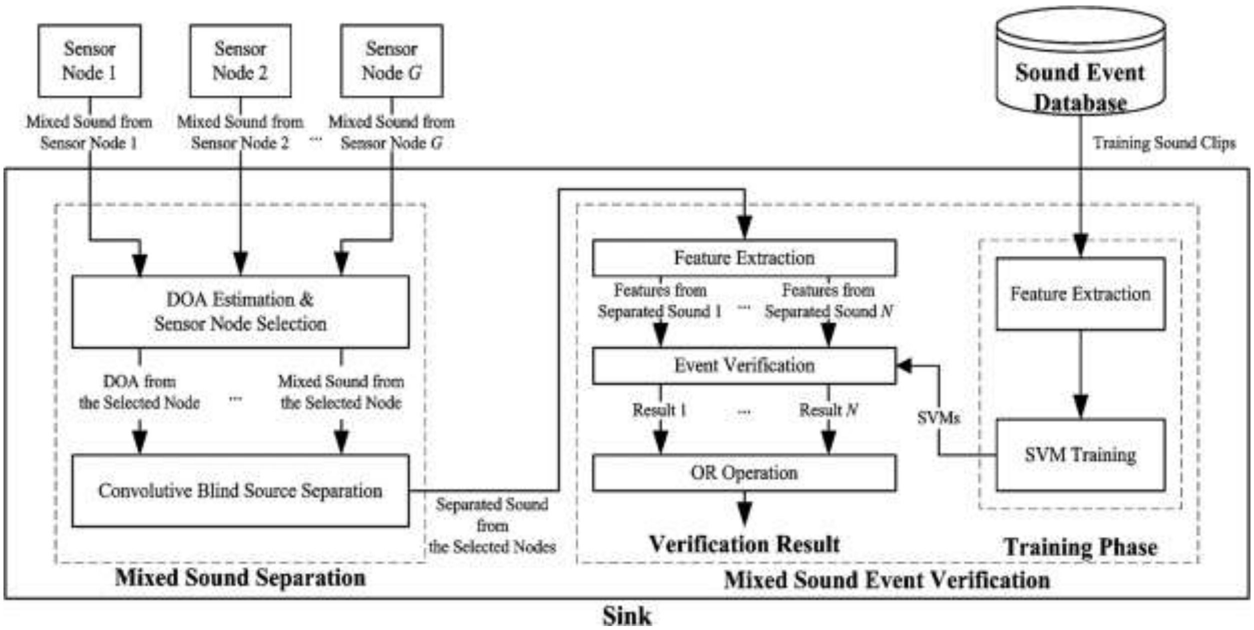
II RELATED WORK

Sound processing and capturing is very low .In sound separation phase convolute blind source is used to separate the sound source. Sound verification phase here SVM training and testing mechanism is used. Using this method sound separation and verification is lacking. System compute only poor recognition. The literature still lacks full discussion on mixed sound recognition for home automation. In a real living setting, sounds rarely occur isolated from one another. To tackle the problem, we first propose a solution to overcome the demixing/separation problem of simultaneous sound occurrence and then perform a sound verification procedure on the separated sound.

III PROPOSED SYSTEM

The proposed system is equipped with microphone capturing simultaneously generated sound in a room. The microphone array at each sensor node receives and transmits the mixed signal to the sink. The system is designed to select the sensor node with maximum average DAO difference. The separated signals corresponding to that sensor node are utilized to perform sound verification. The sound verification is performed using Fuzzy classifier. For estimating the directions of arrival (DOA) of unknown signals that are received from each sensor node the operations are carried out in the sink. Our observations indicate that the proposed FUZZY CLASSIFIER method exhibits better separation performance as the DOA difference increases. Based on such findings, the system is designed to select the sensor node with the maximum average DOA difference, and the separated signals that correspond to this sensor node are utilized to perform sound verification. A mixed signal received by sensor node 3 is chosen to perform sound separation and verification. Our verification phase aims at verifying whether the input signals comprise the sound of interest or not. The last item on the list, criterion estimation, is covered. The difficulty to overcome is that a defined criterion (a relevance index or the performance of a learning machine) must be estimated from a limited amount of training data. Two strategies are possible: “in-sample” or “out-of-sample”. The first one (in-sample) is the “classical statistics” approach. It refers to using all the training data to compute an empirical estimate. That estimate is then tested with a statistical test to assess its significance, or a performance bound is used to give a guaranteed estimate. The second one (out-of-sample) is the “machine learning” approach. It refers to splitting the training data into a training set used to estimate the parameters of a predictive model (learning machine) and a validation set used to estimate the learning machine predictive performance. Averaging the results of multiple splitting (or “cross-validation”) is commonly used to decrease the variance of the estimator.

IV BLOCK DIAGRAM AND ITS DESCRIPTION



In this block diagram here two processes are used for sound triggering. That is sound separation and sound verification. In separation side, here number of sensors is used. Sensor work is collecting the mixed sound from the each sensor using small microphone array. Then it given into the DOA estimation and sensor node selection.DOA for the purpose of which direction from the sounds is comes here. Node selection is mainly used to select the node from the mixed sound nodes. Then it given to the easily separated sound from the selected nodes. These functions are done in sound separation phase. Sound event Database it contains all available sounds that is assigned sounds all are included. Here only we compare with the assigned sound and recent getting sound.SVM training tools are available for the purpose trained the separation sound.SVM have testing tools also but here we cannot use that, under database it contain feature extraction. This three components contain one format is called as Training phase.

Sound Verification method here using feature extraction it used for leveling the sounds that means dividing the sounds. It also has phase difference it is measured by difference between observation and reference. OR operation is used for adding all the sounds. The whole process is called as sink. In proposed method here we used fuzzy classifier.

Sensor nodes are mainly used for the purpose of getting the sounds from various locations and then it can do mixed sound from the each sensor node. Those sensor nodes are available only in the order of numbering. It used to sense the fitting place not than other place.

DOA in the sense Direction of Arrival it mainly used to find out which direction from the sounds are comes from and which one is sink with target sounds and which one is sink with non-target sounds. Each sensor has one separate DOA difference that values are different from each other. Sensor node selection it is used for selecting the sound from the mixing sound matrix. So it filterize the unwanted sound events from the whole sounds. Then it given into the convolute blind source separation.

Direction-of-arrival (DOA) algorithm plays a crucial role in smart antenna system to ensure that the antenna array is able to estimate the direction of the incoming signal and thus, with the aid of adaptive beam forming, to point the array beam towards the estimated direction. The performance of DOA depends on several factors such as the number of element in the array, spacing between elements, number of signal samples (snapshot) and signal-to-noise ratio (SNR) Previous works on DOA estimation usually using isotropic antenna array and mutual coupling effect between isotropic elements is ignored. There are also experimental works using directional antenna array that employ various DOA To the best of our knowledge, there is no previous work that provides analysis of DOA estimation between and directional antenna array. Therefore, this paper aims to analyze the DOA estimation using both types of antenna array. The DOA estimation is performed on the two types of ULA, the isotropic antenna array and directional antenna array. These results are then analyzed to gauge how the algorithm performs to estimate the AOA. A classifier is an algorithm that assigns a class label to an object, based on the object description. It is also said that the classifier predicts the class label. The object description comes in the form of a vector containing values of the features (attributes) deemed to be relevant for the classification task. Typically, the classifier learns to predict class labels using a training algorithm and a training data set. When a training data set is not available, a classifier can be designed from prior knowledge and expertise. Once trained, the classifier is ready for operation on unseen objects. Classification belongs to the general area of pattern recognition and machine learning.

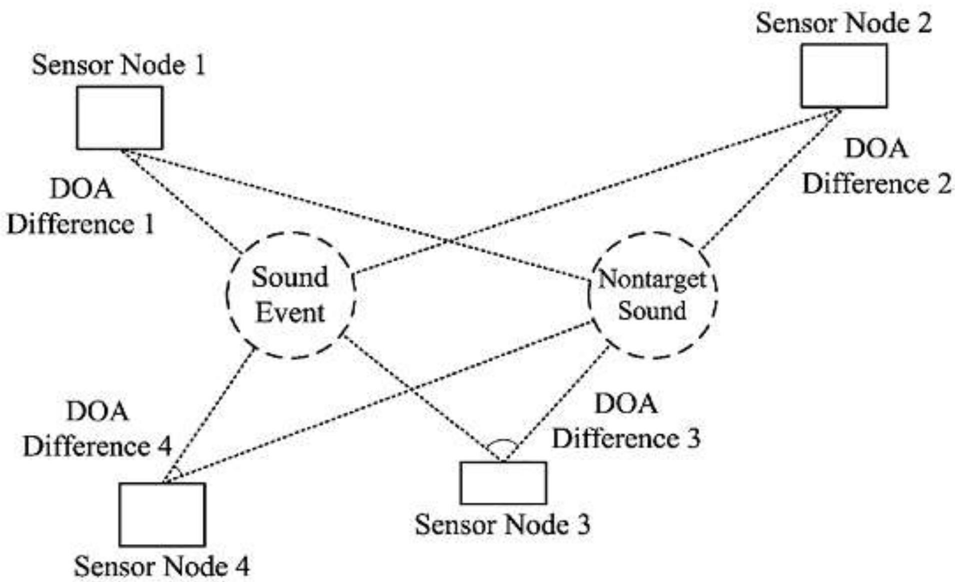


Fig 1: Direction of Arrival

V RESULTS AND DISCUSSIONS

Here the result is obtained from one mixed sound given into the database. If we want one particular sound in the mixed sound source using fuzzy key coding.

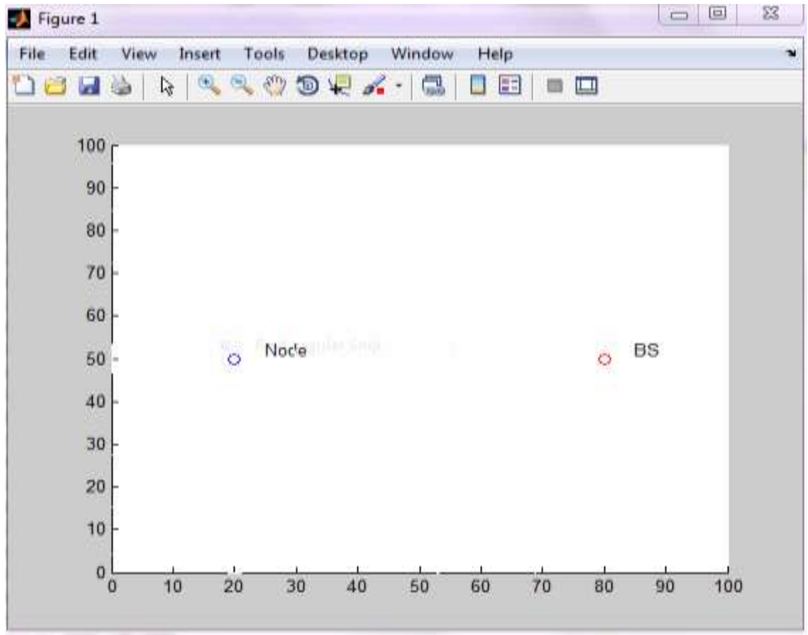


Fig 2: It represent the data that means sound sources are transferred.

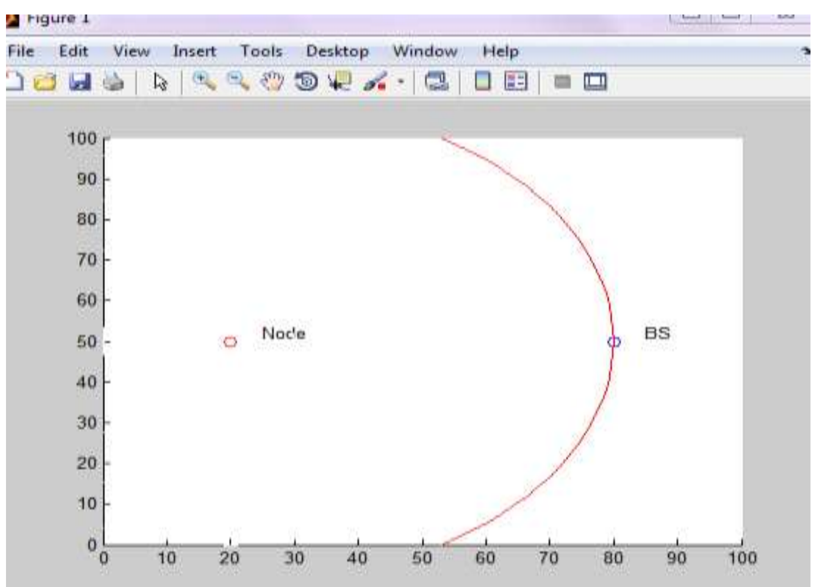


Fig 3:It represent the correct signal only transferred to node to base station

VI CONCULSION

In this paper, we have presented a mixed sound event separation and verification system for WSNs in home automation systems. We show that the **FUZZY CLASSIFIER** can be used to separate mixed sound event signals. In addition to the mixed sound separation, we perform sound verification using SVMs. The presented feature set includes k-means algorithm and Bayesian information criterion derived from the energy distribution throughout a sound's wavelet decomposition. Our experiment shows that the proposed mixed sound separation framework improves the sound verification performance significantly. This is particularly important in automation systems which depend on the verification of sounds in its surrounding environment to trigger certain operations. Our experimental results also show room for future improvement in the mixed sound separation system. The improvement may concern the features used in the separation process to better differentiate a wider range of sound classes.

VII APPLICATION AND ADVANTAGES

Home Automation

Security System

Military Sensing and Tracking

Power Management

Industry Management

Efficiency

In emergency situation only Efficiency is detected by emergency fall detection method.

Time Independent

In Harvesting method it works based on time dependent policy.

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