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ULTRASONIC STIRRER

Omkar Gavali[1], Prashant Raut[2], Amol Deshmukh[3], Prof.P.B.Nikam[4]

[123]Students, E&TC, Sanjay Ghodawat institute, Atigre, India
[4]Professor, Dept. of Electronics & Tele-communication, Sanjay Ghodawat institute, Maharashtra, India

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Abstract – Ultrasonic is one of the non-thermal methods which is being used for food processing in recent times. As a non-thermal technology, power ultrasound is attracting considerable interest in the food industry, with the help of mechanical vibrations of high enough intensity, power ultrasound can produce changes in food either by disturbing its structure or promoting certain chemical reactions. Ultrasound refers to sound waves, mechanical vibrations, which propagate though solids, liquids, or gases, with a frequency greater than the upper limit of human hearing is above 20 kHz. When these waves propagate into the liquid media, alternating compression and expansion cycles are produced.

Key Words: **Ultrasonic Processing, PIC Timer Circuit, Auto sampling, etc**

1. INTRODUCTION

The consumers are now demanding the performance of least Processes and a special emphasis is on the preservation of quality and sensory characteristics therefore, non-thermal milk processing and preservation are crucial. One of the current and important methods of non-thermal milk processing and preservation is the application of ultrasound waves. Man is the capable of hearing sound waves with 20 to 20000 cycles per second frequency. Sound waves with lower 20 cycles per second frequency are called "Infrasound" and a set of mechanical waves with frequencies over the range of human hearing (i.e. 20kz) are called "Ultrasonic" waves. Ultrasound techniques are used in both modification and analysis in milk industry. Other applications of ultrasound waves in milk refer to inactivation of enzymes and bacteria. There are the many possible ways to find other application of ultrasound waves over the milk industries.

1.1 Ultrasound with High Intensity

Waves with high intensity: Ultrasound waves with high intensity in which high power is applied, are mainly used as a tool to change milk properties such as sterilization and microbes, cells destruction Reactions, increasing liquor preservation, etc.

1.2 Ultrasound with Low Intensity

Waves with low intensity: These waves are non-destructive. Their applications include milk quality control For measurement of properties, process control such as controlling fluid flow and detection of foreign bodies, etc. Presence or absence of material between a couple of transducers or between one transducer and a Refract meter can be determined by measuring the amplitude of the electrical wave. If there is a material, the amplitude of the electrical wave will reduce.

2. PROPOSED SYSTEM

1. LM3524 IC.
2. BC 574 TRANSISTOR.
3. P55NF MOSFET.
4. STEP UP & STEP DOWN TRANSFORMER.
5. PEIZO PLATE.
6. METAL ROD
7. PIC CONTROLLER
8. DIGITAL DISPLAY (7 SEGMENT)
9. KEY

3. BLOCK DIAGRAM

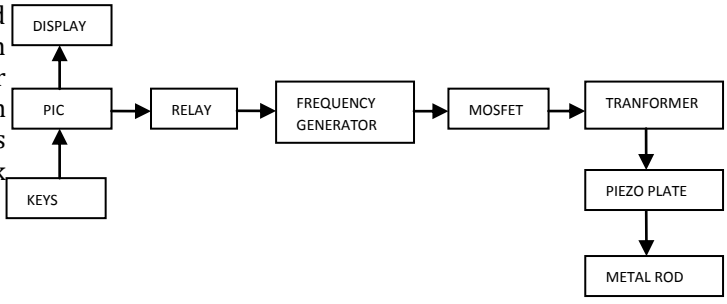


Figure -1: Block diagram of system

For the experimental setup we need to require all these possible component mentioned in the block diagram. First the frequency generator uses the LM3524 IC, which is approximately produces the frequency up to the 40 kHz. This output of the IC is given to the push pull configuration of BC547 transistor, these transistor drives the MOSFET

P55NF.The output of the MOFET is connected to the step up transformer. Step up transformer which boosted the input voltage which is given to it, therefore the output of the transformer is very high voltage and it is applied on the piezo plate. The piezo plate is type of transducer which is converted one form of energy into another. Here the high voltage input is applied into the piezo plate where due to the high voltage piezo plate produces some displacement and because of these we get the vibration. These piezo plates are placed between the specially designed metal rod. At the end of the metal rod we get the vibration.

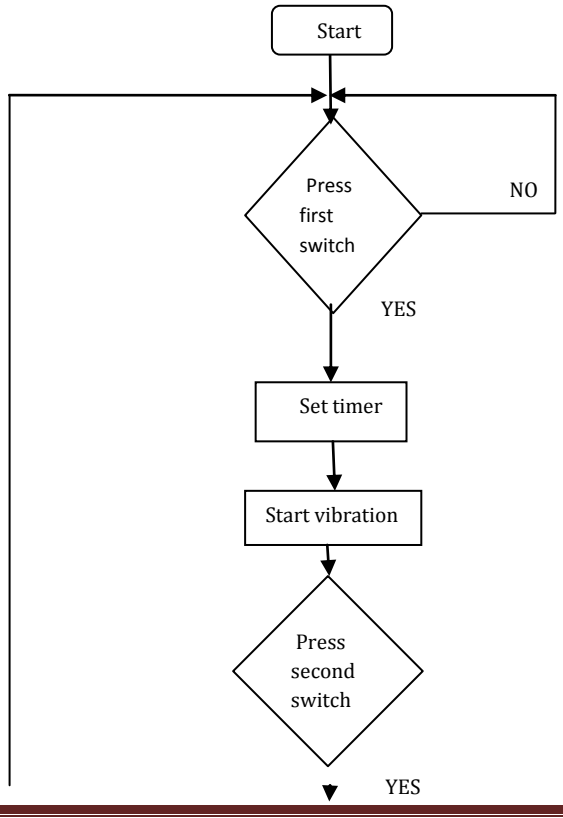
4. FREQUENCY MEASUREMENT

Table -1:

DIFFERENT FREQUENCIES FOR DIFFERENT VALUES		
VALUE FOR RT	VALUE FOR CT	FREQUENCY
RT= 1k	CT= 0.001uf	17.5 kHz
RT= 5.6k	CT= 0.01uf	30 kHz
RT= 2.7k	CT= 0.01uf	46 kHz

Here the RT and CT are the Resistor and Capacitor values which is named in the LM3524 IC pin no 6 and 7 respectively. As the table shows there are different values of Resistor and capacitor which is used to determine the various frequency values. Here using the above values we can design the various frequencies.

5. FLOW CHART



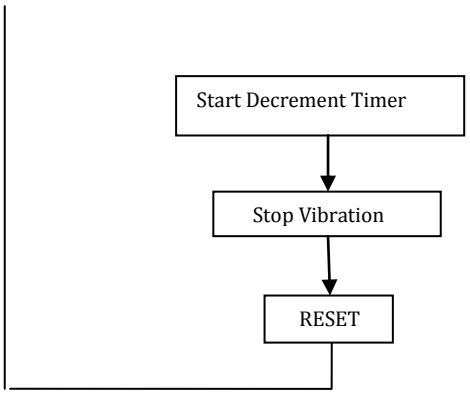
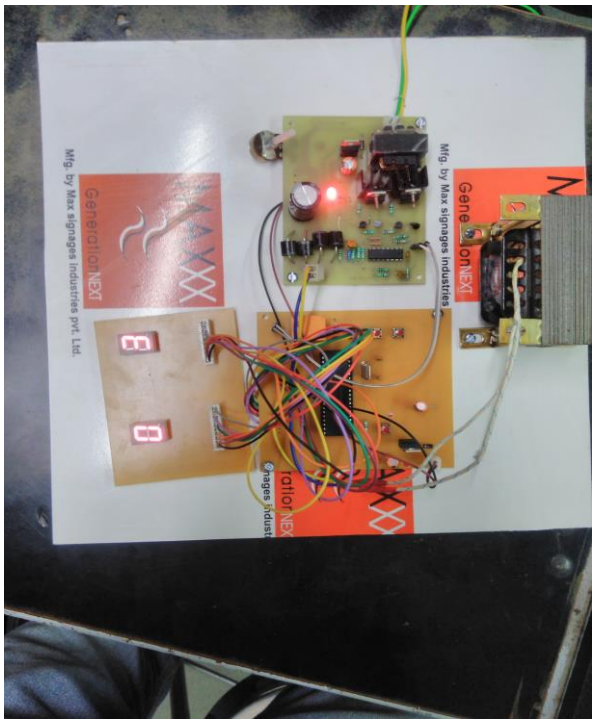


Figure -2: Flow Chart of system

Here the figure (2) is the flow chart of system where the operation of timer circuit is shown. The PIC microcontroller is used to control timer circuit. After pressing the first switch the timer gets on and provide vibration for that time period and after pressing second switch its start decrementing after reset the timer its stop its vibration.

6. SYSTEM OVERVIWE



Here in the above figure (3) the overall system is showed, In the Hardware overview the first part is generates the ultrasonic waves and in the second part it controls the vibration through the controller. To control the vibration the

software is required. In the software overview the c language code is generated to control the hardware.

7. CONCLUSION

In the many milk industries the sampling and FAT measurement process can be done by with new techniques, therefore due to these they required thin layer of milk. When the fresh milk is arrived it is thick and having bubbles, unwanted microstructure, therefore with the help of stirrer we can remove the thickness and bubbles from the milk. It is very easy and low cost technique which is widely used in the milk industries.

REFERENCES

[1]https://www.wikipedia.org/ultrasonicprocess

[2]https://www.microchip.com/pic16f877A

[3]https://www.industrial-electronics.com/home/emct_3524

[4] The Influence of Ultrasonic Stirring on the Solidification Microstructure and Mechanical Properties of A356 Alloy S.Jia,L. Nastac.

[5]D. K. Chernov, Nauka Metallakh, Moscow: Metallurgizdat, 563, 1950.

[6]G. I. Eskin, Effect of ultrasonic (cavitation) treatment of the melt on the microstructure evolution during solidification of aluminum alloy ingots, Zeitschrift fuer Metallkunde 93, 502-506, 2002

[7] T. V. Atamanenko, D. G. Eskin, L. Katgerman, Structure refinement by means of (ultrasonic) cavitation melt treatment, Aluminium Cast House Technology, 2007.

[8] J. Campbell, Effects of vibration during solidification", International Metals Reviews 26, 71-108, 1981.