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Modulating Functions Analysis For Wireless Data Transmission Because Of Advanced Sensors In Energy-Saving Process Of Washing

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1. Introduction

Peru is a young technological country, in which is developed extractive industrial activities, agriculture and fishing primordially, in spite of Inca empire achieved its own technology to keep the organization among population necessities and strategies solutions to solve tasks, such as agriculture over Andenes. In this research is analysed the problematic of the wireless physical variables measurements according to solve specific engineering task.

2. Methodology

Optimization is a methodology or mathematical procedure, in which is compared the requirement of a task with a measured or estimated variable. The best comparison is achieved, when the error tends to be null.

$$\frac{d^n}{dt^n}y(t) + \sum_{i=1}^{n} a_i \frac{d^{n-i}}{dt^{n}_{n_1}}y(t) = \sum_{i=1}^{n} b_i \frac{d^{n-i}}{dt^{n}_{n_1}}u(t) + e(t) \qquad (1)$$

$$J(\theta) = \sum_{i=0}^{} \sum_{k=0}^{} r_{ik} g_i(\theta) g_k(\theta) \qquad (2)$$

$$\frac{\partial J}{\partial \theta} = (\Upsilon - \Gamma\theta)^T W^{-1} (\Upsilon - \Gamma\theta) \qquad (3)$$

$$\theta = (\Gamma^T W^{-1} \Gamma)^{-1} \Gamma^T W^{-1} \Upsilon \qquad (4)$$

$$\alpha_{n+1}(m) = \alpha_n(m) + \mu e(m) X(m) \qquad (5)$$

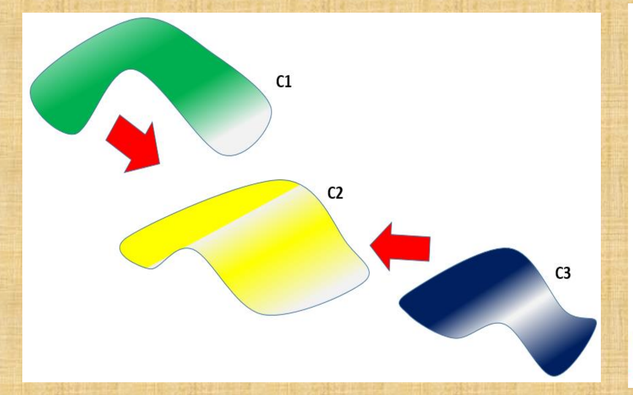

Figure 1. Optimization analysis by surfaces..

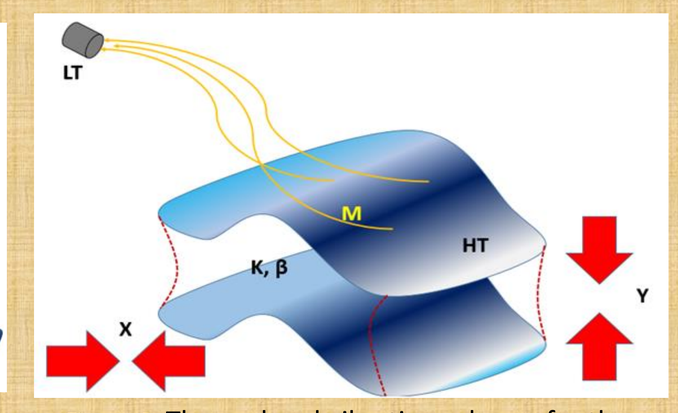

Figure 2. Thermal and vibration scheme for the theoretical modelling of the designed sensor.

$$\Theta(t) = \Theta_f\left(1 - e^{-\frac{t}{RC}}\right) \qquad (6)$$

$$\frac{T^{\circ}}{U(S)} = \frac{K_p e^{LS}}{\tau S + 1} \qquad (7)$$

$$M\left(\frac{d^2X_1}{dt^2} - \frac{d^2X_0}{dt^2}\right) = KX_0 + \beta\frac{dX_0}{dt} \qquad (8)$$

$$MS^2X_1(S) = X_0(S)\left[K + \beta S + MS^2\right] \qquad (9)$$

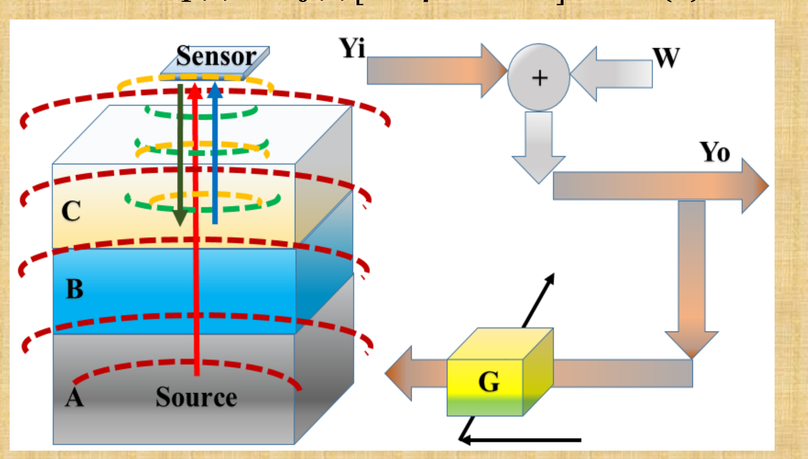

Figure 3. Fluid vibration ultrasound sensor scheme..

3. Results

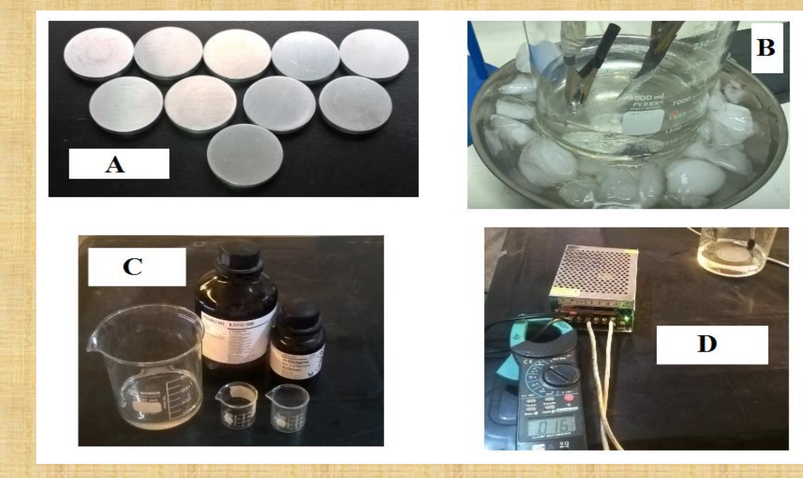

Figure 4: Setup for the transducer samples design.

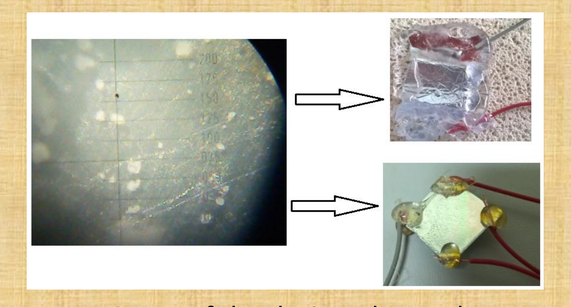

Figure 5: Setup of the designed transducer and sensor samples.

Figure 6: Ultrasound actuator.

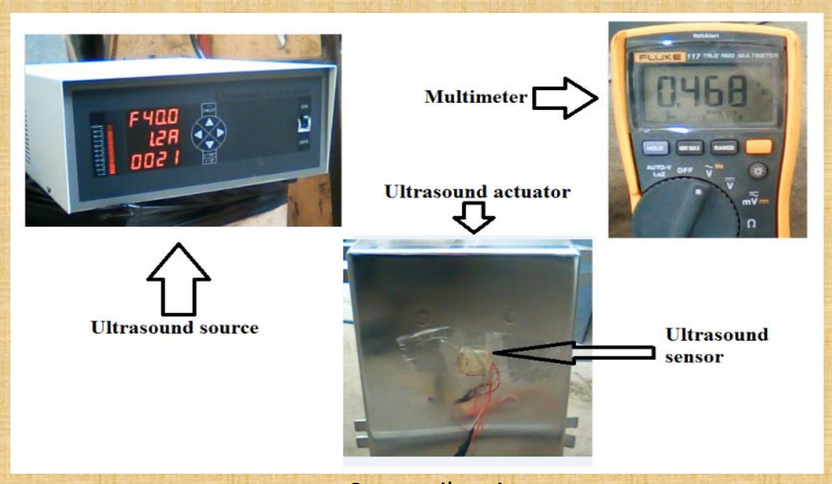

Figure 7: Setup vibration sensor.

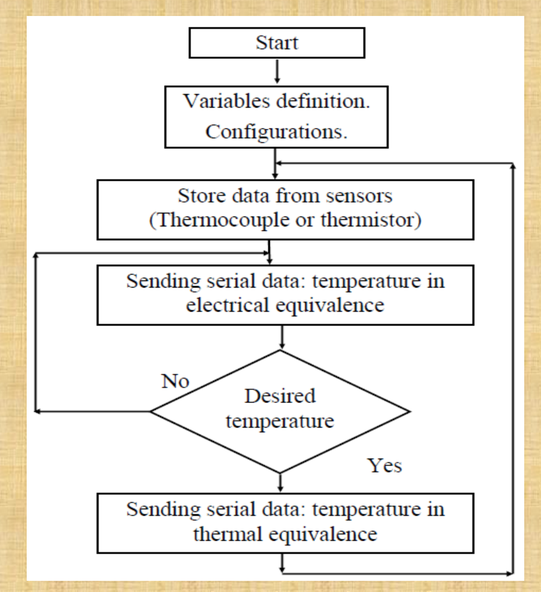

Figure 8:Algorithm scheme for the temperature transduction..

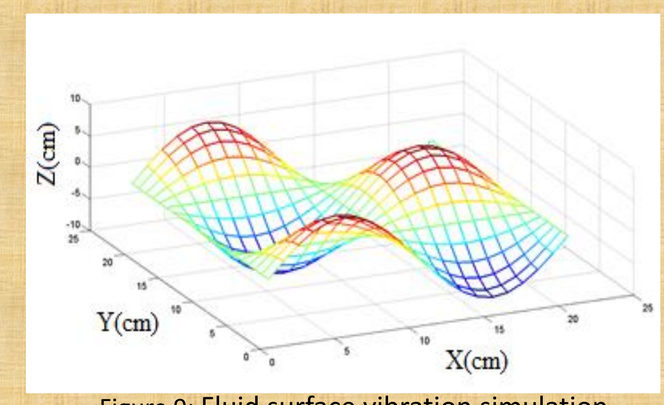

Figure 9: Fluid surface vibration simulation by the transducer designed measurement.

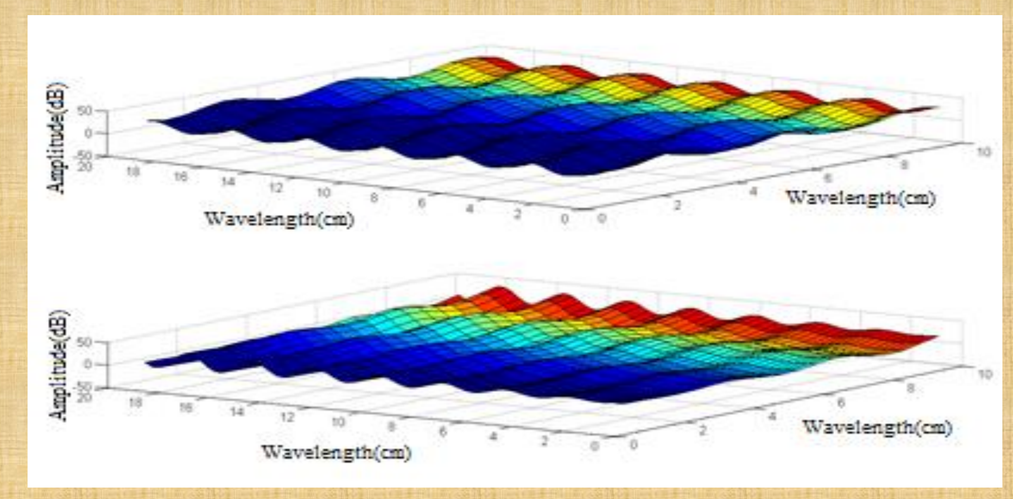

Figure 10:Fluid surface vibration by the designed transducer measurement.

4. Conclussions

It was designed an intelligent temperature/vibration sensor/transducer with the capacity to measure the temperature/vibration of liquids (fluids) in high frequency, hence, this sensor sent infrared signal and ultrasound signal over the surface of the liquid according to receive the refraction of the ultrasound signal and the absorbance of the infrared signal. Both of them received signal that helped to measure the frequency of the liquid vibration surface and to know the frequency of the vibration, moreover, the temperature of the liquid surface by infrared analysis. Therefore, keeping the right temperature measurement helps to enhance an optimal energy consumes of the ultrasound washing machine.

5. Acknoledgements

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