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Generation of electricity and heat with automatic mechanical movements

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ABSTRACT

The electrical and thermal energy is a major source in the industry, agriculture and livestock, fishing, commercial and domestic activities. In each region of the world includes the supply of this type of energy, to secure and maintain the operation of the process that are made population. Our research is to develop an automated electronic system, with which to generate electricity and heat with mechanical movements that originate from small towns and be applied in big cities, with pedestrians and cars. The automatic equipment is receiving electrical pulses with vibrations caused by people and sometimes by vehicular traffic, to convert those movements into electrical energy and heat, which is stored in batteries, and is a source of energy supply for daily life activities. Experimental tests of this electronic equipment, has been performed in two steps: (1) the first stage with the development of this type of automatic equipment and (2) the second with the accumulation of the above two types of energy, being a source of clean energy without creating pollution and climate change it to be used in any operation of our daily activities.

Keywords Electric and heat energy, climate change, electric, mechanical movements

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INTRODUCTION

The electric energy generation and heat requires natural and artificial sources with high costs. This contributes to consumer prices are high or sometimes the cost this kind of very sophisticated operations that generate these energies, and is not affordable. There are regions of the world that has no natural sources and also the economic capital necessary to have the technology to industry generating electricity and heat (Kellaris et al, 2018). The United Nations Organization (UNO) and World Health Organization (WHO), describes that each government in each country should have

equipment and systems that generate and transport electricity and heat at affordable costs for the entire population. Every year, periods of summer and winter are more extreme, by climate change. According to WHO, worldwide there are a lot zones without natural and industrial plants to generate heat and electricity factors, like water and hence, and increase the respiratory infections and stomach, originating large costs on the health of the inhabitants of each country (Wie et al, 2016). Another important factor in generating electrical energy and heat, is required in regions of certain countries, like Mexico, where the foreign investment (companies of U.S., installed in the US-Mexico border), create sources employment at a high cost for the generation of solid waste and hazardous sometimes create environmental problems and thus the already well mentioned and discussed climate change. The development of clean energy such as wind, solar, and vibrational oleic, have contributed to the care of our environment, and for this reason an electronic system based on mechanical vibrations was developed, used to several areas where people or cars moving and these movements are harnessed to generate electricity and heat build up in a device that subsequently, provide this type of energy for any activity. Our automated equipment, it is easy to develop and apply basic electronic components, that transforms small current at high energy. These energies can be transported to the operating equipment or machines you want (Hu et al, 2016).

Clean energy

The exploitation of natural resources and the use of technology for the development of this type of energy, has revolutionized the generation of electricity, heat and others energy supplies for the activities of daily living (Zhu et al, 2018). Some countries, developed or developing, have the opportunity to have a resource such as oil and geothermal areas, and it is a great benefit that supports the generation and supply of electrical energy and heat. In these countries, these resources become scarce and the question is, since it will not have adequate oil and gas derivatives and gas geothermal areas used to generate electricity and heat, what will be in the future. Elsewhere in the world do not have these fonts to generate energy and is necessary to use other natural resources (Kumar et al, 2016). There are several natural sources of supply for electricity and heat, like solar, wind and oleic, and others produced artificially, as energy by chemical reactions of active energy, or rotational movement and with the use of waste to produce methane (Yoshida et al, 2010).

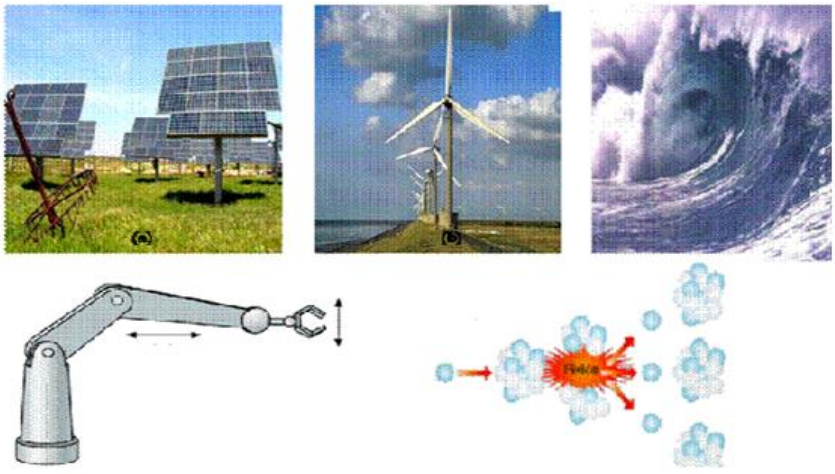

Figure 1 Efficient generators of electricity with: (a) Solar, (b) Eolic,(c) Tidal, (d) Mechanical movements and (e) Chemical reactions energies

This is the race of competition between big companies in this category, from the 1990s of last century,

today and future short, medium and long term. The generation of clean energy is critical to reduce air pollution by producing electricity and heat with resources that do not harm our environment, and thus keep our planet a better quality of life [10].

Energy generated by mechanical movements

The use of technologies that support the development of electricity and heat is a great advantage that can be used by our society. One aspect to consider is to receive low power and minimal with these types of electronic devices, electrical and mechanical, and that is why it is necessary to manufacture equipment and systems should amplify electrical signals and heat required for use (Bell, 2009). Both the electrical and heat energy are used in all functions which are involved living things (humans, animals and plants), from domestic use, transportation systems, industrial plants, agricultural, commercial and care of species. The objective of the systems that produce movement is to convert these pulsations or vibrations into electricity and heat and be accumulated in devices that provide equipment and machines used in our daily routine (Zhang et al , 2015).

Accumulators of energy

Such systems have the function to receive the electricity and heat, and stored for periods of time required to provide it to the equipment used in daily life activities (Lee et al, 2010). They consist of small or large cells that accumulate the power available from generating components and also have amplification systems heat and power, as well as control devices that provide energy in the periods required and not always in operation to avoid wastage of this (Wani et al, 2017).

MATERIALS AND METHODS

The development of automated systems that generate clean energy, has been implemented since the Second World War (used in the fields of battle, without having the necessary energy sources), with very robust systems, which have been manufactured in lower size in the last days. Electronic devices have been the most widely used, leading to complex and sophisticated devices have very small batteries can supply large capacity of energy. In our research, we developed an automatic control system, which based on the generation of vibrational motions, which are activated with actuators that generate electricity and heat. The idea came to know that even small towns and big cities, there are large clusters of pedestrians and cars passing by somewhere repeatedly and generate vibrations allowing you to enable low-current devices to thereby drive the high-rise and low electrical conductivity and heat.

System Generator for clean energy: electricity and heat

The automated equipment that controls the movement keystrokes, active actuators is simple and low cost, not passing the 100 pesos. The experimental development of the control system was made after learning that you wanted to generate electricity and heat. The following describes the system of electrical contacts by pulsation of movements (Figure 2).

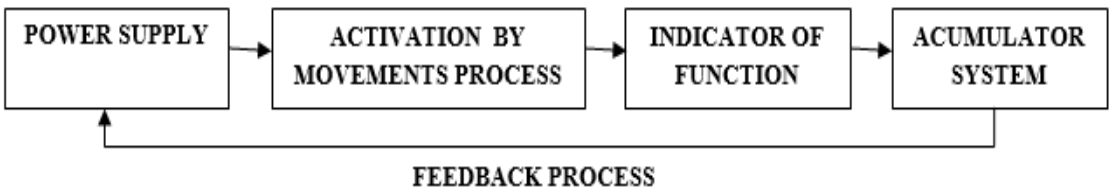

Figure 2 Generator system of electrical and heat energy

The electronic system operates with the power system (a) that can be fed back (a process that has a union of the last stage with the first, so that the electricity required by the generating device is not dependent on a connection of electrical installations in buildings). Feedback is essential to provide the necessary electrical power to act the device is activated on the basis of pulses (b) caused by movements of people or cars. The (c) is the representation that shows when the system on and off the heat and power generator and the accumulator (d) has the ability to store, amplify and provide both heat and power generator system itself, as teams that wish to operate.

RESULT AND DISCUSSION

Once developed the system for generating electricity and heat pulse movements, we proceeded to evaluate it and assess it to be implemented in a low-power operation of any of the two types of energy. The first step to evaluate this energy scale was favorable with an efficiency of 90% (the remaining 10% being to further increase energy and provide a greater efficiency). It should be noted that the team is still in experimental tests, even when in operation generating heat in a greenhouse for organic farming, producing electricity for a ventilation system and low hurdles in an institution and a house-room, in a system automated drip irrigation. The system will be further evaluated and improved in order to be valued in industrial plants and the main goal is to have the ability to quickly supply electricity and heat in summer and winter periods in areas of the country where the economic cost of consumption these energies is high, as is the case of Mexicali, Baja California. In Santa Ana, Sonora, have the same situation as the need for these energies and consumption is lower.

Tests experimental clean energy generating system.

The tests have been made to evaluate system efficiency and functionality, with favorable results, where electrical signals are available ranging from 10 to 100 millivolts and currents from 5 milliamps to 50 milliamps, depending on the strength of the movement generator pedestrian or vehicular. In addition, the rate of change in the amount of heat flowing from 1 ° C to 10 ° C, depending on the capacity of the pulses (Table 1). Based on these values are developed systems to increase accumulation and amplification signals in alternating to 24, 36 and 48 volts, up to 1 amp and raise the heat to 20 ° C and 30 ° C in 18 tests on different months of the year. A major advantage of this system is that it can be also, being cumulative electricity and heat, be activating AC equipment steadily as the vibrations generated by people and cars.

Table 1. Electric and heat capacity of clean energy generating system.

Parameters	**Clean energies generated (January to March)**					
	Test 1[a]		**Test 2 [a]**		**Test 3 [a]**	
	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)
Minimum	0.018 , 0.006	1.1	0.021, 0.010	1.9	0.027, 0.012	2.1
Maximum	0.092, 0.048	8.9	0.105, 0.051	9.2	0.109, 0.054	9.4
Average	0.089, 0.043	8.4	0.097, 0.049	8.9	0.101, 0.050	9.1
Parameters	**Clean energies generated (June to August)**					
	Test 4 [a]		**Test 5 [a]**		**Test 6 [a]**	
	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)
Minimum	0.017 , 0.007	1.9	0.022, 0.012	2.0	0.025, 0.010	2.2
Maximum	0.090, 0.049	9.0	0.108, 0.052	9.1	0.105, 0.057	9.2
Average	0.087, 0.045	8.8	0.094, 0.047	8.7	0.099, 0.051	9.0
Parameters	**Clean energies generated (October to December)**					
	Test 7 [a]		**Test 8 [a]**		**Test 9 [a]**	

	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)
Minimum	0.022 , 0.009	1.6	0.020, 0.009	1.7	0.024, 0.010	1.9
Maximum	0.090, 0.050	9.1	0.101, 0.048	8.7	0.101, 0.052	9.1
Average	0.088, 0.042	8.9	0.095, 0.046	8.4	0.097, 0.050	8.8
Parameters	**Clean energies generated (January to March)**					
	Test 1 [b]		**Test 2 [b]**		**Test 3 [b]**	
	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)
Minimum	0.025 , 0.013	2.7	0.020, 0.011	2.2	0.024, 0.013	2.0
Maximum	0.099, 0.054	9.5	0.107, 0.050	8.9	0.110, 0.051	9.2
Average	0.094, 0.048	9.3	0.099, 0.048	8.5	0.102, 0.053	8.9
Parameters	**Clean energies generated (June to August)**					
	Test 4 [b]		**Test 5 [b]**		**Test 6 [b]**	
	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)
Minimum	0.020 , 0.008	1.8	0.023, 0.012	1.9	0.021, 0.011	2.2
Maximum	0.095, 0.049	9.3	0.108, 0.055	9.3	0.103, 0.049	9.6
Average	0.091, 0.046	8.9	0.101, 0.050	9.0	0.100, 0.047	9.2
Parameters	**Clean energies generated (October to December)**					
	Test 7 [b]		**Test 8 [b]**		**Test 9 [b]**	
	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)	Electrical (V, A)	Calorific (°C)
Minimum	0.018 , 0.005	1.1	0.020, 0.009	1.2	0.019, 0.010	1.4
Maximum	0.087, 0.043	8.7	0.097, 0.050	8.9	0.098, 0.047	9.2
Average	0.089, 0.041	8.5	0.094, 0.046	8.7	0.096, 0.044	9.0

*The analysis was conducted based on 25 observations in each experimental trial in 24 hours at different times of the year by months, where she had a greater flow of pedestrians and vehicles by commercial sites evaluated in each city, being in each test with the system improved in Santa Ana, Sonora[a] to and Mexicali, Baja California[b].

The analysis of system operation was made in different seasons, and in periods of three months, indicating that in the months of June to August, has an older generation because the temperature of the environment contributes to the production and accumulation of energy electric heat. In the months from October to December is less than the generation. In summer as in winter the two types of energy are needed. At each observation and testing the system was improved, capturing a greater amount of movement and thus m greater generation of electricity and heat. In addition, electronic components for exchanging know which one is more efficient for both generation and storage and supply of energy.

CONCLUSION

The generation of clean energy, is considered a technological innovation from the previous century, when from the time of 1990, could the use of solar energy, waste, wind and oleic acid. With this type of technological developments, advances in production and supply of electricity and heat, has revolutionized the way we use natural resources and manufacturing small devices based on vibrations can produce electricity and heat. This research is in progress, is part of the use of an energy that has

been taken into account for over 20 years for developed countries and has entered the developing countries in the last ten years ago. Equipment must operate with low energy consumption, agriculture, education and domestic and want to improve the control device for application in industrial plants and is a savings in power consumption and heat, especially in high-cost areas and periods of extreme cold and heat.

REFERENCE

[1] Bell, L. (2008). Cooling, heating, generating power, and recovering waste heat with thermoelectric systems, Science Journal, Vol. 3, No. 1, pp 57–69.

[2] Hu, Y., Li, Z., Lan, T., Chen, W. (2016). Photoactuators for direct optical-to-mechanical energy conversion: from nanocomponent assembly to macroscopic deformation, Advanced Mater Journal, Vol. 28, No. 6, pp 87- 99.

[3] Kumar, K., Knie C., Bieger D., Peletier M., Friedrich H., Hecht S., Broer D., Debije M., Schenning A. (2016). A chaotic self-oscillating sunlight-driven polymer actuator, Nature Community Journal, Vol. 7, No. 1, pp 19-25.

[4] Kellaris, N., Gopaluni V., Smith, G., Mitchell, S., Keplinger, (2018). C. Peano-HASEL actuators: muscle-mimetic, electrohydraulic transducers that linearly contract on activation, Science Robotic Journal, Vol. 3, No. 1, pp 19-29.

[5] Lee, H., Xia, C., Fang, N. (2010). First jump of microgel; actuation speed enhancement by elastic instability, Software Matter Journal, Vol. 6, 1, pp 43-54.

[6] Wani, O. M., Zeng, H., Priimagi. (2017). A. A light-driven artificial flytrap, Nature Community Journal, Vol. 8, No. 1, pp. 46-61.

[7] Wie, J., Shankar, M., White, T. (2016). Photomotility of polymers. Nature Community Journal, Vol. 7, No. 3, pp. 52-64.

[8] Yoshida, H., Tagashira, K., Kumagai, T., Fujii, A., Ozaki, M. (2010). Alignment-to-polarization projection in dye-doped nematic liquid crystal microlasers, Optical Express, Vol. 18, , No. 4, pp 33-48.

[9] Zhang, F., Liu, J., Yang, W., Logan, B. (2015). A thermally regenerative ammonia-based battery for efficient harvesting of low-grade thermal energy as electrical power. Energy Environmental Science Journal, Vol. 8, No. 1, pp 343–349.

[10] Zhu, L., Gao, M., Peh, C., Wang, X., Ho, G. (2018). Self-contained monolithic carbon sponges for solar-driven interfacial water evaporation distillation and electricity generation, Advance Energy Mater, Vol. 8, No. 2, pp. 74-86.