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Mechanically Induced-Sound Approach to Producing Alternative Electricity

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Abstract
Alternative electricity generation was birthed by a need to make clean energy available. It is characterized by diverse systems and components that undertake the task of producing electricity from renewable sources. These energy resources are engaged to yield electrical power with zero carbon emissions. Some of these resources include: geothermal heat, solar radiation, tidal flow among others. This project intends to develop a means for alternative electricity generation using sound generated through mechanical agitation as source; with a view to providing affordable energy for domestic application. For this to be made possible, Sound has to be deemed fit for adoption into the trail of existing renewable energy resources by vetting its compliance to established standards like: the nature of existing resources, components/systems of alternative electricity generation. The feasibility of deriving alternative electricity for domestic use from sound has to be ascertained. Furthermore, benefits and measures in optimizing the whole process have to be evaluated, before a basis for developing a system that can produce electricity from sound can be actualized. The research methodology of this work centered the design on survey research and laboratory testing (simulation). Survey questionnaires were distributed to necessitate feedback from professionals in the various fields (building construction, electricity/power, sound) and users of alternative electricity. A prototype was also developed and tested to validate the assertion about sound being able yield substantial amount of electrical energy.
Key Words: Mechanic, Alternative, Sound, Piezzo-electricity, Building

1.1 Introduction
Electricity- known essentially as the presence and flow of electric charge is one of the basic forms of energy. As elementary as it may sound, it is indeed one of the most fascinating contributions science has offered to humanity. Utility value of electricity remains on the rise day by day. Sound defines the physical phenomenon that occurs when vibration propagates as an audible wave of pressure via a transmission medium. According to (Roby,Davigny, Francois, Henneton, Sprooten, 2012) and Barnhart, Dale, Brandt, Benson 2013), the sound energy is another form of energy domiciled in our planet (Earth); though relatively low when compared to other forms of energy, it has the capacity to stimulate the sense of hearing. In humans, the frequency limits for audibility of sound waves lie within 40Hz and 35,000 Hz. Sound outputs frequencies below 35Hz is being refered to as infrasonic sound and those greater than 20, 0000 Hz are known as ultrasonic. Alternative energy sources are fast becoming the preferred choice for electricity generation among developed and developing countries around the world (Roby,Davigny, Francois, Henneton, Sprooten, 2012) and Barnhart, Dale, Brandt, Benson 2013). Irrespective of its seemingly insignificant upturn, alternative energy production is projected to constitute most or all of the world's energy production in 50 years. (International Energy Agency (IEA), World Energy Outlook 2011, Farnell 2010 and Arnau 2008).

1.1.1 Statement of Research Problem

Alternative energy sources have therefore turned out to be humanity's safest option for electricity generation. Solar and wind energy seem to assume the lead role in this trail of renewable energy applications, as they provide electricity with zero carbon emissions. While the cost and efficiency of harnessing these clean energy sources remain constantly improving, utilizing them poses the risk of being problematical at high levels for one very specific reason- the supply does not match up with the demand. Hence, the need for research either on ways to optimize existing technology or to discover alternative but much more efficient renewable energy sources for our built environment. Sound, known to be a physical phenomenon that stimulates the sense of hearing, remains an inherent characteristic in earth's biosphere. Practically every process in nature has a way of featuring this unique form of energy. This peculiar attribute of energy can be utilized to birth an unusual kind of clean energy from sound. In order to make this possible, the potency of sound as an energy source to be leveraged upon needs to be investigated. In this study, the focus will be on developing a system that can maximize sound input to yield adequate electricity for domestic use.

1.2 Research Questions

There is a need to articulate research questions for the purpose of this research work, the questions are as follows:

i)What is the nature of existing Alternative Energy forms?
ii) What are the components and systems of Alternative Electricity Generation? iii) How feasible is it to generate Alternative Electricity for domestic use from Sound?
iv) What are the benefits of capitalizing on Sound as an energy source for Alternative Electricity Generation?
v) What measures can be implored to optimize the adoption of Sound for Alternative Electricity Generation on a Domestic scale?

1.3 Research Aim and Objectives

The aim of this study is to develop a means for Alternative Electricity Generation using Sound as Source agitated mechanically, with a view to providing affordable energy for Domestic Application. As a follow up to the questions originally asked, the following objectives are set:

i. To appraise the nature of existing forms of Alternative Energy; ii. To identify components and systems of Alternative Electricity Generation; iii. To ascertain the feasibility of deriving Alternative Electricity for Domestic use from Sound; iv. To evaluate benefits and identify measures in optimizing the adoption of Sound for Alternative Electricity Generation on a Domestic scale;
v. To establish a basis for developing an Alternative Electricity Generation (AEG) system from Sound.

2.1 Methodology

The research methodology of this work centered the design on survey research and laboratory testing (simulation). Survey questionnaires were distributed to necessitate feedback from professionals in the various fields (building construction, electricity/power, sound) and users of alternative electricity. A prototype was also developed and tested to validate the assertion about sound being able yield substantial amount of electrical energy.

3.0 Analysis of Results

3.1 Gender Responsiveness

The gender distribution of the respondents that took part in the survey is illustrated in Table 2. Out of the 40 respondents, 36 (90%) are males while 4 (10%) are females. From available statistics; it is clear that the males are the majority.

Table 1: Respondents' Gender Responsiveness

S/N	Gender	Number of Respondents	Percentage (%)
1	Male	32	78.05
2	Female	9	21.95
	Total	41	100

Source: Field Survey (2018)

3.2 Questionnaire Data Breakdown and Results

In order to obtain workable inferences, questionnaires were distributed for the purpose of a comprehensive statistical study. A pilot survey was carried out first with five (5) research questionnaires. Subsequently, thirty five (32) data collection 41 instrument(questionnaire) were distributed; All questionnaires were returned, vetted and deemed fit for analysis. These valid responses gotten were typified as statistical data, presented in descriptive representations (tables, diagrams, charts) and are shown below (Abu-Rub, Malinowski, and Al-Hadad, 2014) and Akinsola 2016, Alankrit, Vivek, Vivek 2014).

3.3 Respondents' Knowledge of Alternative Electricity

In order to determine the respondents' knowledge of Alternative Electricity, this section of the questionnaires had been placed on a scale of 1-5, where 1= Highly Adequate, 2= Sufficient, 3= Average, 4= Insufficient and 5= None. The data retrieved and collated showed that out of 40 respondents, 6 respondents (15%) have highly adequate knowledge of the subject, 10 respondents (25%) have sufficient knowledge, 19 respondents (47.5%) have average knowledge and 5 respondents (12.5%) have insufficient knowledge about Alternative Electricity Generation. It is also worthy of note that none of the respondents have no knowledge of the subject matter. Figure 5 illustrates how well the respondents know the AEG.

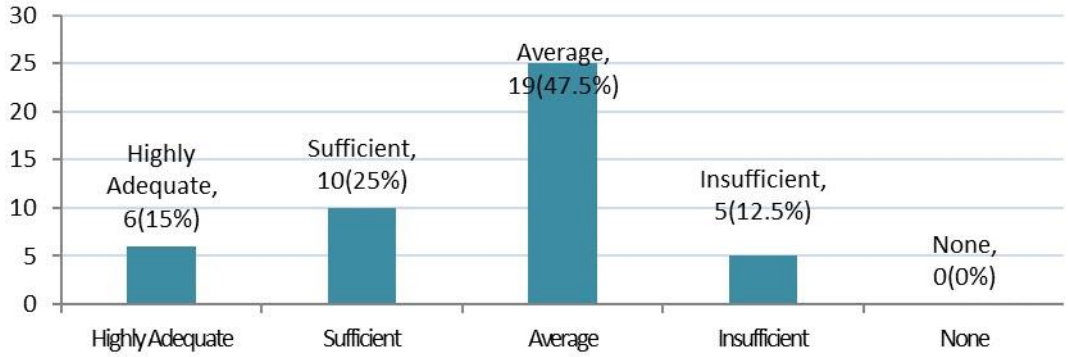

Figure 1: Respondents' Knowledge of Alternative Electricity Generation Source: Field Survey (2018).

3.4 Understanding of Alternative Energy Forms

The evaluation of the participants' conversance with the various forms of alternative energy was based on their level of knowledge, awareness and technical experience. The details of this evaluation are shown in Table 3. This section of the questionnaires had been placed on a scale of 1to 5.

Table 2 Alternative Energy Forms

Batteries and Supercapacitors

	Frequency	Percentage (%)
Very Low	1	2.5
Low	5	12.5
Average	10	25.0
High	12	30.0
Very High	12	30.0
Total	40	100.0

Converters and Inverters

	Frequency	Percentage (%)
Very Low	0	0
Low	2	5.0
Average	7	17.5
High	13	32.5
Very High	18	45.0
Total	40	100.0

Table 3 Respondents' Understanding of Alternative Energy Forms

Solar induced Energy

	Frequency	Percentage (%)
Very Low	0	0
Low	2	5.0
Average	6	15.0
High	16	43.2
Very High	13	35.0
Total	37	100.2

Wind related Energy

	Frequency	Percentage (%)
Very Low	4	10.0
Low	7	17.5
Average	11	30.0
High	10	25.0
Very High	8	17.5
Total	40	100.0

Geothermal Energy

	Freq	Percent (%)
Very Low	7	17.5
Low	12	30.0
Average	14	35.0
High	5	12.5
Very High	2	5.0
Total	40	100.0

Bioenergy *Hydro Energy*

Energy
Energy

	Frequency	Percentage (%)
Very Low	11	27.5
Low	14	35.0
Average	9	27.5
High	5	12.5
Very High	1	2.5
Total	40	100.0

	Frequency	Percentage (%)
Very Low	0	0
Low	2	5.0
Average	4	10.0
High	11	27.5
Very High	23	5750
Total	40	100.0

Hydrogen
Ocean

	Frequency	Percentage (%)
Very Low	14	35.0
Low	8	20.0
Average	7	17.5
High	5	22.5
Very High	4	10.0
Total	40	100.0

	Frequency	Percentage (%)
Very Low	16	40.0
Low	9	22.5
Average	7	17.5
High	7	17.5
Very High	1	2.5
Total	40	100.0

3.5 Understanding of Alternative Energy Components / Systems

The evaluation of the participants' familiarity with various components and systems of alternative energy was based on their level of knowledge, awareness and technical experience. Details of this evaluation are shown in Table 4 below

Table 4: Respondents' Understanding of Alternative Energy Components and Systems

Photovoltaic (PV) Panels

	Frequency	Percentage (%)
Very Low	12	30
Low	2	5.0
Average	9	22.5
High	12	3.0
Very High	5	12.5
Total	40	100.0

Wind Turbines

	Frequency	Percentage (%)
Very Low	4	10.0
Low	5	12.5
Average	14	35.0
High	9	22.5
Very High	8	20.0
Total	40	100.0

Transformers

	Frequency	Percentage (%)
Very Low	1	2.5
Low	3	7.5
Average	4	10.0
High	8	20.0
Very High	24	60.0
Total	40	100.0

Microgrids

	Frequency	Percentage (%)
Very Low	9	22.5
Low	7	17.5
Average	11	27.5
High	6	15.0
Very High	7	17.5
Total	40	100.0

3.6 Respondents' Knowledge of Sound / Sound Energy

In order to determine the respondents' knowledge of Sound and Sound Energy, this section of the questionnaires had been placed on a scale of 1-5, where 1= Highly Adequate, 2= Sufficient, 3= Average, 4= Insufficient and 5= None. The data retrieved and collated showed that out of 40 respondents, 5 respondents (12.5%) have highly adequate knowledge of the subject, 9 respondents (22.5%) have sufficient knowledge, 15 respondents (37.5%) have average knowledge, 9 respondents

(22.5%) have insufficient knowledge and 2 respondents (5.0%) have no knowledge about Alternative Electricity Generation as shown in Figure 6.

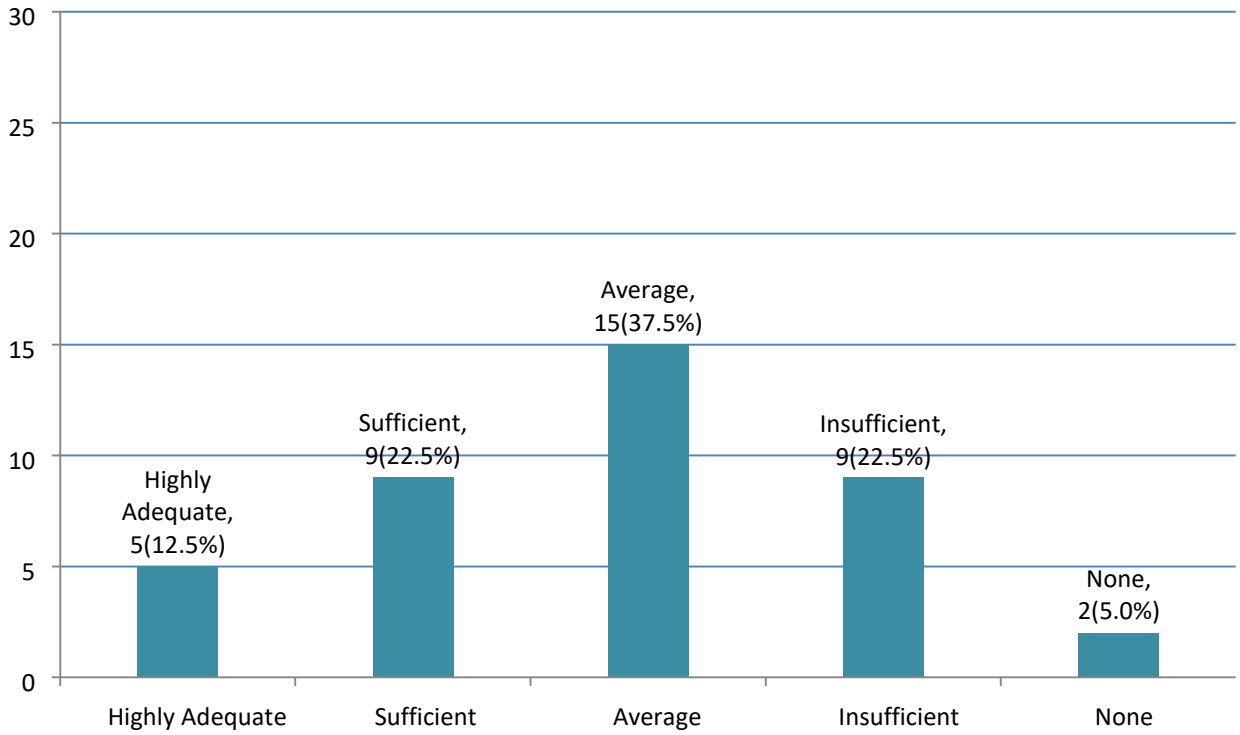

Figure 2: Respondents' Knowledge of Sound and Sound Energy

Source: Field Survey (2018)

3.7 Characteristics Influencing The Adoption Of Sound

In order to ascertain if Sound can be an energy source from which Alternative Electricity can be derived, certain characteristics of Sound have to be put into consideration. The questionnaire captured the respondents' opinion on how feasible these stated characteristics of Sound could be instrumental; especially towards establishing it as a viable energy source to be leveraged on for Alternative Electricity. This section of the questionnaires had been placed on a scale of 1-5, Details of this evaluation are shown in Table 5.

Table 5: Evaluation of Characteristics that Influences the Adoption of Sound

Intensity (Amplitude)

	Frequency	Percentage (%)
Very Low	4	1.0
Low	9	22.5
Average	14	35.0
High	7	17.5
Very High	10	25.0
Total	40	100.0

Pitch (Frequency)

	Frequency	Percentage (%)
Very Low	4	10.0
Low	9	22.5
Average	12	30.0
High	9	22.5
Very High	6	15.0
Total	40	100.0

Wavelength

	Frequency	Percentage (%)
Very Low	3	7.5
Low	11	27.5
Average	14	35.0
High	6	15.0
Very High	6	15.0
Total	40	100.0

Duration (Time-period)

	Frequency	Percentage (%)
Very Low	3	7.50
Low	11	27.5
Average	12	30.0
High	9	22.5
Very High	5	12.5
Total	40	100.0

Velocity (Speed)

	Frequency	Percentage (%)
Very Low	2	5.0
Low	4	10.0
Average	14	35.0
High	11	27.5
Very High	9	22.5
Total	40	100.0

Quality (Timbre)

	Frequency	Percentage (%)
Very Low	5	12.5
Low	12	30.0
Average	12	30.0
High	6	15.0
Very High	5	12.5
Total	40	100.0

Direction

	Frequency	Percentage (%)
Very Low	4	10.0
Low	7	17.5
Average	14	35.0
High	7	17.5
Very High	8	20.0
Total	40	100.0

Source: Field Survey (2018)

3.8 Benefits Of Adopting Sound

Stated in the questionnaire, were benefits of adopting Sound as an energy source for Alternative Electricity Generation. This section of the questionnaires had been placed on a scale of 1-5, where 1= Insignificant, 2= Unexceptional, 3= Ordinary, 4= Significant and 5= Exceptional.

The details of this evaluation are shown in Table 6.

Table 6: Assessment of Benefits of Adopting Sound

Abundantly available

	Frequency	Percentage (%)
Insignificant	6	15.0
Unexceptional	4	10.0
Ordinary	10	25.0
Significant	10	25.0
Exceptional	10	25.0
Total	40	100.0

High Reliability Index

	Frequency	Percentage (%)
Insignificant	4	10.0
Unexceptional	5	12.5
Ordinary	14	35.0
Significant	13	32.5
Exceptional	4	10.0
Total	40	100.0

Low Operational / Maintenance costs

	Frequency	Percentage (%)
Insignificant	6	15.0
Unexceptional	4	10.0
Ordinary	8	20.0
Significant	15	37.5
Exceptional	7	17.5
Total	40	100.0

High Flexibility Quotient

	Frequency	Percentage (%)
Insignificant	9	22.5
Unexceptional	4	10.0
Ordinary	14	35.0
Significant	11	27.5
Exceptional	2	5.0 100.0
Total	40	

Space-efficiency

	Freq	Percent(%)
Insignificant	5	12.5
Unexceptional	5	12.5
Ordinary	6	15.0
Significant	14	35.0
Exceptional	9	22.5
Total	39	100.0

Relatively Non-hazardous

	Frequency	Percentage (%)
Insignificant	7	17.5
Unexceptional	7	17.5
Ordinary	7	17.5
Significant	9	22.5
Exceptional	10	25.0
Total	40	100.0

Source: Field Survey (2018)

3.9 Appropriating Sound As A Source Of Alternative Electricity

In order to find out if there actually is a need to appropriate Sound as an Alternative Electricity source to be leveraged on, this section of the questionnaire was designed to capture the opinion of the respondents on the subject matter. Figure 7 shows their responses to this question. Out of 40 respondents, 15 respondents (37.5%) agreed to the motion that there is indeed a need to appropriate Sound as a source of Alternative Electricity, 8 respondents (20.0%) disagreed with the motion, 17 respondents (42.5%) were not sure.

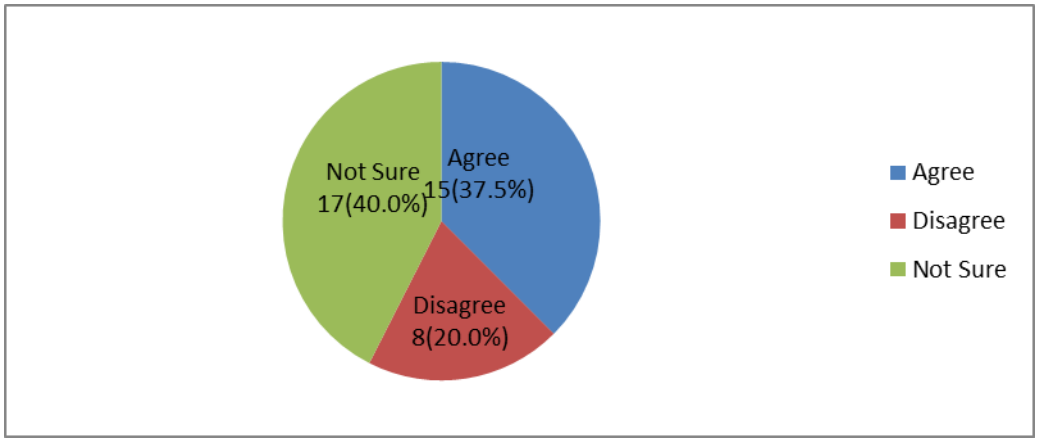

Figure 4: Respondents' Opinion on Appropriating Sound as an Alternative Electricity Source

Source: Field Survey (2018)

4.1 Optimizing The Adoption Of Sound For Alternative Electricity Generation On A Domestic Scale For Sound to be fully adopted for Alternative Electricity Generation especially on a Domestic scale; certain measures have to be implored to optimize this process. This section of the questionnaire captured the respondents' opinion on how significant these measures would be towards achieving its objective. The details of this evaluation are shown in Table 7. The scale of evaluation was 1-5, where 1= Not Significant, 2= Of little Significance, 3= Neutral, 4= Significant and 5= Very Significant.

Table 7: Assessment of Measures for Optimizing Adoption of Domestic AEG from Sound

Enhanced research explorations into this untapped potential of Sound

	Very Significant	Significant	Neutral	Of little Significance	Not Significant	Total
Frequency	15	11	7	5	2	40
Percentage (%)	37.5	27.5	17.5	12.5	5	100
Review of Stand ard Code to acknowledge S ound as a renewable sour ce fit for AEG						
	Very Significant	Significant	Neutral	Of little Significance	Not Significant	Total
Frequency	8	10	15	5	2	40
Percentage (%)	20	25	37.5	12.5	5	100
Adding Sound to the AEG cou rses taught in institutions of higher learning						
	Very Significant	Significant	Neutral	Of little Significance	Not Significant	Total
Frequency	14	10	8	5	3	40
Percentage (%)	35	25	20	12.5	7.5	100
Manufacturing o f systems that can effectivel y convert Sound to Electricity for Domestic Application						
	Very Significant	Significant	Neutral	Of little Significance	Not Significant	Total
Frequency	14	9	10	5	2	40
Percentage (%)	35	22.5	25	12.5	5	100
Creating public a wareness on the need/benefits of adopting Sound for Alternative E lectricity						
	Very Significant	Significant	Neutral	Of little Significance	Not Significant	Total
Frequency	15	9	8	5	3	40
Percentage (%)	37.5	22.5	20	12.5	7.5	100

Source: Field Survey (2018)

4.4.9 Efficiency Of A Domestic Alternative Electricity Generation system From Sound

For a system or systems that would effectively generate alternative electricity from the energy in sound for domestic applications; the value(s) of efficiency would vary due to several factors. The respondents were given a platform to state their projections as to what range the efficiency of the said system would fall. These projected values are stated in Table 8 below.

Table 8: Respondents' Rating of Efficiency of a Domestic AEG System from Sound

Efficiency	Frequency	Percentage (%)

0	2	5.0
1%-10%	2	5.0
11%-20%	3	7.5
21%-30%	3	7.5
31%-40%	10	25.0
41%-50%	6	15.0
51%-60%	2	5.0
61%-70%	4	10.0
71%-80%	4	10.0
81%-90%	1	2.5
91%-100%	3	7.5
Total	40	100.0

Source: Field Survey (2018) 4.2

Statistical Analysis and Ranking

Statistical analysis cuts across gathering, examining, summarizing, handling, and interpreting quantitative information to find its fundamental causes, examples, connections, and patterns. A ranking depicts a connection between an arrangement of things with the end goal that, for any two things, the first is either 'positioned higher than', 'positioned lower than' or 'positioned equivalent to' the second. It isn't really a definite sequence of items since two unique articles can have the same rank; if this happens, it is viewed as a tie. By decreasing point by point measures to a grouping of ordinal numbers, rankings make it possible to assess complex data based on certain criteria. The IBM SPSS Statistics data analytics tool was used to derive the descriptive mean statistical analysis and ranking for the research study. The mean was determined for each cluster of features appearing in the questionnaire distributed based on response set variables ranging from "1, 2, 3, 4 and 5".

Table 9: Respondents' Statistical Analysis and Ranking for AEG forms

AEG Forms	Frequency (N)	Mean	RAI	Ranking
Hydrogen Energy	40	2.20	0.44	1st
Bioenergy	40	2.33	0.47	2nd
Ocean Energy	40	2.55	0.51	3rd
Geothermal Energy	40	2.58	0.52	4th

Wind Energy	40	3.23	0.65	5th
Solar Energy	40	4.10	0.82	6th
Hydropower	40	4.30	0.86	7th

Source: Field Survey (2018)

The table above has it that among all the AEG forms listed, Hydrogen Energy has the least RAI value with 0.44, while Hydropower has the highest with 0.86.

Table 11: Respondents' Statistical Analysis and Ranking for Sound Energy Characteristics

Characteristics	Frequency	Mean	RAI	Ranking
Intensity (Amplitude)	40	3.38	0.68	6th
Pitch (Frequency)	40	3.10	0.62	3rd
Wavelength	40	3.03	0.61	2nd
Duration (Time-period)	40	3.13	0.63	4th
Velocity (Speed)	40	3.53	0.71	7th
Quality (Timbre)	40	2.85	0.57	1st
Direction	40	3.20	0.64	5th

Source: Field Survey (2018)

The table above has it that among all the Sound Energy Characteristics listed; Quality (Timbre) has the least RAI value with 0.57, while Velocity (Speed) has the highest with 0.71.

Table 12: Respondents' Statistical Analysis and Ranking for Sound Adoption Benefits

Benefits	Frequency	Mean	RAI	Ranking
Abundantly available	40	3.35	0.67	4th
High Reliability Index	40	3.20	0.64	2nd

Low Operational and Maintenance costs	40	3.33	0.67	4th
High Flexibility Quotient	40	2.88	0.58	1st
Space-efficiency	40	3.48	0.70	6th
Relatively Non-hazardous	40	3.20	0.64	2nd

Source: Field Survey (2018

The table above has it that among all the Sound Adoption Benefits listed; High Flexibility Quotient has the least RAI value with 0.58, while Space-efficiency has the highest with 0.70

Table 13: Respondents' Statistical Analysis and Ranking for Sound Adoption Measures

Parameters	N	Mean	RAI	Ranking
Enhanced research explorations into this untapped potential of Sound	40	3.80	0.76	5th
Review of Standard Code to acknowledge Sound as a renewable source fit for AEG	40	3.43	0.69	1st
Adding Sound to the AEG courses taught in institutions of higher learning	40	3.68	0.74	2nd
Manufacturing of systems that can effectively convert Sound to Electricity for Domestic Application	40	3.70	0.74	2nd
Creating public awareness on the need/benefits of adopting Sound for Alternative Electricity	40	3.70	0.74	2nd

Source: Field Survey (2018)

The table above has it that among all the Sound Adoption Measures listed; Review of Standard Code to acknowledge Sound as a renewable source fit for AEG has the least RAI value with 0.69, while

Enhanced research explorations into this untapped potential of Sound has the highest with 0.76 (DOE, 2011, Hostick, Belzer. Hadley, Markel, Marnay, Kintner-Meyer, 2014).

4.3 Alternative AEG Prototype

This study, having ascertained the dynamics of adopting Sound as a workable source to generate Alternative Electricity from; an alternative prototype was developed to simulate this conversion process. Its sole aim is to meet the fifth and most crucial objective of this research- to establish a basis for developing an Alternative Electricity Generation (AEG) system from Sound (Aelenei, Musall, Cubi, Ayoub, Belleri, 2013). Primarily, this prototype was built to certify possible opportunities that lie in deriving Electricity from Sound; especially in the built environment. The prototype comprises of several functional units within an enclosure as illustrated in Figure 8.

Source: Researcher's Prototype Design (2018)

Source: Researcher's Prototype Design (2018)

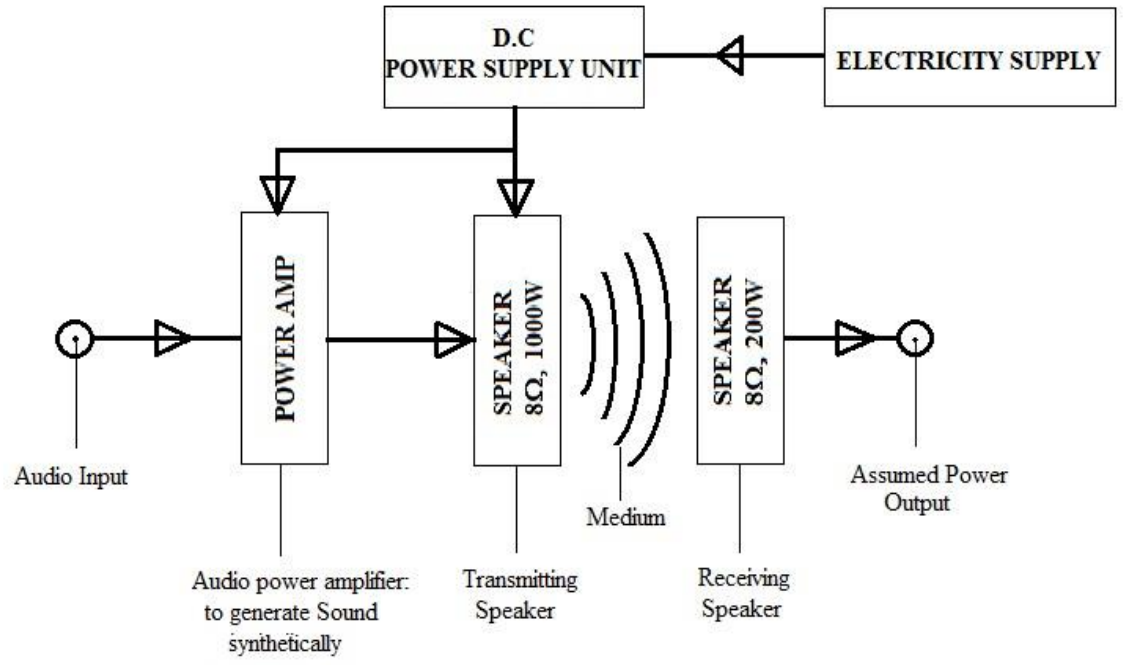

Figure 5: Block Diagram illustrating Prototype's Working Principle

Source: Researcher's Prototype Design (2018)

4.4 Prototype Testing

In order to ascertain the possibility of converting a synthetic sound input to an assumed output-electric charge, it became pertinent to experiment. A working prototype was developed within the course of the research study and underwent a laboratory simulation. The results of this experiment are outlined in Table 14.

Table 14: Results of Prototype Laboratory Simulation

Sound Level (%)	Sound Intensity (dB)	Resulting Voltage (mV)
100	126.3	15
80	123.9	7
60	122.1	4
40	94.6	0.8
20	50.4	0
0	22.8	0

Source: Field Survey (2018)

5.1 Discussion

The study identified some processes by which the adoption of Sound to generate Alternative Electricity for Domestic Applications could be made possible; bearing in mind Physical, Ecological and Technological factors. The aim of this study was stated as developing a means for Alternative Electricity Generation using Sound as Source with a view to providing affordable energy for Domestic Application; and the objectives were: to appraise the nature of existing forms of Alternative Energy, to identify components and systems of Alternative Electricity Generation, to ascertain the feasibility of deriving Alternative Electricity for Domestic use from Sound, to evaluate benefits and identify measures in optimizing the adoption of Sound for Alternative Electricity Generation on a Domestic scale and to establish a basis for developing an Alternative Electricity Generation (AEG) system from Sound

5.2 Conclusions

Considering all the elements that constitute the objectives of this research study, the project; using the outcomes of various analyses, testing and observations reached the following conclusions:

i. Existing forms of Alternative Energy share one thing in common- they are nature-bound; ii. The working principles of a component or system of Alternative Electricity Generation can only take after the characteristic(s) of its source;
iii. The amount of single sources of constant sound in nature is very negligible;
iv. The homogeneity of Sound to other Alternative Energy resources is that it is relatively abundant in nature;
v. It is feasible to derive Alternative Electricity from Sound, but making it available for Domestic Application is the most challenging part; vi. Harnessing Sound for Alternative Electricity is an environmentally friendly and a completely non-hazardous process;
vii. Measures such as improved research and manufacturing can be adopted to ensure that Alternative Electricity from Sound becomes affordable energy for Domestic Application.
viii. Sound has the potential to yield substantial amount of electricity for Domestic Application, if the right mechanism is implored.
ix. Developing a system that can efficiently translate Sound to Electricity is achievable;
x. Alternative Electricity Generation for Domestic Application using Sound as Source is attainable

5.3 Recommendations

Considering the current drift towards sustainable and clean energy for society; it is typical to state that, a lot of demands would be placed on the operation and delivery of Alternative Electricity solutions. Based on the findings deduced from this research and the inferences stated, the following recommendations are proposed:

i. All characteristics of an energy source for Alternative Electricity should be leveraged upon so as to enhance efficiency;
ii. Being that naturally occurring single sources of constant sound seem to be rare or nonexistent, creating a synthetic source could be a better alternative;
iii. Modified academic curriculum at all levels to cater for Alternative Electricity challenges; iv. The proficiency of professionals in industry should be augmented to allow for more efficient Alternative Electricity Generation solutions;
v. The development of systems that would convert sound inputs into usable and storable quantities of clean electricity for Domestic Applications within the built environment;
vi. Ensure that the systems stated in the 5th recommendation, are user-friendly bearing in mind the requirements human factors and ergonomics.

Acknowledgement

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