

PLATFORM FOR POWER GENERATION FROM FOOTSTEP PEOPLE

Peter A.A.¹, Mamonova T.E.², Kiseliev A.V.³

¹ TPU, SCSR, gr. 8E02, e-mail: paa13@tpu.ru

² TPU, SCSR, Associate Professor., e-mail: stepte@tpu.ru

³ TPU, SCSR, Associate Professor., e-mail: kiselevav@tpu.ru

Introduction

With a growing population and increasing demand for energy, energy issues are becoming a global concern. As a result, there is a growing global movement toward more sustainable and renewable energy sources. However, many countries are struggling to adopt these resources and develop clear plans for sustainable energy production. Egypt is one such country facing energy challenges due to its growing population and lack of clear plans for renewable energy production. The country also faces problems with the quality of the indoor environment, especially in public buildings. However, a potential solution to these challenges is the "Power Generation Platform with Foot-Powered Energy Utilization". This innovative technology uses piezoelectric materials to harness the mechanical stress caused by foot movements to generate electricity. The power generated can be used to power small electronic devices and sensors in various locations, including urban areas, transportation, and industrial facilities. By implementing this technology, Egypt could address energy issues and improve the quality of indoor environments in public facilities at the same time.

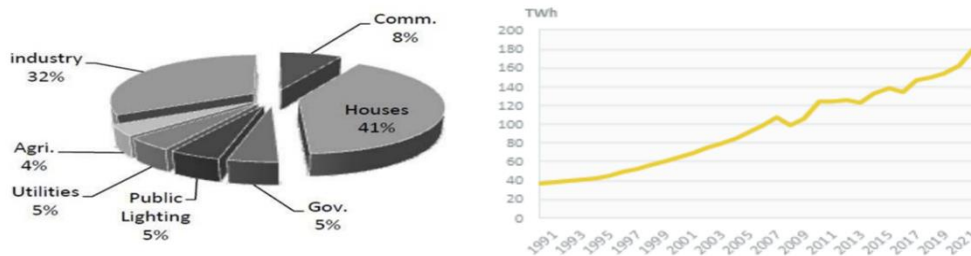


Fig. 1. Percentage of energy consumption of each sector and breakdown of electricity consumption by sector in Egypt (2021%)

Population of Egypt

The platform for power generation from foot-powered energy was chosen as a project of high interest due to the growing population in many countries, including Egypt. As the population grows, so does the demand for energy, making it increasingly important to find sustainable and renewable sources of energy. There are also plans to build new electric railroad stations in the future, which will require large amounts of energy. This platform can be installed in such stations and in busy areas to generate electricity from the feet up. This technology has the potential to reduce the demand for traditional energy sources and address energy issues in a sustainable manner. Furthermore, the technology can be implemented in public buildings in Egypt to generate electricity and simultaneously improve the quality of the indoor environment of buildings [1].

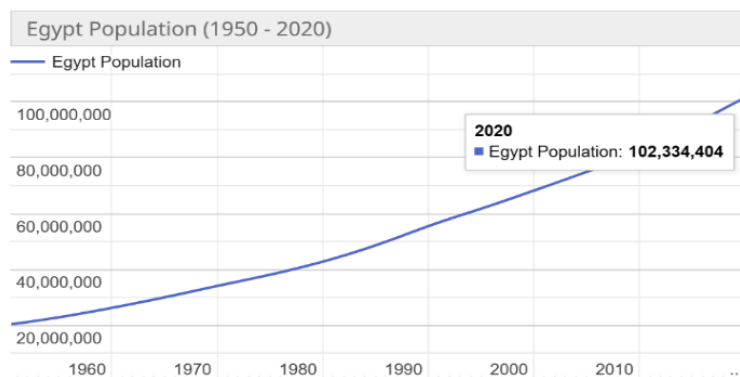


Fig. 2. Population of Egypt

Egypt's high-speed electric train route to include 15 stations

The trains will depart from Ain Sokhna and pass through the new administrative city, south of New Cairo until October 6, from there to Alamein, and then to Burj Al Arab, Alexandria, and Hammam. According to sources in the Ministry of Transportation, the construction sequence of the project has been revised [2]. According to the original plan, the project was to be built in three phases: Ain Sokhna - New Administrative City, New Administrative City - October 6, and October 6 - Alamein New City. The route on the map is as follows (Figure 3).



Fig. 3. The map route shows the names of the stations that has been settled upon

Platform for power generation form footstep

Based on my research, I considered the rapid increase in the number of buildings with high human occupancy and the mass application of platforms for power generation.

Main Idea: Piezoelectric flooring materials have been proposed as one of the solutions for power generation by foot energy [3]. This type of flooring material contains piezoelectric material, which can convert the mechanical stress caused by footsteps into electrical energy. When a person walks on the floor, the pressure generates an electric charge in the piezoelectric material. This charge can power small electronic devices and sensors or be stored in a battery for later use. Piezoelectric floors are a promising solution because they can be easily integrated into existing infrastructure without major changes. This makes it a cost-effective and scalable solution for energy harvesting. The use of piezoelectric flooring in high-traffic areas such as train stations, airports, and shopping malls have the potential to generate large amounts of electricity and reduce reliance on traditional energy sources.

Research Question: Can it be used as a sustainable and renewable energy resource in Egypt's most populated and public spaces!

The purpose of this research is to find new and suitable energy sources that are sustainable and renewable, using human power to help conserve energy. The idea is to use vital energy to generate energy in all public places. I have developed a platform that consists of the following (Figure 4).

Model platform for generation power form footstep

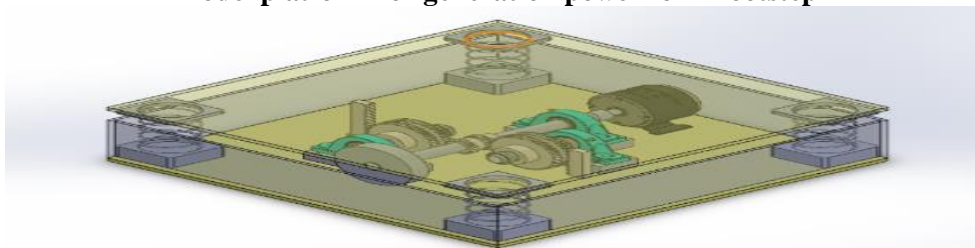


Fig. 4. 3D-model in solid works

Conclusion

Power generation platforms based on piezoelectric floor-based foot-operated energy are a promising solution to the energy challenges faced by many countries, including Egypt. As energy demand continues to increase with population growth, finding sustainable and renewable sources of energy is becoming increasingly important. With piezoelectric flooring, electricity can be generated underfoot without major changes to existing infrastructure, even in busy areas such as train stations and airports [4].

References

1. The Egyptian ministry of electricity and energy website, Annual reports. USD: <http://www.moe.gov.eg>
2. High speed train in capital route to include 15 stations USD: egyptindependent.com/high-speed-new-administrative-capital-train-route-to-include-15-stations
3. Future of Electricity for generation WEF (world economic forum), "Future of Electricity" Report, January 2015, p.234
4. Feasibility study of embedded piezoelectric generator system on a highway for street lights electrification: https://www.researchgate.net/publication/328754576_Feasibility_study_of_embedded_piezoelectric_generator_system_on_a_highway_for_street_lights_electrification