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Development of a Low-Cost Hydroelectric Generation System for Application on Water Pipelines

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Abstract:

Electrical energy is one of the most important sources of energy in the world, and it powers most of the equipment. However, some methods of generating energy can be damaging to the environment such as water dams which can affect marine life. There are also green systems that provide electricity while causing no harm to the environment, such as solar panels which produce electricity but are inefficient on overcast days. As a result of this challenge, a new way for producing electrical energy that is both efficient and environmentally beneficial has been developed. Thus, the development of a low-cost hydroelectric generation system for application on water pipelines is presented in this study. The project is able to harness the kinetic energy of flowing water to generate electricity that will be stored in batteries and used to power other electronic equipment. Two designs have been proposed in this project to see the effect of the Venturi shape on water flow in pipes. The system is equipped with small-sized pipes (0.5 to 1 inch), G1 turbine flowmeter, microcontroller, 5 V water flow turbine hydroelectric generator, XH-M603 charging control module, and 12 V GP rechargeable battery. Although the recommended system is lightweight and compact, the system can be improved by incorporating larger turbines and connecting to municipal canals with higher water flow to generate more electricity. As a result of the experiment, it was found that an increase in water flow would cause the turbine to rotate faster, which resulted in an increase in energy generation. The project can provide effective and efficient results in addition to features such as green technology, lower construction costs, and reliable energy production.