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Design of a Kinetic Power Charger Integrated with a Portable Exercise Device

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Abstract - The increasing reliance on portable electronic devices and the need for charging points is a growing concern in the modern world. Additionally, the importance of regular exercise, maintaining a healthy lifestyle, and prioritizing environmental sustainability is widely recognized. This study aligns with the United Nations Sustainable Development Goals (SDGs) 7 (Affordable and Clean Energy), aiming to design a portable charging device that harnesses the user's kinetic energy through movements and exercises to generate electricity for smartphones and power banks. By integrating energy generation with physical activity, the device addresses the technological demands of modern life while promoting personal health and supporting environmental sustainability. The methodology of this project includes identifying design specifications and key components, creating a prototype, testing the prototype's functionality, and collecting data and analysis through controlled tests. The final prototype utilizes a hand crank mechanism, which can adjust voltage between 3 and 15 V and generate up to 20 watts of power. Results indicate that the device can charge a small power bank by 1% in approximately 3 minutes, aligning well with the duration of a typical workout session before rest. This study concludes that the hand crank-based portable charger provides a practical and sustainable solution for portable energy generation, with the potential for further development and optimization.