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STUDY ON THE DESIGN AND PRODUCTION OF A PROTOTYPE LIQUID LEVEL DETECTION EQUIPMENT UTILIZING GEIGER-MULLER DETECTOR

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INTRODUCTION

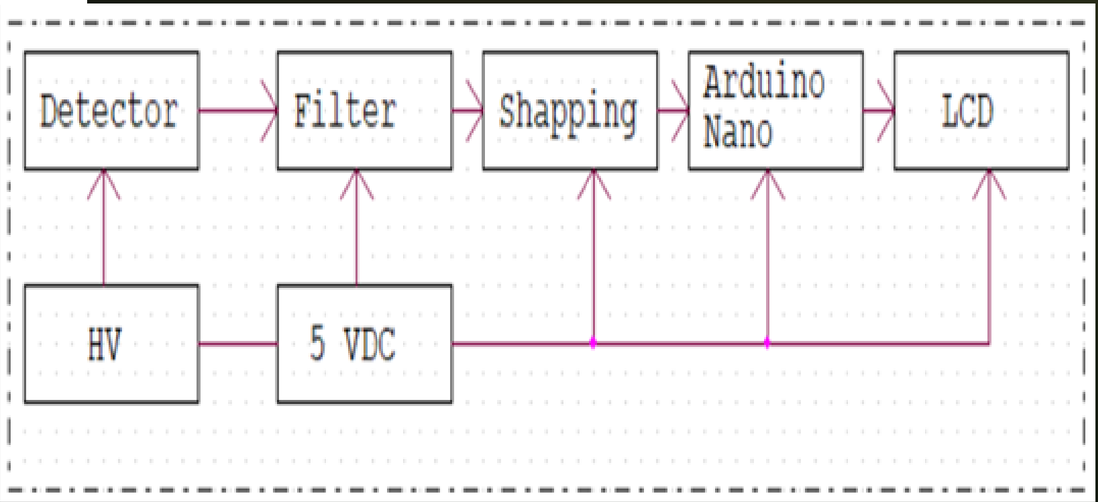


Figure 1. *Schematic diagram of a prototype handheld level measurement device utilizing a Geiger-Muller detector employing the gamma transmission method*

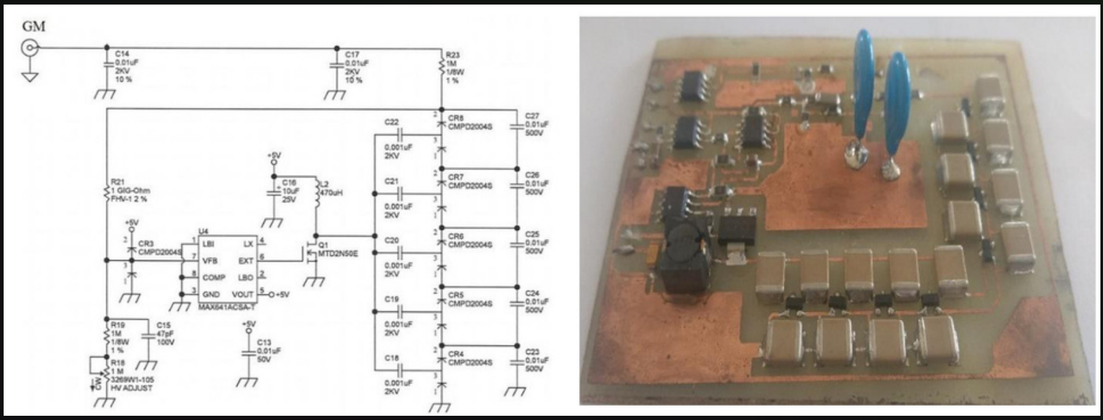


Figure 2. *High Voltage Circuit; (a) Schematic diagram; (b) High-voltage circuit is designed and fabricated*

The article discusses a research presentation on the design and manufacture of handheld radiation measurement devices using Geiger-Muller tubes counting gamma radiation, applied in educational settings. The research and development aim to support educational training, aiding students in comprehending the interactions of radiation with matter, contributing to the dissemination of knowledge about atomic energy applications, and enhancing the quality of presentations at the Nuclear Research Institute Training Center. Initial results have led to the creation of a portable radiation measurement device utilizing Geiger-Muller tubes and a 10µCi Cs-137 gamma source, displaying the count on a 16×2 LCD screen, and powered by a 9VDC supply for ease of use and safety. This serves as a foundation for further research in developing radiation measurement devices using X-rays, with the goal of enhancing the visual and vivid aspects of lectures on atomic energy applications. The objective is to use gamma transmission methods without relying on complex and expensive equipment, ensuring radiation safety at the Training Center.

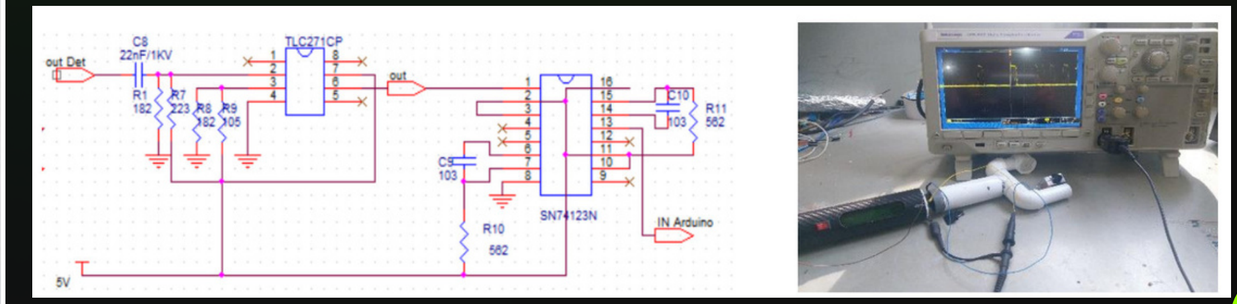
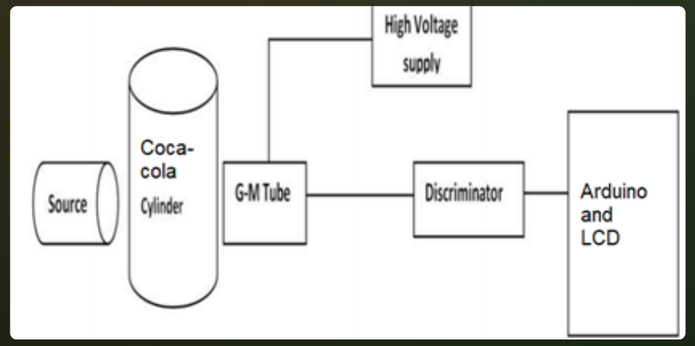


Figure 3. *Pulse-Shaping Circuit Schematic; (a) Schematic diagram; (b) Output pulse signal at the pulseshaping circuit output.*

CONCLUSION

The GM counting tube-based level measurement device was utilized as an effective tool for student training. The visual and dynamic aspects of lectures on atomic energy applications and the gamma transmission method were enhanced without requiring complex and expensive equipment, thereby ensuring radiation safety at the Training Center. Its application extended to the teaching and introduction of the principle of transmission measurement in liquid level sensing at the Nuclear Research Institute or other educational institutions.



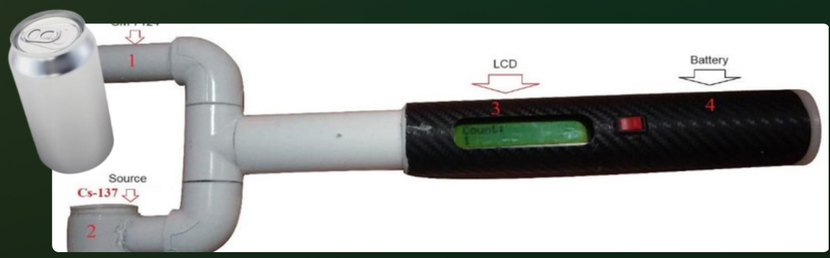


Figure 5. The experimental setup for investigating the handheld level measurement device utilizing the GM7124 counting tube was arranged.

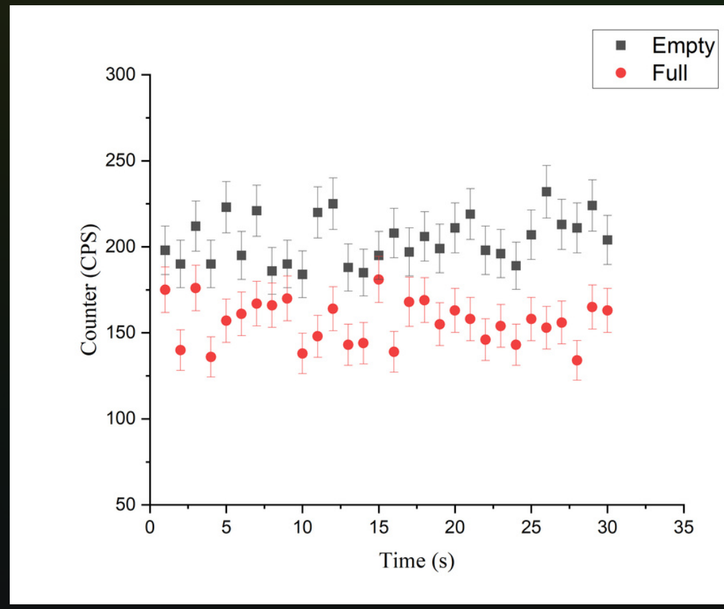


Figure 6. *The comparison graph was made between the can with water and without water in the case of using a Cs-137 source with an activity of 10μCi.*

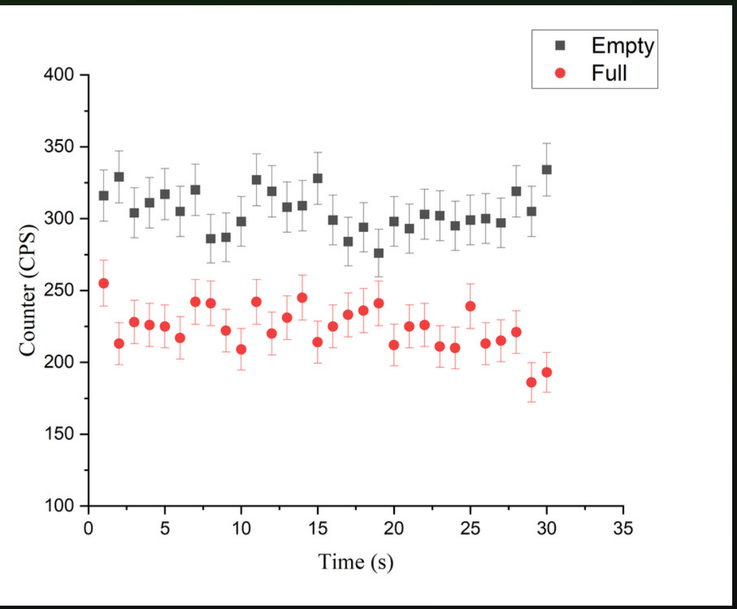


Figure 7. The comparison graph was created between the can with water and the can without water in the case of using two sources: Co-60 with an activity of 10μCi and Cs-137 with an activity of 10μCi