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# INTERACTIVE SPECTROSCOPY-BASED 3D MAPPING OF LUNAR SURFACE

**Abstract**

The study of the lunar surface is crucial not only for understanding our natural satellite's geological history, but for future missions and resource potential as well. One of the traditional observational techniques for mineral mapping relies on spectroscopy; however, spectral data by default require additional steps and analysis. This research presents an interactive 3D visualization approach that integrates lunar spectroscopy data with topographical models (visible surface data) to enhance mineral mapping accuracy and usability. Using spectral datasets from remote sensing missions, such as Chandrayaan-1 M3 Map, the goal is to employ data processing techniques and 3D rendering tools to generate an immersive, high-resolution model of the lunar surface. In addition, in order to increase the user participation and engagement, gamification elements are added to the final prototype. The final product aims to be a useful research tool for exploration of the lunar mineral distribution interactively, such as the pyroxene distribution. This approach for lunar mapping and mineral distribution has potential applications in planetary science, lunar exploration, and mission planning, offering a novel tool for analyzing extraterrestrial surfaces.