Lunar Exploration Navigation System – L.E.N.S

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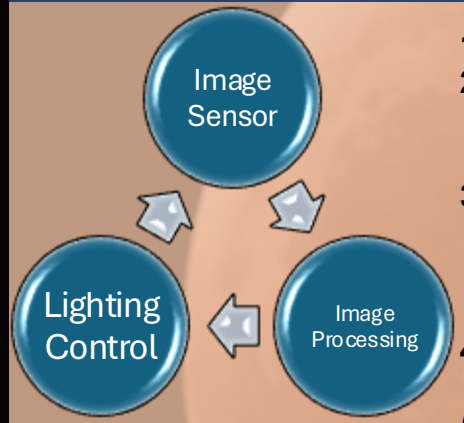
Background

The lunar surface presents extreme lighting variation from total darkness in shadowed craters to intense solar glare on exposed terrain. Current lunar imaging systems produce inconsistent imagery due to these lighting variations, and a fixed setup cannot adapt to changing lighting conditions which limits image quality and usability.

Objective

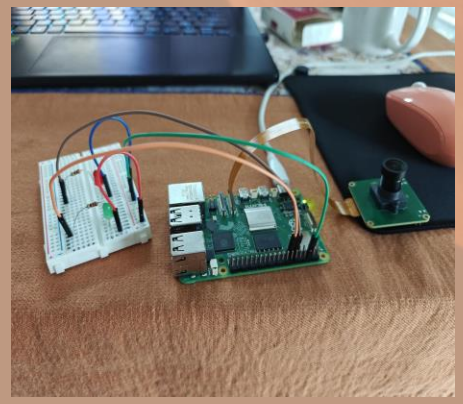
Develop an integrated camera and lighting system optimized for lunar imaging. The system should autonomously adapt to different lighting environments through an adaptive lighting control module.

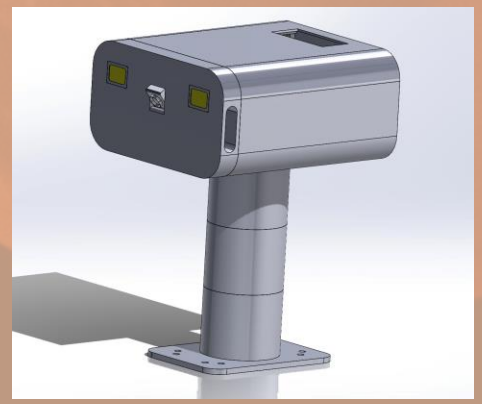
System Architecture



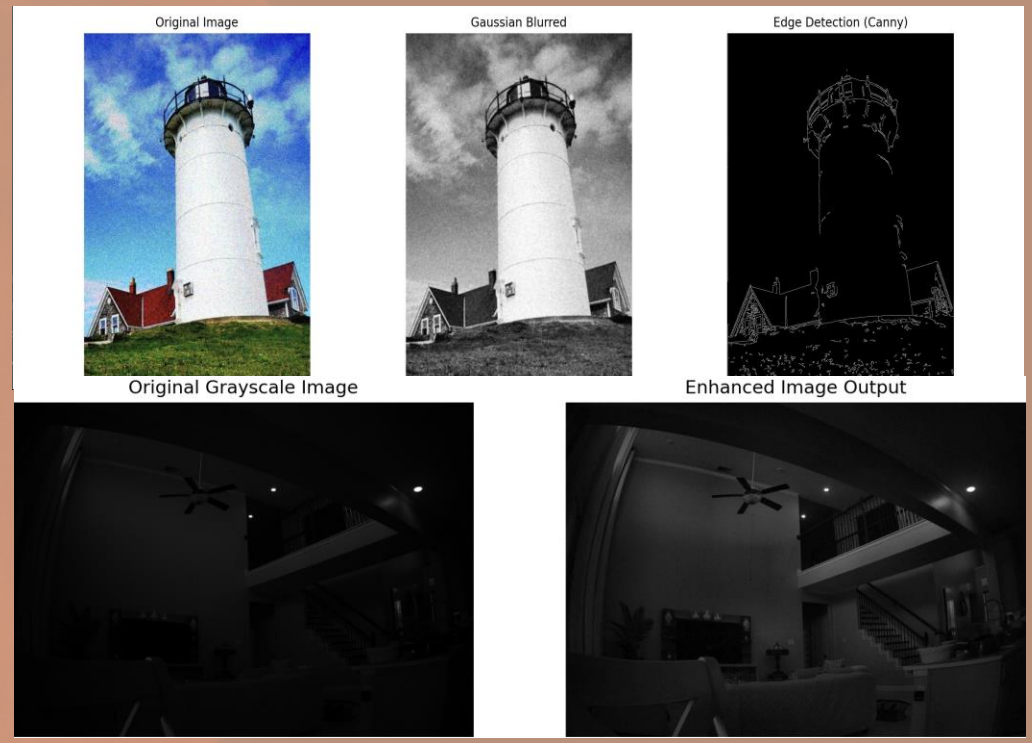
1. Image is captured
2. Image is processed to reduce noise and evaluated for its brightness
3. Controller triggers lighting adjustments until target brightness values are reached
4. User receives a sharp, well-lit final output image
5. Camera re-captures image and process restarts

Hardware Setup and 3D Model





Results



Conclusion & Future Work

The system demonstrates an autonomous lighting control method using data image as an input. Results confirm stable, intelligent lighting performance under variable conditions, improving image quality for lunar applications. Future work includes integration of a power bank and heat sink system for thermal dissipation.

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