

## Vision Aided INS for Soft Landing

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**Abstract :** The lunar surface may contain rough and non-uniform terrain with dips and peaks. Soft-landing is a method of landing the lander on the lunar surface without any damage to the vehicle. This project focuses on finding a safe landing site for the vehicle by developing a method for the lateral velocity determination of the lunar lander. This is done by processing the real time images obtained by means of an on-board vision sensor. The hazard avoidance phase of the soft-landing starts when the vehicle is about 200 m above the lunar surface. Here, the lander has a very low velocity of about 10 cm/s:vertical and 5 m/s:horizontal. On the detection of a hazard the lander is navigated by controlling the vertical and lateral velocity. In order to find an appropriate landing site and to accordingly navigate, the lander image processing is performed continuously. The images are taken continuously until the landing site is determined, and the lander safely lands on the lunar surface. By integrating this vision-based navigation with the INS a better accuracy for the soft-landing of the lunar lander can be obtained.

**Keywords :** vision aided INS, image processing, lateral velocity estimation, materials engineering

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