Problem Statement
The critical step in laparoscopic surgery is the primary trocar insertion because it is executed with limited visibility of organs inside. Over-insertion frequently occurs due to either inability to stop a breaching trocar or by failure to accurately judge depth of insertion.

Background
Laparoscopic Surgery is a minimally invasive surgical procedure that offers patients benefits that are more favorable than traditional open surgery. The benefits include minimal scarring, less pain and discomfort, and fast recovery. However, this procedure gives surgeons many drawbacks, such as a confined working space, reduced dexterity, and obscured vision. With 5 million laparoscopic procedures done worldwide in 2013, 3 million in the US alone, it is a necessity to address the issues surgeons are facing in order to meet the patients’ growing demands for laparoscopic surgery.

Current Progress

Design Concept
Proposition 1: Automated Retraction
Dual Cannula-Trocar System

Proposition 2: Incremental Insertion with Spring-Loaded Retraction

Design Criteria & Specifications
1. More control on insertion force: \( \leq 13 \text{ mmHg} \)
2. High removal force: \( \geq 10 \text{ mmHg} \)
3. Low organ/vessel puncture risk: \( \leq 3 \text{ mm over-insertion} \)
4. Reduction of fibrous damage
5. Ease of use

Timeline
Current State: Prototyping design
End of March: Complete early prototype
End of May: Validation and Presentation

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Contact
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