

Laparoscopic Screen Pointer

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Project Design Specifications

Function:

This project aims to improve a surgeon's ability to teach and complete laparoscopic surgery. Current surgeries require two surgeons, one to hold the instruments and the other to hold the camera. The image from the camera is then transmitted to a TV. When this surgery is performed by a resident and an attending, the attending holds the camera and directs the resident through the surgery. Often times, the attending wishes to clarify what he says by pointing at various objects on the screen but cannot complete such a task because his hands are occupied. It is our aim to install a screen pointer onto the TV that can be operated from the camera, allowing surgeons to point out various structures during surgery without the need to move their hands.

Client Requirements

- Design a pointer controller that attaches to a wide variety of laparoscopic camera handles, the system will be detachable as well
- Design a system to embed a pointer onto the signal going to the HD TV screen
- The device should not hinder the image or ability to hold and operate the camera
- The pointer controller should be wireless

Design Requirements

1. Physical and Operational Characteristics

- a. Performance Requirements: The device must function in a surgery setting without hindering the process or damaging the signal. It must also apply a cursor that can be positioned intuitively without blocking the image.
- b. Safety: The device should not disable the video feed. The attached pointer on the camera should not damage the operator in any possible way.
- c. Accuracy and Reliability: The overall camera system should not go through extensive processing to delay the signal. The system should maintain power throughout surgery. The pointer should be fine so that the users can see what is being pointed out, not too fine so that it is difficult to see. The pointer should move in a relatively smooth and controlled fashion.
- d. Life in Service: Should last a comparable length of time as the cameras that are used during surgery.
- e. Shelf Life: Must withstand operating room conditions and should be built to last. Should last until the next generation of human sub species.
- f. Operating Environment: The environment of this device is the operating room. Potential exposure to bodily fluids for the pointer attachment.
- g. Ergonomics: The device must be comfortable for the user and in no way inhibit his ability to operate the camera.

- h.** Size: The camera mounted controller should be smaller than the standard track ball for a standard computer mouse. If there is a cord it should sufficiently long to go the length of the operating room. The interceptor box should be smaller than a standard laptop.
- i.** Weight: The controller should be less than one pound, the interceptor box should be less than twenty pounds.
- j.** Materials: Should be able to be sterilized by operating room standard room standard cleaning equipment. The controller should be a durable plastic that will hold up over time.
- k.** Aesthetics, Appearance, and Finish: The device will be used in an operating room setting, so it should look professional.

2. Product Characteristics

- a.** Quantity: One testing unit is necessary, and possibly multiple prototypes
- b.** Target Product Cost: This has not been determined

3. Miscellaneous

- a.** Standards: If we are successful with our prototype testing, we will attempt to implement with one of Dr. M's surgeries, if that is successful, we will then attempt to attain a patent.
- b.** Customer: Hospitals around the world that perform laparoscopic surgeries.
- c.** Patient Related Concerns: This device must be able to be sterilized and must maintain an instant video feed for the duration of the surgery; overall the pointer controller will not interfere with the patient directly.
- d.** Competition: None