

## **Spring Break Deliverable Plan: Functional Prototype**

### **MVP**

Our minimal viable product for the Spring break deadline will have the following characteristics and functionality:

- Detection of a stiffness difference between two media with stiffnesses representative of the sphincter and the prostate
- Balloon inflation mechanism is consistent and can attain stiffness readings
- Manual screw mechanism integrated with the balloon component and calibrated to attain the required imaging resolution
- Micro-controller software developed to be able to work through the full sequence of events (inflation, location detection/refinement, surgical tool positioning)
- Position of external sensor (for attachment onto the surgical tool) can be detected relative to the boundary that has been located

### **Tasks for after Spring Break (End of April Deadline)**

Taking into account the initial vision and conception of the project scope, this is a list of features that will be implemented after Spring break for the final submission:

- Automation of the mechanical refinement process
- Improvement of the user input and display system to provide an intuitive user experience
- Adding additional sensors to increase ease of attaining an initial estimate of where the boundary is
- Optimize and reduce physical size of device (e.g. replacing Arduinos)

## Schedule

Week	Stiffness	Boundary Location	Surgical Tool Detection	UI and General	Testing Model
2	Sensor choice	Develop design and related specifications for the working mechanism	Test EM mechanism as a proof-of-concept	Draft and discuss IO requirements	
3	Sensor characterization on balloons	Mechanical and electrical design/schematic	Configure two sensors along a line: electrical and software (Arduino)  Test different EM sources	Mechanical design of what all the parts will look like together	Cardboard tube
4	Sensor and balloon optimization	Prototype screw mechanism	Optimize the sensors and source with a chunk of meat  Create indicator to show position of the tool relative to boundary	Create CAD drawing and begin mechanical prototyping	Gelatin model with one stiffness
5	Continue sensor characterization; design of mechanical part	Prototype screw mechanism	Add third sensor for detection in 3D space; test out five configurations		Gelatin model with two stiffness
6	Construct balloon inflation mechanism	Circuit design and building	Test out five configurations (carried on from previous week)	Ensure mechanical design of all parts can be integrated	
7		Circuit design and building			
8	Integration				Test with device
9	Demo				