

Smart Capsule

Targeted Drug Delivery System for Increased Drug Efficacy
ECE and CS Senior Design Project 2017

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The Problem

Ailments in the gastrointestinal tract such as Crohn's disease or cancer can be more effectively treated when the full drug dosage is administered directly to the damaged tissues. **Targeted drug delivery** is a method by which medication can be administered to specified regions of the body. As such, controlled drug delivery has been the focus of much research in recent years. However, many of the devices out there can be expensive, invasive, or impractical for use in human trials.

The Solution

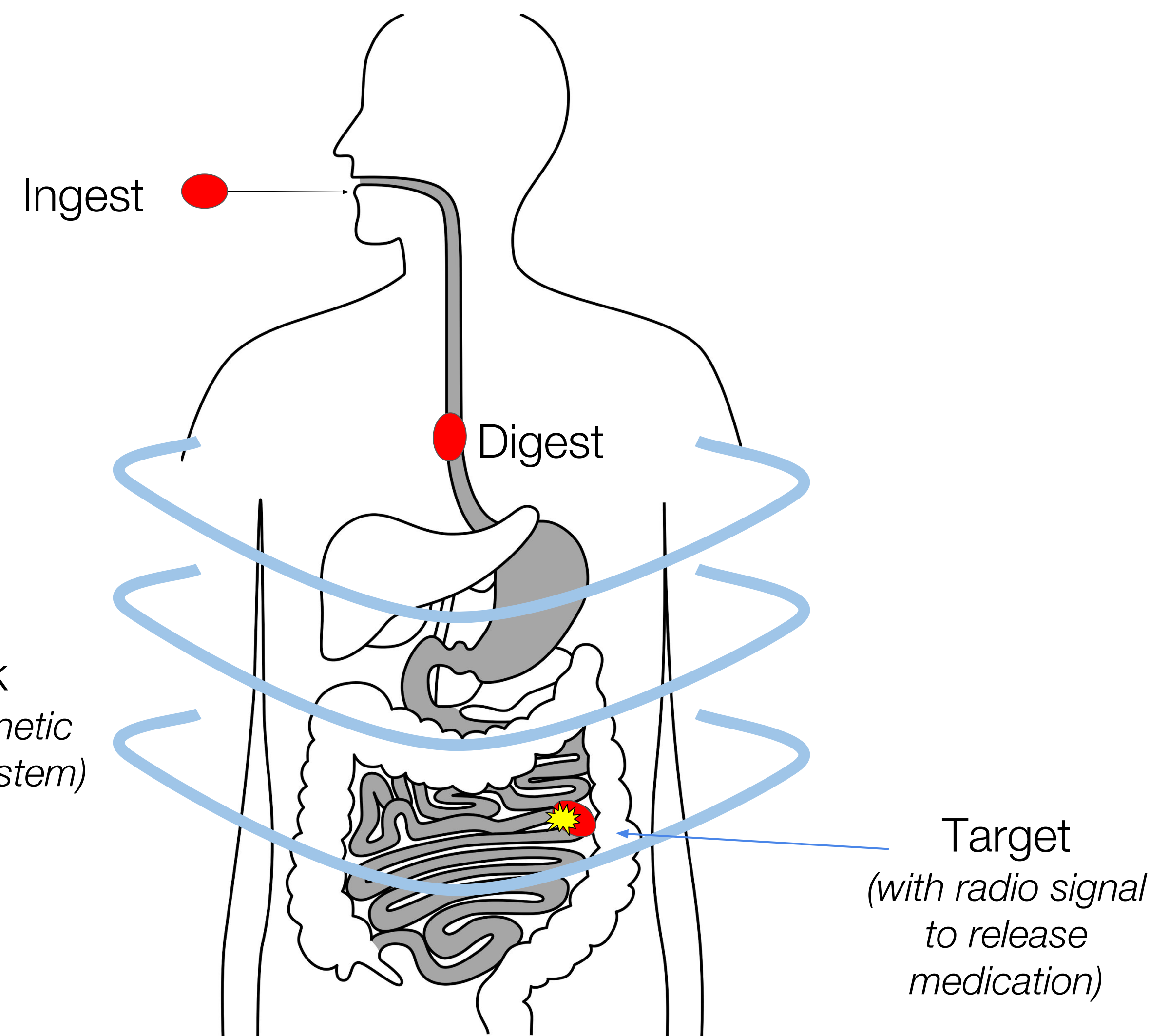
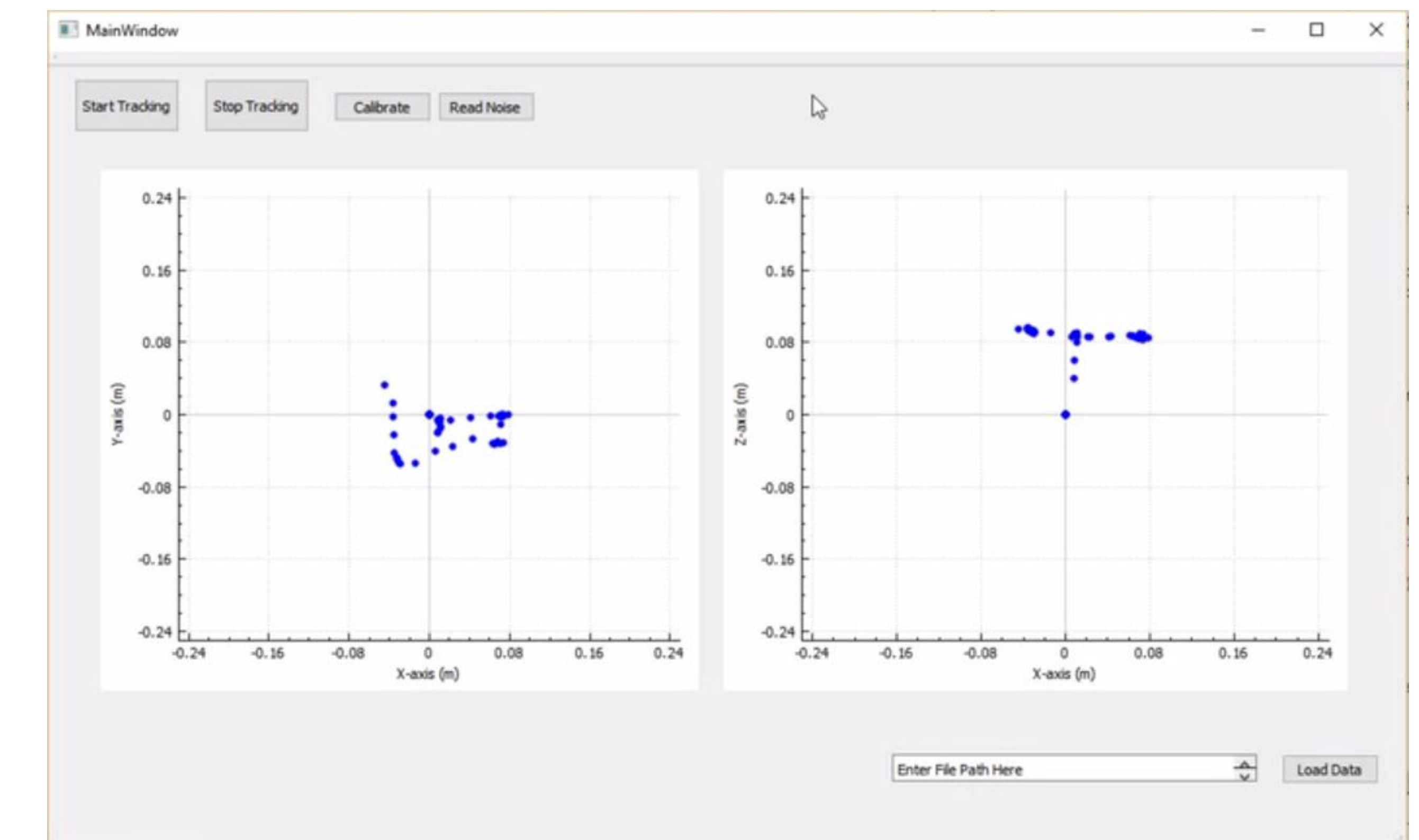
The "Smart Capsule" is a device that is capable of remotely releasing medications to programmed locations within the gastrointestinal tract. It does so by using a magnetic tracking system to externally monitor the location of the pill, and a radio-frequency triggering mechanism to externally initiate the release of the medication.

(1) Tracking System

The tracking system consists of eight magnetic field sensors and a digital acquisition board. The sensors measure the magnetic field at various distinct locations surrounding the smart capsule. These could be placed around the abdomen of a patient who recently swallowed the capsule. A computer program then calculates the location of the capsule from these measurements.

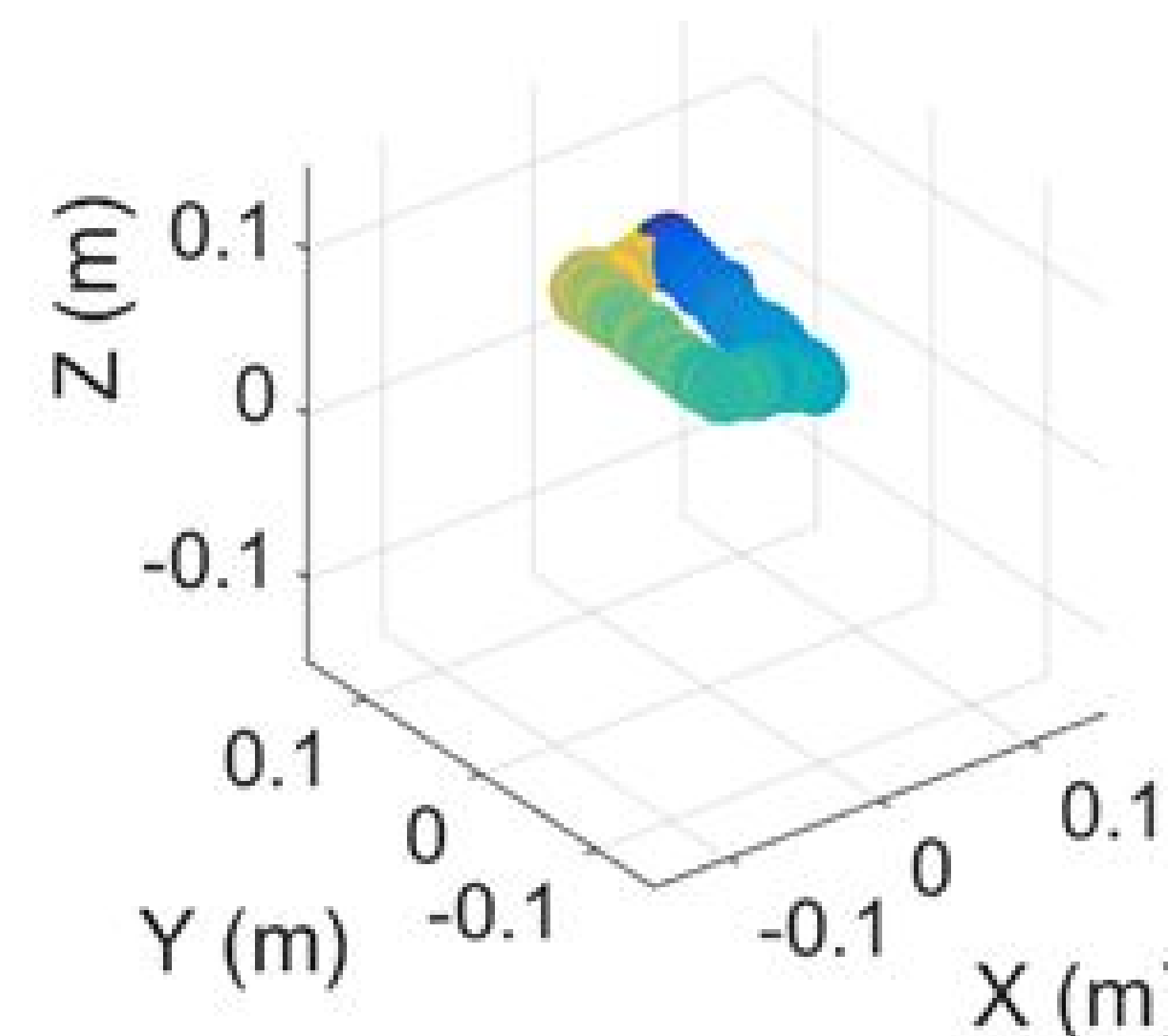
(2) Delivery System

The delivery system consists of a capsule containing an electrical system that will trigger the release of the capsule's medical contents when subjected to a specific radio frequency.



Results

Preliminary tests show that this system has great potential for the application of targeted drug delivery.



Future Work

- Molds of Capsule design for construction with biocompatible materials
- Integrated Circuit design for the RF module inside of the capsule
- Improvements of tracking system