Manipulator Short project: Skull tumor surgery

Introduction

A team of surgeons specialized in surgery of tumor skull and Computer Science students wants to simulate the robotics environment of the operating room to learn how some tasks can be done.

The surgeons make an introduction of Dicom images to the students and pass them a folder with 112 images taken of a patient's skull with three fiducials for registering Dicom images with the Robot Reference Frame. The surgeons indicate in which images appear the fiducials (32 - 65 - 94)

Assume it: two Dicom Images gap is about 1.4 mm.

They recommend use as Dicom viewer: https://www.imaios.com/en/Imaios-Dicom-Viewer.

The surgeons explain to the students the strategy to be follow: first it is needed to known the kind of tumor, All of us hope, the tumor will be benign. There will be then two options: remove the tumor or to burn it.

Robotics Tasks explanation

According to that, the surgeons want to see a simulation of the robot performing the following tasks:

a) Using the specific tool to make a biopsy of the tumor taking a sample from the center of mass of the tumor. To do that, a small hole must be perform in the top of patient's skull near to the tumor. The robot must move very slowly when inside the brain and it must follow a straight line.

b) To make a hole in the patien's skull to remove the benign brain tumor. The drill pose must cut the skull traking a circle of radius a litle bit less than the tumor equivalent sphere radius. To facilitate the later bones soldering the z axis of tool (EE=cutting drill) must has an orientation of 45º with the longitudinal axis of the human body.

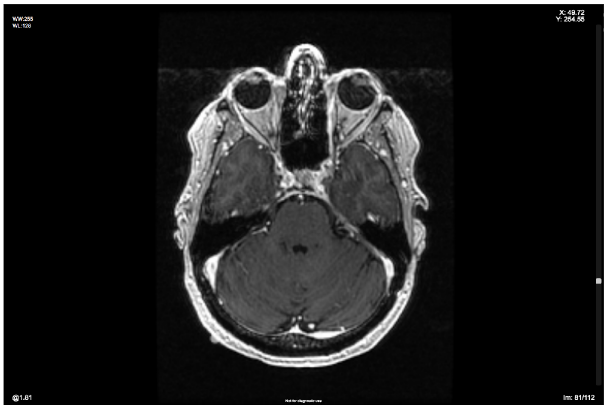
c) Burn the tumor with a laser tool. The hole is no necessary to be big, the surgeons forecast half radius of the tumor equivalent sphere. To burn the tumor, assume the tool irradiate heat like a sphere shape of 4mm radius. Take care not burn healthy biological tissues.

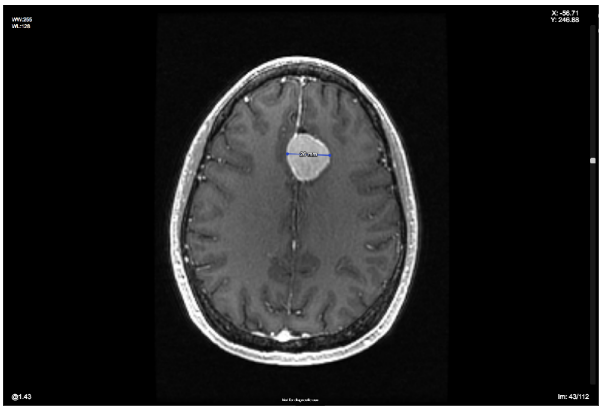
List of to do:

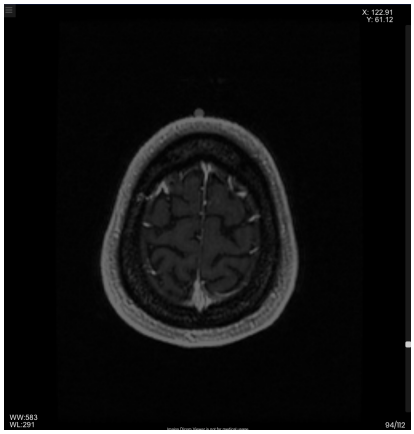
Go to: ... MatlabDrive/Robotica_20_21_2Q/Todo_s/Manipulator_Short_Project/ 1_Short_project_Template

and follow the indications

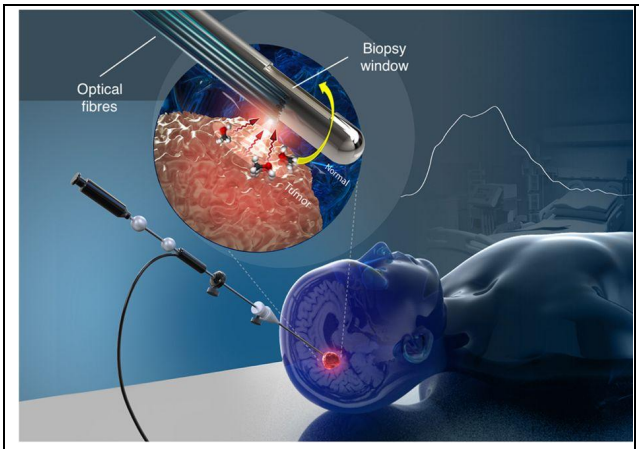
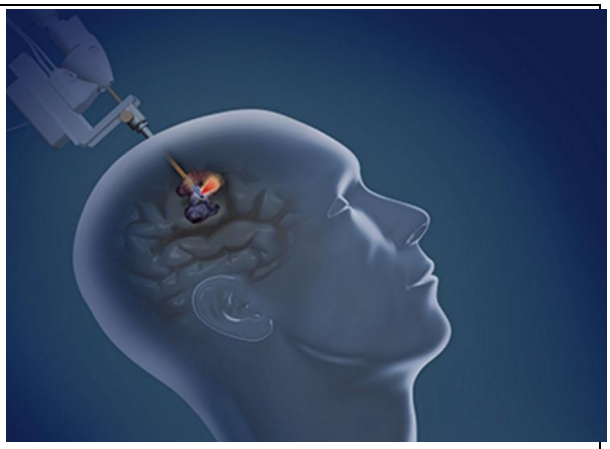
Dicom image with Fiducial for registering:







Tools

	
Biopsy	Laser

Drill