|  |  |  |  |
| --- | --- | --- | --- |
|  | Deliverable | Key Milestones | Status |
| Minimum | Documentation for SyntheX, provide applicable interfaces | Documentation and well-organized repository for SyntheX | **R** |
| Data exchange channel | Scripts for reading and writing h5 and dicom files | **R** |
| A well-documented program integrating previous works | Python Scripts incorporates previous works | **R** |
| Expected | validation of integration program on cadaveric images | Test of the program on dicom file from loop-X | **R** |
| Fully constructed software architecture | Reconstruction of python scripts for future users’ modification | **R** |
| A python pip package for integration software | A Python installation package | **90%** |
| A user-friendly GUI | A GUI designed to import input and run the program | **R** |
| A fully automatic pipeline | A well-designed, documented, and automatic pipeline | **70%** |
| A view-rendering application for projective visualization | Simulated scene of projective visualization in unity | **☒** |
| A report for Validating our application on cadaveric images | A well-analyzed report about validating the program | **☒** |
| Maximum | Integration with mixed reality visualization of relevant anatomy | Simulation app executable in HMD | **☒** |

Although point-based registration using physically contacted anatomical features is dominant in current IGS systems, an image-based 2D/3D registration approach, where intraoperative X-ray images are used to solve the registration, has several advantages. First, it does not require physical contact with the anatomical region of interest in the patient, in contrast to the conventional point-based method which requires invasive exposure and contact with large portions of target anatomy. Second, the preoperative images do not need to be segmented to isolate contact features; point-based registration requires the segmentation of the target anatomy to identify the location of anatomical landmarks or surfaces, and it usually involves manual interaction by an experienced operator, making it time consuming and subjective by nature. Third, the procedure time is reduced since the image-based approach requires the surgeon to acquire only a few X-ray images.

**R**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Need | Status | Followup | Contingency Plan | Planned | Hard Deadline |
| MOCK OR Lab Access | manipulate Loop-X | Get access | N/A | Ask Benjamin for access | Feb 06 | Feb 10 |
| Loop-X | Generate X-ray and CT Scan | Ready to use | API | Ask Benjamin for access | Feb 06 | Feb 10 |
| SyntheX | Generate Domain Generalizated X-ray | Open source github repository | N/A | N/A | Feb 01 | Feb 06 |
| Model Checkpoint | hyper parameters of SyntheX | on private onedrive folder | N/A | N.A | Feb 08 | Feb 10 |
| xReg | Compute registration parameter between CT scan and X-ray Image | Open source github repository | N/A | Request the source code from Dr. Grupp | Feb 08 | Feb 10 |
| CT DataSet | As a input used in Xreg | Ready to use | Keep secured | N/A | Feb 06 | Feb 10 |
| Total Segmentator | Do CT Scan segmentation | Open source Software | N/A | N/A | Feb 06 | Feb 10 |
| Computers | Our own computer with an environment for software development | Install python, C++, Unity; Ready to use | N/A | “PACKMAN” ARCADE Server | Jan 23 | N/A |
| HoloLens | Do mixed reality visualization | plan to request at Mar 10 | N/A | N/A | Mar 15 | Mar 20 |
| optional Wifi Flash Memory Stick | synchronizing data | Plan to purchase | Research agreement to get API on Loop-X | N/A | Mar 10 | Mar 23 |

FX-ray,CT