Development Plan

Peng Cui

Yiwei He

Peihua Jin

Guangwei Tang

Erping Zhang

09-24-2022

1 Revisions

Table 1: Revision History

Date	**Developer(s)**	**Change**
Sept 24th 2022	All	Revision 0

2 Team Meeting Plan

Team meeting will be hold once a week online on Wednesday after all team members' agreement. Meeting was scheduled from 10:30 to 11:30 which is a time slot no one has lecture going on. Period will be adjusted later on based on the real circumstances. Individual team member will be required to give a report on his work during previous week and the goal in next week. There will be no strict requirements but will be adjusted regarding schedule basis.

3 Team Communication Plan

Microsoft Teams will be the mean communication platform for team communication. Since work are divided into two parts, each small group will have private chat and the mean chat will be used for general discussion and integration later on. There will be no strict restriction. Communication will be conducted as needed basis.

4 Team Member Roles

4.1 Hardware team(Erping Zhang, Guangwei Tang)

- Responsible for the computer vision human motion detection and tracking algorithm

- Servo control algorithm
- Firmware/Platform decision and adaption
- CAD design using Invertor or SolidWork
- 3D print and assembly
- Assist with software team

4.2 Software team(Peng Cui, Peihua Jin, Yiwei He)

- Computer vision Object detection algorithm
- UI/UX design and implantation
- User experience design
- Test cases design and module units testing
- Optimize algorithm performance on the firmware
- Design the communication between software, camera and servo

5 Workflow Plan

- Design the new requirement and function of new module
- Design the test cases according to the requirements
- Pull the latest version from master repository
- Create a branch and only develop on one function or module

- Implement the module which is independent from other module or only use the finished/stable module
- Test the module according to test cases
- Check if there is any changes to the old finished module which the developing module calls during the development period(if yes, changes may be applied to the developing module)
- Merge the branch to the master repository after all members permission

6 Proof of Concept Demonstration Plan

The main roadblock of the project is how to make the object detection algorithm accurate and distinguish the different objects using limit resources. Another technical risk is the detection of re-location of objects.

To overcome these risk, we will have a specific task-oriented logic in order to record the different status of objects such as re-location etc. Our plan is to use hand-tracking algorithm and frame-to-frame comparison method to activate the 'location-change' mode.

7 Technology

- Programming language: Python/C/C++

- IDE: Visual Studio/PyCharm
- Version Control Tool: Github/GitLab
- Library: tKinter/OpenCV/numpy/PySerial
- Unit testing framework: PyUnit
- 3D modelling Tool: Inventor/SolidWork

8 Coding Standard

As python will be the primary language to be use. PEP 8 style will be applied during the development. As the major work will be divided into two parts, it is essential to keep the coding style consistent in integration stage. To be specific, code lay-out, naming convention and comments will be following the PEP 8 style in order to reduce the issues will be likely encountered in later development.

9 Project Scheduling

The whole framework is divided into hardware and software parts respectively. The role for members can refer to the team member role section. As the development is in the initial stage, the prototype design plan will likely be changed in future stages. The first milestone would be the decision making on hardware as well as the software language which will be done in the first few weeks. The second milestone would be the prototype algorithm of item identification. As the software part would play a major role in the design,

3 or 4 team member will concentrate on the algorithm design. The third milestone would be the completion of the software design and debugging. The final milestone would be the final integration of hardware and software.