Project Updates: Master Record

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November 17, 2023

Contents

Introduction

This master record collates weekly project updates to produce a thorough insight into progress within a single document. Each section consists of a week's update. Within each section are the following subsections and descriptions:

- **Supervision Meetings:**
  Consists of a listing in table format of the supervision meetings that have occurred since the last update, including dates, attendees, and a brief description of discussions and actionable items.

- **Actionable Items Recap:**
  Consists of a listing in table format of the actionable items from the previous week, briefly discussing the progress made and pending tasks.

- **Additional Project Updates:**
  Consists of updates that weren't 'actionable items' from the previous week, such as brief overviews of experiments conducted, data collected, and research findings.

- **Next Week's Agenda:**
  Consists of a listing in table format of the actionable items to complete before the next weekly update, including task descriptions, rough timelines, and success metrics.

- **Comments & Concerns:**
  Consists of a brief analysis of comments or observations about other aspects of the project, such as facilities, work environment, and any outside interest in the project. Furthermore, outlines any concerns about the project.

1   03-11-2023

1.1   Supervision Meetings

Date	Agenda	Actionable Items	Attendees
31/10/2023	• Pinpointing project scope/objectives. • Laying out rough schedule based on project objectives. • Getting started on pre-reading/literature review. • Discussing organisational tips/workflows. • Schedule for re-occurring meetings.	• Next meeting in person to see existing lighting system. After seeing the existing system, I can decide the avenue I'd like to pursue. • Carry out some rough preliminary research for the 4 potential objectives: improving real-time computing, underwater testing, backscatter depth perception, ML-based backscatter position tracking.	• Sidharth Shanmugam • Paul Mitchell • Benjamin Henson

1.2   Actionable Items Recap

Actionable Item	Progress Report	Pending Tasks

No actionable points from the last weekly update.

1.3   Additional Project Updates

Additional Update	Description
Created project journal	• Created project-journal GitHub repository. • Consisting of Word doc outlining entire project progress.

1.4   Next Week's Agenda

Actionable Item	Description	Success Metrics	Target
Preliminary research	• Read about each of the 4 objectives, make notes on the technical aspects that would be required for each in project journal.	• Make notes in project journal, discuss during the next supervision meeting.	Thursday
Next supervision meeting	• Next supervision meeting to take place on Thurs 9th Nov @ 2pm at the ISA (Paul Mitchell to send calendar invite). • As discussed in the last virtual supervision meeting, after seeing the lighting system it'll be easier to decide which avenue I want to research. • Since the next meeting is at the ISA I may get a tour of the facilities. I can learn about the tools I'll have at my disposal for this project.	• Not very easy to generate measurable success metrics for these items. • Decide on one of the 4 objectives. • Make notes on useful facilities for this project at the ISA in project journal.	Friday

1.5   Comments & Concerns

No comments or concerns at the moment.

2   10-11-2023

2.1   Supervision Meetings

Date	Agenda	Actionable Items	Attendees
09-11-2023	- Discussed real-time software research findings. - Tour of the ISA, desk assignment. - Meetings to happen bi-weekly in person until next semester. Will be in touch with Paul & Ben with any project updates. - Discussion about hypervisors with Ben. Using Docker to package script and assign CPU/hardware, potentially solving OS scheduling issues. - I've shown interest in the 'improving real-time computing' aspects of the project. May have some aspects of underwater testing using facilities. - Rewriting software in C to reduce the overheads introduced by Python. - Paul & Ben mentioned to start simple with the software logic - with simple thresholding - then fine tuning to improve accuracy. - Ben mentioed to read older literature (e.g. 2010-era) on digital image processing - since there wont be any added complexities such as computational intelligence/ML/AI. - Work can be done to research the performance of different algorithms to detect and eliminate backscatter.	- Ben will send me some underwater footage to help me test any code without needing to implement in hardware and physically test. - I will ask Ben to send me the existing Python code so that I can get it set up on my Raspberry Pi. - With some underwater footage, I can modify the existing Python code to stream the video from file instead of from a camera, I can try to experiment with hypervisors (Docker) to see differences in performance. If there is an improvement, I will implement Docker in my final code. - I will try to research digital image processing from *older* literature. - I will try experiment with running C programs on Raspberry Pi.	- Sidharth Shanmugam - Paul Mitchell - Benjamin Henson

2.2   Actionable Items Recap

Actionable Item	Progress Report	Pending Tasks
• Next meeting in person to see existing lighting system. After seeing the existing system, I can decide the avenue I'd like to pursue.	• I have shown interest to delve into the 'improving real-time computing' avenue. • I have seen the existing lighting system, and have received a tour of the ISA.	• *No pending tasks.*
• Carry out some rough preliminary research for the 4 potential objectives: improving real-time computing, underwater testing, backscatter depth perception, ML-based backscatter position tracking.	• Initial research into 'improving real-time computing' has been conducted with some reading into real-time software (documented in the Project Journal). • I have not conducted any research on the other 3 objectives since those avenues would probably not be pursued. • Underwater testing aspects may need to be researched, however, not any time soon.	• *No pending tasks.*

2.3   Additional Project Updates

Additional Update	Description
No additional updates.	-

2.4   Next Week's Agenda

Actionable Item	Description	Success Metrics	Target
Experiment with hypervisors	- Get existing Python code and some underwater GoPro footage from Ben. - Modify the existing Python code to stream the video from file instead of from a camera. - Package the software with Docker, measure performance differences.	- Modified code should be working and containerised with Docker. - Make notes in project journal, discuss during the next supervision meeting.	Friday
Gather some digital image processing literature	- Since this is quite early on and I have other modules to focus on this semester, I won't be going into too much depth with the literature. - So this actionable item would be to simply gather a list of potential pieces of literature that I could read in depth at a later date. - I should be making some brief notes on the contents.	Log the brief notes in the Project Journal, citing the sources of the literature.	Friday
Experiment with RPi and C programming	- Make simple scripts in C and run on Raspberry Pi. - Set up a simple-yet-efficient workflow that can speed up development time in preparation for when I start writing the project software.	Log progress in the Project Journal, maybe even store code in a 'spike' repository on Github.	Friday

2.5   Comments & Concerns

No comments or concerns at the moment.

3   17-11-2023

3.1   Supervision Meetings

Date	Agenda	Actionable Items	Attendees
15-11-2023	- Findings on Python performance issues research. - Discussed objectives for detecting backscatter. - Discussed objectives for predicting backscatter motion. - Discussed timing complexities for synchronising find backscatter-project holes-predict next location cycle. - Future work could be to stitch images of the seabed together to produce 'panorama'.	- Research simple blob detection algorithm. - Research object tracking algorithms, starting with linear moving on to more advanced algorithms later.	- Sidharth Shanmugam - Benjamin Henson

3.2   Actionable Items Recap

Actionable Item	Progress Report	Pending Tasks
• Experiment with hypervisors	• Underwater GoPro footage with backscatter has been received. • Existing code has been retrieved, had to extract the files from the Pi's SD card. • Will be shifting this task for later so that I can produce software beforehand.	• *No pending tasks.*
• Gather some digital image processing literature	• I have gathered two textbooks for digital image processing. • Didn't get a chance to read through them yet, but will be doing so for next week.	• Log the different algorithms and complexities for each.
• Experiment with RPi and C programming	• I've researched that C programming would be quite difficult for this task. • Instead of C I could use C++. • A lot of the online resources suggested prototyping in Python, then translating to C++ for production.	• Set up C++ workflow to develop and deploy to Raspberry Pi.

3.3   Additional Project Updates

Additional Update	Description
No additional updates.	-

3.4   Next Week's Agenda

Actionable Item	Description	Success Metrics	Target
Start researching on blob detection algorithms	• Use the literature for this.	• Make notes in project journal.	Friday
Gather literature for object tracking/predicting movement	• Starting with linear interpolation.	• Make notes in project journal.	Friday
Experiment with blob detection algorithms	• Extract individual frames from the underwater Go-Pro footage. • Or create own backscatter assets (black/grey background with white dots). • Using Python and OpenCV, experiment with blob detection algorithms.	• Log progress in the Project Journal, maybe even store code in a 'spike' repository on Github.	Friday

3.5 Comments & Concerns

No comments or concerns at the moment.

4   27-10-2023

4.1   Supervision Meetings

Date	Agenda	Actionable Items	Attendees
31/10/2023 (upcoming)	- Pinpointing project scope/objectives. - Laying out rough schedule based on project objectives. - Getting started on pre-reading/literature review. - Discussing organisational tips/workflows. - Schedule for re-occurring meetings. (more to be added if I can think of anything else important)	N/A	- Sidharth Shanmugam - Paul Mitchell - Benjamin Henson

4.2   Actionable Items Recap

Actionable Item	Progress Report	Pending Tasks
Actionable item 1	- Progress report 1 - Progress report 2 - Progress report 3	- Pending task 1 - Pending task 2 - Pending task 3
Actionable item 2	- Progress report 1 - Progress report 2 - Progress report 3	- Pending task 1 - Pending task 2 - Pending task 3

Since this is the first weekly report and supervision meetings haven't previously taken place, there are no actionable items to reflect on. Therefore, a boilerplate table is provided above to outline the structure for future weeks.

4.3   Additional Project Updates

Additional Update	Description
Created weekly updates automation	- Created weekly-updates GitHub repository. - Branch contains templates which I update each week. - Jenkins CI/CD to pull the templates, compile LaTeX to generate PDFs. - PDFs then downloaded and emailed accordingly.

Since this is the first weekly report and work on this project hasn't commenced yet, there are no additional updates to reflect on.

4.4   Next Week's Agenda

Actionable Item	Description	Success Metrics	Target
Actionable item 1	• Description point 1 • Description point 2 • Description point 3	• Success metrics 1 • Success metrics 2 • Success metrics 3	Thursday
Actionable item 2	• Description point 1 • Description point 2 • Description point 3	• Success metrics 1 • Success metrics 2 • Success metrics 3	Wednesday

The future week's agenda will be discussed in the upcoming supervision meeting. Above is a boiler-plate table to outline the structure for future weeks.

4.5   Comments & Concerns

No comments or concerns at the moment.