FYP - Weekly Logs

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**Software and Electronic Engineering**

**Year 4**

# Week 8: Ending – 22/11/2020

1. **This week’s work:**
   1. Created a Jira page for the project. Created Epics for each main task, added the epics to a roadmap and created sub tasks for the Epics currently in progress.
   2. Continued work on OpenCV course. Completed basics and am now moving onto more advanced topics like object detection/tracking.
2. **Next week’s work:** 
   1. Continued work on OpenCV course. Hope to complete advanced topics and move onto deep learning.
   2. Will commence software diagram for ESP32 code.
3. **Blockers:** None.
4. **Schedule:** Looks like Image processing software diagrams will not be started until week 10.

# Week 9: Ending – 29/11/2020

1. **This week’s work:**
   1. Completed software flowchart for ESP32-CAM.
   2. Came to realisation that my use of ESP32-CAM may not be justified; its only use will be to capture images and send them to be processed, this can be done by any WIFI camera.
   3. Continued work on OpenCV course. Finished topics on feature and face detection.
2. **Next week’s work:** 
   1. Moving onto Deep Learning on OpenCV course. Hope to have this finished before end of week, so software design of my own project can start.
   2. Come to a clear conclusion on how/if I want to continue to implement the ESP32-CAM, or just use a normal WIFI camera.
3. **Blockers:** None.
4. **Schedule:** If it is decided I will not use ESP32-CAM, time will be diverted from its development, to other tasks.

# Week 10: Ending – 06/12/2020

1. **This week’s work:**
   1. Completed Deep Learning section of OpenCV course.
   2. Did research into facial recognition. (Viola-Jones algorithm).
   3. Decided to use ESP32-CAM only if time allows, (in semester 2). Doing some pre-processing on it (such as grabbing the area around a persons face for use in gaze detection, or possibly some data augmentation like rotation/flip/zoom/shear etc.)
2. **Next week’s work:** 
   1. Develop software diagrams for image processing code.
   2. Begin programming image processing software.
3. **Blockers:** None.
4. **Schedule:** On schedule at the moment. Goal for the technical presentation is to demonstrate some image processing functionality, such as tracking the gaze direction of one person, not the actual gaze point.

# Week 12: Ending – 20/12/2020

1. **This week’s work:**
   1. This week and last has unfortunately involved minimal work on my project, due to other assignments and exams taking up my free time. I did however come to a conclusion of what I hope to present for the technical demonstration, that being head detection and gaze direction functionality and testing.
2. **Next week’s work:** 
   1. Develop software diagrams for image processing code.
   2. Begin programming image processing software.
   3. Adjust my Jira timeline to reflect changes to my schedule.
3. **Blockers:** None.
4. **Schedule:** Under serious time pressure if I want to complete the functionality that I would like working in time for the presentation. Will have to have a plan b ready should I not meet my ideal functionality.

# Week 13: Ending – 27/12/2020

1. **This week’s work:**

Unfortunately, due to other projects taking up more time than anticipated, less work was completed this week than I would have liked.

* 1. Took a step back from last weeks plan as I was struggling to visualise how I was going to approach the work I had set out for myself. The result of this was breaking down the work I plan to do in a way that it is more understandable to me.
  2. Jira page has been adjusted to reflect changes to my schedule. I also integrated sprints into my Kanban board so that my progress can be easier tracked.
  3. Did research into different methods that gaze direction estimation can be achieved. More work will need to be done on this before I start the diagrams.

1. **Next week’s work:** 
   1. Develop software diagrams for image processing code.
   2. Begin programming image processing software.
2. **Blockers:** None.
3. **Schedule:** This week’s work spilled over into Tuesday of week 14. Still under time pressure. I will approach the gaze direction estimation work incrementally so that if it is not complete, I will still have some sort of functionality to show.

# Week 14: Ending – 03/01/2021

1. **This week’s work:**
   1. This week I began programming the image processing code. Namely, the method to get a face from a larger image and its location in that image. These will be used as inputs to the gaze direction estimation method.
2. **Next week’s work:** 
   1. Develop software diagrams for gaze direction estimation code.
   2. Alter architectural diagram to more accurately represent how I am approaching the project.
   3. Develop gaze direction estimation code.
   4. Complete technical demonstration video.
3. **Blockers:** None.
4. **Schedule:** I will stop with the gaze direction estimation code this Friday so that I have time to alter the architectural diagram and create the technical demonstration video which is due for Sunday 5pm. If I fail to get the gaze direction estimation completely finished by then, I will at least hope to determine the head orientation which is a large portion of the work towards gaze direction estimation.

Semester 2:

# Week 1: Ending – 31/01/2021

1. **This week’s work:**
   1. A plan was made on Jira for the work I plan to do over the next 4 weeks, these will be broken down into week long sprints.
   2. I continued trying to train my own version of the Hopenet head pose estimation model. Proving difficult to get it to learn properly. Loss values are hovering in the thousands whereas the paper states values of around 10 for each angle.
   3. Began small bits of work on my project report.
2. **Next week’s work:** 
   1. I believe the issue with the model training lies in either the loss function I am using or in how the datasets are processed for training.
   2. I will code the gaze mask functionality which will occlude all areas in an image except for the rough direction a persons head is pointing.
   3. I will continue to work on my project report.
3. **Blockers:** None.
4. **Schedule:** The web application development has been pushed back a few weeks to give myself a chance to get the image processing software up to a working (prototype) state.

# Week 3: Ending – 14/02/2021

1. **This week’s work:**
   1. Created an AWS SageMaker Studio notebook which will allow me to offload training of my models to the cloud, therefore saving time.
   2. Parked Head Pose Estimation training for now. Instead I began researching saliency mapping hand ways to go about implementing it.
   3. Continued work on the references section of my project report.
2. **Next week’s work:** 
   1. Continue research on the saliency mapping aspect of the project.
   2. Code the gaze mask functionality which will occlude all areas in an image except for the rough direction a persons head is pointing.
   3. Continue to work on my project report.
3. **Blockers:** None.
4. **Schedule:** I hope to have an image processing prototype ready for march 19th, the prototype may implement the pretrained model for Head Pose Estimation. However if I have time I would still like to have my own version of it.

# Week 5: Ending – 28/02/2021

1. **This week’s work:**
   1. Came to the conclusion that in order to get basic functionality of the project working I will use pretrained models for both head pose estimation and saliency mapping. This will act as a baseline that I can fall back on as training my own models is proving difficult.
   2. Found a tensorflow implementation of a saliency papping deep learning model called MSI-Net. Training time is extremely lengthy (5 days) so I am currently considering my options on how I can most (cost) effectively train the model.
   3. Began work on the project poster.
2. **Next week’s work:** 
   1. Decide on training method and complete the training of MSI-Net.
   2. Continue work on my poster.
   3. Changes to how I am approaching the project will need to be reflected in the Jira timeline. A general restructuring will be necessary as I am finding it hard to have a clear idea of my goals week-to-week.
3. **Blockers:** None.
4. **Schedule:** Sprints that I have been setting out for myself have been going over time. There is also an issue with goals I am setting for myself are not being fully met upon sprint completion. I believe the issue lies with somewhat vague goals. This will be hopefully fixed by the restructuring I plan for this week.

# Week 6: Ending – 07/03/2021

1. **This week’s work:**
   1. Realised there are pretrained tensorflow versions of MSI-Net available. I download and compared versions which were trained on different datasets to see which one works most effectively. Came to conclusion that the model trained on the OSIE dataset is most effective for my needs.
   2. Continued to work on my poster. This time settling on a layout, colour scheme and doing work on my architectural diagram so it fit well into the poster.
   3. Figured out how to use the GMIT computers for training models, this may come in handy in the future.
2. **Next week’s work:** 
   1. Begin developing the larger image processing code using the pretrained models. That is, to take in a frame, estimate the gaze and then get saliency of objects in gaze.
   2. Continue work on my project poster. Aim to get a rough version finished with placeholder text and images where necessary
3. **Blockers:** None.
4. **Schedule:** Sprint completed on schedule. New one starting Monday.

# Week 7: Ending – 15/03/2021

1. **This week’s work:**
   1. Incorporated the saliency estimation into the larger code. I am not happy with it however. Changes need to be made so that the head pose estimation is more accurate. Also, the saliency model relies on a file to be fed into it so that saliency may be estimated. This means the HPE must write to a file, which will then be used for saliency estimation. I would prefer to just feed an image straight into the saliency method without the need for creating a file first.
   2. Did work on my poster. Happy with the layout and colour scheme. The summary and architectural diagram sections are OK, but more content needs to be added to the other sections.
2. **Next week’s work:** 
   1. Continue work on the poster to reach last weeks intended goals.
   2. Figure out how to implement a more accurate HPE model.
3. **Blockers:** None.
4. **Schedule:** Sprint objectives from the week were not fully finished and so have spilled over into next week.

# Week 10: Ending – 18/04/2021

1. **This week’s work:**
   1. Reorganised my Jira to reflect the amount of work and time I have left. Narrowing down my jobs to mainly:
      1. Method to calculate the most salient area in a person’s gaze field.
      2. Improving accuracy and speed of image processing code.
      3. Completing documentation and videos.
   2. Began work on the method to calculate the most salient area in a person’s faze field. Going well, just need to factor in the angle between the area and the predicted gaze direction. Will use this as a weight to get only the most salient area.
2. **Next week’s work:** 
   1. Complete most salient area method.
   2. Move on to improving accuracy of code.
3. **Blockers:** None.
4. **Schedule:** Long but unavoidable pause in work on my project. This has left me in a position where I needed to really narrow down the work I intended to do. The changes were not actually that massive from my original plans before the easter. All changes reflected in my Jira.

# Week 11: Ending – 25/04/2021

1. **This week’s work:**
   1. Completed the method which calculates the most salient area in a saliency prediction and overlays that area on top of the input image.
   2. Began work on improving the accuracy of the image processing code. Specifically, I began researching how I might train a more accurate head pose estimation model.
2. **Next week’s work:** 
   1. Change my head pose estimation code so that more visible improvements can be seen in its accuracy with successive epochs. The following week can be used for actually training the entire model.
   2. Begin writing the report on Sunday.
3. **Blockers:** None.
4. **Schedule:** Work on schedule, according to the week that I set out for myself after the break.

# Week 12: Ending – 03/05/2021

1. **This week’s work:**
   1. Attempted to train a more accurate version of the head pose estimation model.
   2. Started working on my report.
2. **Next week’s work:** 
   1. Continue work on report
3. **Blockers:** None.
4. **Schedule:** I am going to focus on writing the report for now. If I have time I will approach the code again