Initial Plan: Internet of Things Driven Cosplay

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CM3203: One Semester Individual Project – 40 credits

Project Description

Cosplay is the fusion (portmanteau) of the words costume and play. It is both a noun and a verb. It can describe the performance art in which individuals wear costumes to represent a specific character; or it can also refer to the costumes themselves. Those who participate in the art, are referred to as 'Cosplayers' [2].

Individuals can engage in cosplay in a variety of different ways. Most participants mainly engage by attending conventions. These conventions very in size and theme; they can be smaller, local events like 'Cardiff Film & Comic Con' or larger, international events like 'Gamescom'. Those individuals who fabricate their own costumes, can choose to participate in competitions. These competitions are usually proportionate to the size of the convention/event that they are hosted by. Meaning, they can be small, friendly events or large, international competitions with hefty prize pools; like Twitchcon 2018, which had a total prize pool of over $70,000.

Since the coining of the term 'Cosplay' in 1984 [1], this sub-culture has experienced exponential international growth. Due to the growth of this sub-culture, many individuals have successfully converted this hobby into their professional business model, by capitalising on their social media influence. Even other industries have recently begun to exploit the influence cosplay has on popular culture; employing these influential individuals to both create costumes from their new/current product and attend marketing events in said costumes.

As the industry grows and gains further popularity, it can afford to support more business. These businesses produce new materials and technologies that are usually cheaper, more efficient and better suited for costume creation.

In this project, I plan to explore how recent IoT technologies can impact and improve the cosplay industry. Observing how utilising multiple sensors and actuators in a 'smart' costume can improve both visual impact and social interaction [3]. In order to facilitate this observation, I will fabricate an interactive helmet. This helmet will consist of LED lighting, a Bluetooth LE capable microcontroller [4], and an Android application. This application will provide and control multiple methods of interactivity, including motion control, audience participation and ambient conditions. This project will be considered successful if the primary motion-controlled interactivity is functional; audience and ambient controls are considered secondary and subject to time constraints.

The motion controls will rely on the in-built accelerometer and gyroscope within the mobile device to recognise pre-defined motions. These motions will execute the commands that will alter the colours and patterns of the LED lighting.

To exploit audience participation, the application will utilise a live streaming platform (Twitch.com). I will implement code that employs an IRC library to read audience comments in real-time. It will recognise pre-defined comments and execute the relevant commands. I decided on Twitch.com as it is the most popular streaming service with a mobile application; which increases the likelihood that audience members will interact with the system [5].

Lastly, I will be adding ambient system interaction. This will be done by utilising the weather, which is achievable via the in-built mobile sensors or a weather API. The application will recognise pre-defined weather states and execute the relevant commands.

Project Aims and Objectives

- Analyse and identify project problem and feasible solutions - Primary
    - Research project background.
    - Explore feasibility of accessible solutions.
    - Produce an initial plan.
    - Complete ethics course.
    - Submit ethics form.
    - Design project hardware.
    - Design project software.

- Construct an interactive helmet - Primary
    - The helmet should be constructed using the appropriate electronics that will allow the system to receive Bluetooth Low Energy (BTLE) commands and impact the environment state (LEDs) accordingly.

- Produce the mobile application - Primary
    - This application will act as the BTLE 'Central', receiving, processing, and sending data to and from the helmet via UART code.
    - Implement a static manipulation of the helmet's LED lights.

- Monitor and utilise User data (motion sensors) - Primary
    - Include code that utilises a worn mobile device's in-built accelerometer and gyroscope to recognise pre-defined motions from the wearer.
    - Send the recognised motion's relevant command to the helmet processor, which will change the LED state accordingly.

- Monitor and utilise Audience data (social media interactivity) - Secondary
    - Improve the mobile application by developing the social media / streaming platform interactivity code. Starting with Twitch.com, utilise an IRC library to read and recognise correctly formatted comments (!blue1fast, !red2slow).
    - Send the recognised comment's relevant command to the helmet processor, which will change the LED state accordingly.

- Monitor and utilise Ambient data (weather) - Secondary
    - Utilise either the in-built mobile sensors or an online API to read and recognise the current ambient weather conditions.
    - Send the recognised ambient condition's relevant command to the helmet processor, which will change the LED state accordingly.

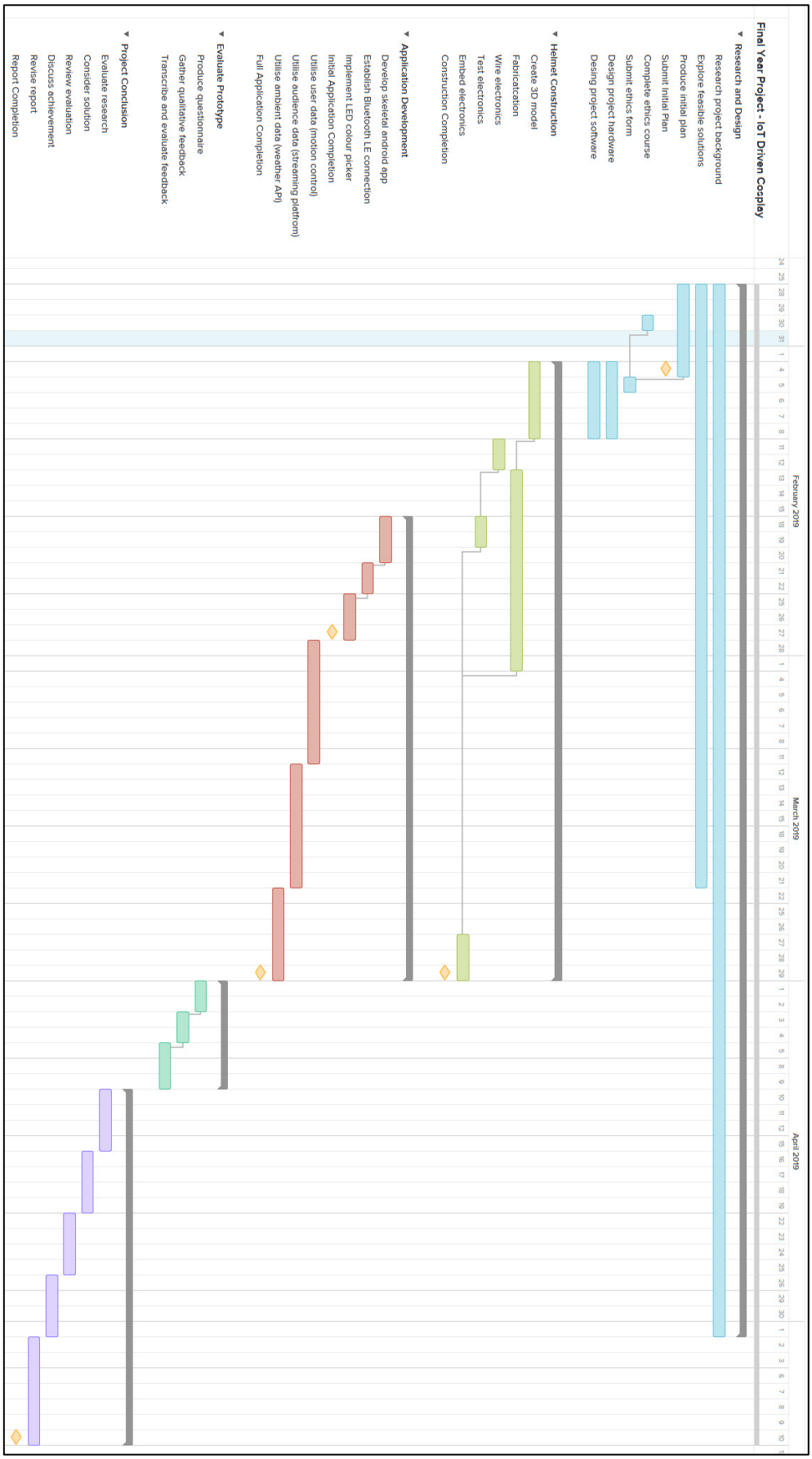
- Evaluate the completed prototype - Primary
    - Produce ethically acceptable questionnaire.
    - Carry out qualitative user-based evaluation via focus group.
    - Transcribe and evaluate given feedback.
    - Utilise evaluated feedback in final report.

- Write project final report - Primary
    - Evaluate research. Understand project problem and background.
    - Consider solution approach and implementation.
    - Review evaluation. Analysing the test methodology and validity.
    - Discuss achievement of agreed overall deliverables.

Risks

Risk	Risk Impact (Low, Medium, High)	Likelihood of Event (Certain, Likely, Somewhat Likely, Unlikely)	Solution
Data Loss	High	Unlikely	Utilise multiple backups over different storage solutions.
Illness	Low	Somewhat Likely	Distribute workload evenly. Ensure there is unallocated time available for emergency.
Defective Hardware	Medium	Unlikely	Procure and test all required hardware early.
Delays	Medium – High	Likely	Produce and meet daily/weekly achievable goals. Schedule tasks by critical importance, ensuring functionality.
Lack of Experts	High	Somewhat Likely	Search and confirm appropriate candidates early.
Focus Group Absences	Medium	Likely	Gather a surplus of experts, allowing for a few absences.
Unexpected System Malfunction (Viva)	High	Unlikely	Collect suitable evidence illustrating system functionality.
Ethical Approval Delays	High	Unlikely	Submit the Ethical Approval Form early, resolve any resulting issues quickly.
Insufficient Funding	High	Unlikely	Confirm all required purchases early. Ensuring there is sufficient funds before purchase.

Work Plan


Final Year Project - IoT Driven Cosplay
Research and Design
Research project background
Explore feasible solutions
Produce initial plan
Submit Initial Plan
Complete ethics course
Submit ethics form
Design project hardware
Desing project software
Helmet Construction
Create 3D model
Fabricatcation
Wire electronics
Test electronics
Embed electronics
Construction Completion
Application Development
Develop skeletal android app
Establish Bluetooth LE connection
Implement LED colour picker
Initial Application Completion
Utilise user data (motion control)
Utilise audience data (streaming platfrom)
Utilise ambient data (weather API)
Full Application Completion
Evaluate Prototype
Produce questionnaire
Gather qualitative feedback
Transcribe and evaluate feedback
Project Conclusion
Evaluate research
Consider solution
Review evaluation
Discuss achievement
Revise report
Report Completion
February 2019
March 2019
April 2019

- 28/01/19 – 01/02/19: Week 1
    - Examine and evaluate project.
    - Discuss project approach during Supervisor meeting.
    - Produce Initial Plan:
        - Draft, proof-read, correct then submit. (Deadline - 04/02/19) (Milestone)
    - Complete ethics course.

- 04/02/19 – 08/02/19: Week 2
    - Research existing solutions and background knowledge.
    - Begin design of the hardware.
    - Begin design of software.
    - Create 3D model of helmet.
    - Submit ethics form.

- 11/02/19 – 15/02/19: Week 3
    - Finalise hardware design.
    - Begin construction of helmet.
    - Wire essential electrical components.
    - Continue application research and design.

- 18/02/19 – 22/02/19: Week 4
    - Finalise application design.
    - Continue helmet construction.
    - Begin application development.
    - Successfully establish BLE connection between application and helmet system.

- 25/02/19 – 01/03/19: Week 5
    - Implement basic LED colour picker. (Milestone)
    - Begin development of motion controls.
    - Complete helmet fabrication.

- 04/03/19 – 08/03/19: Week 6
    - Continue motion control development.

- 11/03/19 – 15/03/19: Week 7
    - Complete motion control development.
    - Begin development of audience interaction controls.

- 18/03/19 – 22/03/19: Week 8
    - Complete audience interaction control development.
    - Begin ambient interaction development.

- 25/03/19 – 29/03/19: Week 9
    - Complete ambient interaction development.
    - Finalise application. (Milestone)

- 01/04/19 – 05/03/19: Week 10

    - Produce questionnaire.
    - Gather qualitative feedback – via focus group.
    - Begin transcription of gathered feedback.

- 08/04/19 – 12/04/19: Week 11
    - Complete transcription and evaluation of feedback.
    - Begin report write up.

- 15/04/19 – 19/04/19: Easter Week 1
    - Continue report write up.

- 22/04/19 – 26/04/19: Easter Week 2
    - Continue report write up.

- 29/04/19 – 03/05/19: Easter Week 3
    - Finish initial draft of final report.
    - Begin report revisions.

- 06/05/19 – 10/05/19: Week 12
    - Continue report revisions.
    - Submit final draft of completed report. (Deadline – 10/05/19) (Milestone)

Ethical Consideration

As this project relies on qualitative feedback for evaluation, human participation is required. This participation would involve interview, observation, questionnaire and personal data. As such, I require ethical approval. The process for achieving this approval has been factored into this initial plan.

References

1. Bruno, M. Cosplay: the illegitimate child of SF masquerades. Glitz and Glitter Newsletter, Millenium Costume Guild, 2002.
2. Lamerichs, N. The cultural dynamic of doujinshi and cosplay: Local anime fandom in Japan, USA and Europe. Participations, 2013.
3. Swan, M. Sensor Mania! The Internet of Things, Wearable Computing, Objective Metrics, and the Quantified Self 2.0. Journal of Sensor and Actuator networks, 2012.
4. Gomez C, Oller J and Paradells J. Overview and Evaluation of Bluetooth Low Energy: An Emerging Low-Power Wireless Technology. Sensors, 2012.
5. Zhang C, Liu J. On crowdsourced interactive live streaming: a Twitch.tv-based measurement study. Proceedings of the 25th ACM Workshop on Network and Operating Systems Support for Digital Audio and Video, 2015.