Initial Project Description

Team 21

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Project Name

Cosplay Companion

Project Synopsis

The Cosplay Companion is an electronic costume helmet paired with an integrated companion app, allowing for unique LED expression puppeteering and heat-monitoring safety features.

Project Description

A new development in cosplay is the use of electronics such as LEDs and servos to enhance various features of a costume.

A frequent issue of heavier costumes is the danger of heat exhaustion. This is particularly concerning when a costume involves a helmet, because it is important to dissipate heat away from the head. The use of electronics in a costume provides the unique opportunity to add sensors into a helmet that can detect excessive heat levels, and with the prevalence of IoT-compatible microcontrollers, it is possible to sync the sensors and other electronic components with a custom mobile app.

The Cosplay Companion aims to test this concept by constructing an electronic costume helmet with an integrated companion app. The helmet will display expressions and animations on LED panels that can be controlled manually by the wearer via buttons in the gloves, allowing for exceptional puppeteering and audience interaction. The app will use heat/humidity readings from the sensors to control fans and alert for excessive heat levels. In addition to these safety features, the app may provide useful control options for the LEDs, such as RGB color adjustment, extra animation features, and switches for battery-saving or photo-friendly modes.

The project will result in a fully functional costume helmet that can be worn to fan conventions and maker events. It also serves as a prototype if any group members would like to take commissions in the future.

Project Milestones

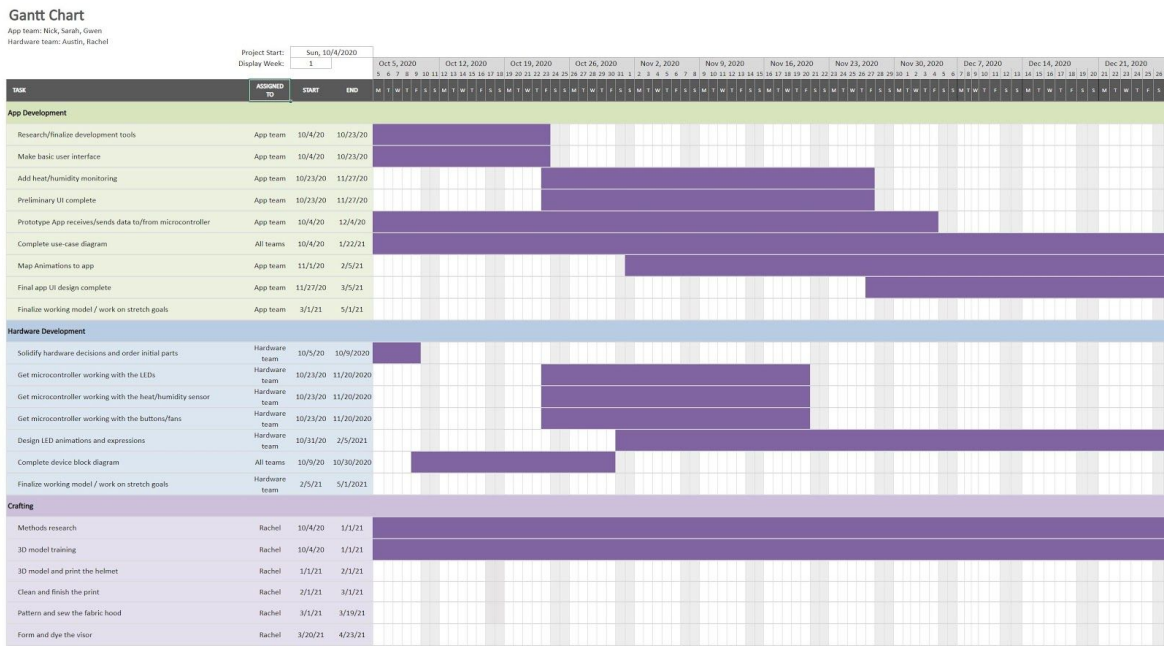
Milestones:

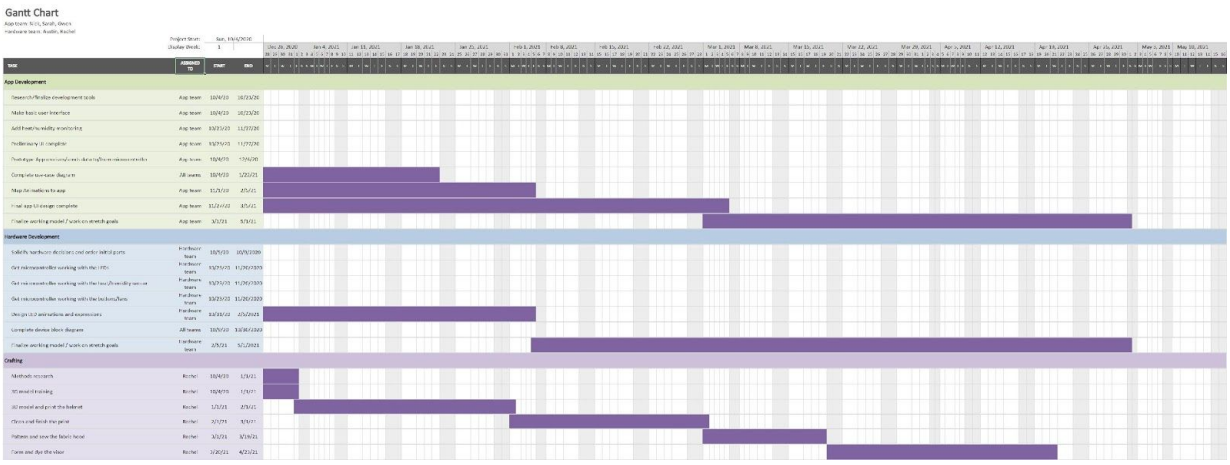
- First semester
    - All hardware/software decisions finalized (10/23/20)
    - **o** Device block diagram complete (10/30/20)
    - Microcontroller sends/receives data to/from peripherals (11/20/20)
    - Preliminary UI for app complete (11/27/20)
    - Prototype: App receives/sends data to/from microcontroller and peripherals (12/04/20)
- Second semester
    - Use case diagram complete (1/22/21)
    - **o** Animations mapped to physical buttons and app (2/5/21)
    - Final app UI design complete (3/5/21)
    - Helmet crafting complete (4/16/21)
    - Deliver working model (5/1/21)

Gantt chart:

Our preliminary work plan is to have an app team consisting of Nick, Sarah, and Gwen, as well as a hardware team consisting of Austin and Rachel, while Rachel takes primary responsibility for the crafting. The following Gantt chart shows the predicted timeline of tasks to complete. Each task is separated into the project's three main categories: the app, the hardware, and the crafting.

Please refer to the attached PDF for a full-size view of the Gantt chart.





Project Budget

Hardware, software, and/or computing resources:

This project is split into three main parts: the app, the hardware, and the crafting. Potential resources have been identified, but final decisions are still in progress. The app requires software that can connect to microcontrollers via Bluetooth or Wi-Fi. The helmet requires hardware and peripherals along with the software to drive them. Software decisions for the helmet are highly tied to the hardware decisions since many libraries and APIs are developed for certain products.

Hardware and software decisions will be made with an emphasis on the availability of learning resources within the constraint of being budget friendly.

Estimated cost:

Here is a price breakdown for one potential hardware implementation:

Hardware:

- Raspberry Pi 3 B+: $35.00
- RGB Matrix Bonnet for Raspberry Pi: $14.95
- 64x32 RGB matrix 3mm pitch: $44.95; x2 = $89.90
- 16x8 1.2” LED matrix + backpack: $21.95; x2 = $43.90
- Temperature/humidity sensor: $8.95
- Portable 5V 4.8A power supply: $49.99
- 5v Fans x2: $6.99
- Tactile switch buttons x10: $2.50
- 1.14” LCD display: $9.95

Software:

- No anticipated software costs at this time.

Crafting:

- Fabric 1yd: $29.99
- EVA foam roll: $9.99
- 3D printing: $2.00 + $0.30/gram; estimate ~$20
- Vacuum forming: Unknown; estimate ~$40
- Finishing materials (paint, filler, etc): Unknown; estimate ~$40

Tentative total: $402.11

Note that the listed prices are for brandname items. Offbrand alternatives at lower costs may be considered.

The above estimate is the cost of creating one helmet. Due to concerns regarding COVID-19, we are considering the possibility of creating two helmets so that more team members may work on hardware while maintaining physical distance.

Vendors:
None of the preferred vendors carry any required parts, so they must be acquired from other sources. The above prices are from vendors Adafruit, MicroCenter, Amazon, and BigZFabric.

Special training:
Many aspects of the project are new to the members and will require hands-on learning. We are keeping this in mind as we select our hardware, software, and crafting methods so that free learning resources are available. There are no anticipated training costs at this time.

When they will be required:
We are prioritizing the software development and hardware aspects of the project. As such, we will request that parts listed under “Electronics” be supplied by 11/01/20 so that we may begin prototyping. The crafting section of the project may begin after we are satisfied with our prototype; the current project timeline suggests we may need crafting materials as soon as 12/04/20.