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Independent Study and Mentorship

29 January 2023

Hardhat detection on mobile application

# Introduction and Statement of Purpose

While creating the product during the first semester of ISM, new information was found through research and interviews, such as the fact that there are many cameras on construction sites that overlook workers all the time. With that information, Original Work could be improved significantly on its practical application, as the Original Work did not consider practical applications. By creating an accessible mobile application that utilizes hardhat detection, more people will have access to it, although it would be best utilized by Safety Officers who monitor construction site workers. Rather than focusing on the detection of general objects of construction sites, hardhats will be the focus as it is one of the most crucial PPE and a lot of workers overlook wearing them.

# Review of Skills and Research

To create a mobile application for hardhat detection, research on how to create a mobile application is necessary. This is not something that has been researched during the first semester, and will be one of the main focuses while creating the product. Another research that needs to be done is how the YOLO algorithm can be applied on the mobile application, as in the Original Work, YOLO has been run on a desktop PC on Windows operating system, not on a mobile platform and operating system.

There are some essential skills necessary for creating this product, too. One of them is knowledge in various technologies and devices, as this product will be using a combination of various technologies on different platforms. Coding skill is also necessary as it is needed to create a mobile application and tweak algorithms to work in different platforms. While these skills need to be improved on to be able to create the product, some degree of it is already achieved from past experiences and recent experiences while creating the Original Work.

# Methodology

## Materials

To create the product, a desktop PC and mobile device are needed.

## Description of Process and Procedures

First, research on how to create a mobile application will be done to create the product. After creating the outline of the mobile application, research on how to use the YOLO algorithm on mobile applications will be done and applied. Then, since the product is to detect if a worker is wearing hardhats or not, hardhat and worker detection should be created through training the algorithm. Lastly, everything will be put together and tested for use.

# Utilization of Higher-Level Thinking Skills

To create this product, problem-solving skills will be essential. After all, the product is a tool that is proposed to solve the problem of safety hazards in the construction workplace by trying to increase the percentage of workers wearing hardhats. While creating the product, many challenges will be faced as this product requires the use of various platforms. This challenge will require problem-solving skills to solve. Designing skills will be necessary while creating the mobile application, as an effective interface will improve the usability of the application.

# Conclusions

While creating this product, various thinking skills such as mentioned above will be gained, as well as coding skills and mobile application skills. This product will be very useful in the real world if further developed by increasing the safety of workers on construction sites. Since a lot of workers do not wear hardhats of inconvenience, when an accident happens, it becomes more dangerous. The product will hopefully prevent that from happening by detecting if workers have hardhats on or not and address them to wear it. This product can be either utilized on cameras already implemented in construction sites or cameras separately installed for the purpose of using this product.

| Week 1  Jan. 29 - Feb. 4 | \*\*\*Look for a mentor  \*Work on finalizing Product Proposal  \*Research how beneficial hardhats are and how much this product can prevent injuries or fatalities  \*Complete research assessment over the benefits of promoting wearing hardhats  \*Complete the VLOG |
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| Week 2  Feb. 5 - Feb. 11 | \*If a mentor is found, ask the mentor to review my proposal and calendar. If not, look for mentor as soon as possible  \*Research and start creating mobile application  \*Complete research assessment over creating mobile applications for object detection  \*Complete the VLOG |
| Week 3  Feb. 12 - Feb 18 | \*Finalize and submit Product Proposal  \*Continue researching and creating mobile application  \*Complete research assessment over application of YOLO algorithm on mobile applications  \*Complete the VLOG |
| Week 4  Feb. 19 - Feb 25 | \*Work on the mobile application  \*Complete research assessment on product progress  \*Complete the VLOG |
| Week 5  Feb. 26 - Mar. 4 | \*Continue working on the mobile application  \*Work on digital portfolio  \*Work on poster for showcase  \*Complete the Blog |
| Week 6  Mar. 5 - Mar. 11 | \*Finalize digital portfolio  \*Start research on hardhat detection |
| Week 7  Mar. 12 - Mar. 18 | \*Start setting up YOLO  \*Ask mentor for new ideas and confirmation of current project objectives |
| Week 8  Mar. 19 - Mar. 25 | \*Gather and annotate images |
| Week 9  Mar. 26 - Apr. 1 | \*Gather and annotate images  \*Set up for training the images |
| Week 10  Apr. 2 - Apr. 8 | \*Finish training a custom object detection model  \*Finish what’s remaining |