**Title (Nhan)**

* Hello, my name is Nhan Nguyen and this is Justin Haryanto.
* Our sponsor is Mister Krishna Gadepally
* And our project is on fall detection using video footage

**Problem Overview (Nhan)**

* We are designing a video based fall detection system. To do this, we are using pose estimation to extract information on the body’s movement and location, such as key points and bounding boxes, from images derived from the inputted video. With this information, we utilize machine learning models to determine if a fall has taken place within the video.

**Block Diagram (Justin)**

* Our system consists of the video processing, pose estimation, and fall detection subsystems.
* Nhan is responsible for processing the video input into a useable format and then applying bounding boxes and keypoints with the pose estimation system
* I am responsible for sending Nhan’s output to the two machine learning algorithms within the fall detection system: random forests and convolutional neural networks (or CNNs)
* Finally, the results of the two algorithms are combined via majority vote, and then sent out to an external system

**Engineering Design Accomplishments (Justin)**

* We used the UR Fall Detection data set for our experiments, which consists of several videos, each with around 200 frames
* Our pose estimation model, called AlphaPose, was able to apply bounding box and keypoint information to the images
* This allowed for the training of the CNN and Random Forest models, which resulted in it being able to give initial predictions on falls

**Pose Estimation (Nhan)**

* Mean Average Precision is a measurement to evaluate object detection systems. It is the average of average precision over all detected classes.
* Our Pose Estimation system, AlphaPose, has a mean average precision of 75 on the Coco data set, a renown object detection data set. The first open source system to do so.
* We seek to eventually improve upon this by retraining the system on more diverse data. But for now, we are using this system to obtain bounding boxes and key point data
* You can see this in this figure.

**Fall Detection (Justin)**

* The processed data made by the pose estimation subsystem was used in the machine learning models
* But before that, the data was separated such that the keypoint information was sent to the random forests model, whereas the bounding box information was sent to the CNN model
* The reason for this was because it was recommended by our sponsor to use a CNN to analyze the bounding box information because this model excels at image processing tasks
* Based on a small data set, the random forest model was able to get an accuracy of 100%, but we expect it to be much lower once it’s given a larger data set
* However, the CNN model had a low accuracy of 26%, so this needs more improvement before being given a larger set

**Execution and Validation (Nhan)**

* For our execution plan, we made considerable progress. Notably, we have made progress on practicing machine learning and for training the models we have for fall detection.
* This is evident in our validation plan, where we are testing almost all of these systems, such as the accuracy of the CNN and Random Forest models.
* We have not, however, tested all of these as a whole system.

**Remaining Tasks (Justin)**

* **demo**
  + There are a couple of things we need to work on before our final demo
  + The pose estimation system needs to be tested with video
  + We need to combine both our parts and see if the whole system is functioning
  + The accuracy of the fall detection algorithms needs to be improved and needs more training
* **404**
  + Our goals for 404 are to improve the performance of both our systems in terms of accuracy and speed
  + We are looking to get the entire system to run on live video
  + And to get more training using larger and more diverse data sets

**End**

* Thank you for your time, we are now open to questions