1.

* Program to be investigated:
  + Gesture Library Training Tool
  + For our purposes we will use sign language to give a good base library of varying but also similar gestures
* Based on theory and algorithms from Assignment 1

2.

* Environmental restrictions:
  + Background
    - For successful tests we hope to eliminate background considerations but realize that may be out of the scope of our project
* Program Restrictions
  + Make as generic as possible so can run on any library
    - Taking a fore into / experimenting with the actual training side of hand gestures but taking sign language as a specific experiment for the bounds of the project
  + Likely be using openCV and C++ using the STDlib C++11. And possibly the QT project library

3.

* REFERENCES – look it up!!

4.

* Measuring Program Performance
  + We hope to develop a training tool in general for any hand gesture set with the end goal of providing some active feedback on the positioning of their hands
  + Start with American sign language as a starting library—using it as a limited case
* Step s:
  + This will be live capture!!
  + Split the alphabet into different equivalence classes
    - Differentiating between these classes will be step 1
    - At this step we are exempting the letters of ASL that use motion as part of their gestures (J and Z) – time permitting we hope to expand the tutorial to include motion vectors as well although it is likely outside the scope of this project
  + Distinguish individual gestures within the equivalence classes
    - Can extend this / talked about extending this time permitting to modify this into an actual training tool for a non-fluent user
    - Not as a linguistic tool but purely as a code based/ alphabet training tool which will give a good example of simulating training for any hand gesture set
    - This will be the main (more than likely) challenge for this assignment and will be our main goal of this assignment and we hope to get 95% acceptance with reasonable degrees of rotation and position
    - This will be the first main milestone at which we can judge our programs performance
    - Haar Classifier will be used
      * We will experiment with these classifiers in order to gain quick recognition of various similar hand gestures
      * Potentially building our own classifier database but more likely using one of the many hand image databases that exist already but it is more than likely that for some of the gestures we will have to role her own
  + Binary Correct/Not correct
    - Start with binary recognition with negative feedback displaying the correct gesture to be courted side by side with the live video
    - Binary feedback while not our ultimate goal for our program will still be a good measure of success for the overall implementation but depending on the complexity of recognizing the very similar hand gestures such as M and N in ASL this maybe a little bigger of a bit than we can chew
  + After we distinguish between gestures and equivalence classes we plan on implementing an active feedback mechanism
    - Model the users hand dimensions through a series of training tests/commands/methods in order to accurately model the dimension their specific hand gestures will have and create a model that we can overlay on top of their actively pronounced hand gestures and show where they need to correct themselves
    - These active feedback models will be tailored specifically to the users hand in order to provide accurate and colorful overlays that will allow the user to adjust in real time
      * This is crucial for seeing the minute differences between what may be similar hand gestures
      * We feel this will be useful for any system using gestural imput when it be hand or other object visual input—will be helpful in the guise of a language training program and also has a wider reaching scope to other gesture sets in general.

5.

* Evaluation Metrics
  + The first challenge we envision is eliminating the backgournd from the picture but expounding upon an earlier derived algorithm form assignment one we hope to be able to automatically distinguish skin regions from reasonable backgrounds
    - This will be our first milestone / point of evaluation
  + being able to distinguish between very similar gestures such as M and N in ASL will be a good metric for success of the program
  + providing active feedback with a gesture overlay
    - judge the helpfulness of the feedback
    - judge the correctness of the overlay
* we hope to run at every milestone, tests involving more than 10 subjects of different hand shapes, sizes, and colors to prepare a reinforce the general scope algorithms
  + work closely with the subjects
  + ensure that algorithms are correctly generalized
* failures will tell us where we need to improve overlay generation, feedback helpfulness
* we expect the main point of failure to be differing between similar hand gestures—if this is the case we hope to learn what exactly the bounds are for a specific gesture set to be recognized by purely visual input
  + in exploring this we can set a standard not only as guildines for our own training program but for other future programs to come

6.

* after dividing the gestures into equivalence classes jointly each member will be responsible for certain subgroups—developing the specific metrics and algorithms
  + in many ways this can bleed into other milestones as well while the same set of algorithms will likely be used throughout the program—also in making the overlays, etc.
  + supplementary classes and GUIs will be split so there is equal development on a more tedious side of development as well
* because our backend is very integrated with the “front-end” we do not forsee being able to split the work on those boudns but if we reach our final milestone we plan on evolving the project into a more marketable/musable user interface and with that the GUI side and the specific implementation of training alrogithms can be split once more
* another proposed split at the beginning of the project – one member can work on background filtering while the other begins work on refining the interface and other tasks if there is enough of a problem so that the interface will be ready after the background is finished
  + can use time wisely and eliminate dead time