1) Discoverability, simplicity and feedback are the three principles that can immensely help in bridging the gulf of execution and evaluation. Discoverability enables the user to seamlessly figure out the different options available to execute their task. Simplicity goes hand in hand with discoverability in the sense that it makes sure that the user is not overwhelmed with the different options available. If the user can quickly find the various options and execute them with ease they will feel like they are directly interacting with the task. The better these two principles are followed in the design, the narrower the gulf of execution, resulting in the user not realizing the presence of an interface at all. Once the user executes an action feedback from the system is important in order to evaluate if their action yielded the intended results. The feedback should be in such a way that the user should be able to take the output from the system, interpret it and compare the same with their goals. It is said that an improper feedback is worse than no feedback at all because it will distract the user from their intended goals.

   Flexibility and equity are two principles that can be used to create interfaces from the participant point of view. As an iPhone user I use the voice activated search Siri often. When Siri was introduced I hardly had any success using it because of my accent. However, over the last few years Apple has developed Siri in such a way that users with different accents can use it easily. To me the iPhone interface is highly flexible because there are many ways to execute my tasks whether it is searching for a restaurant or calling someone. Also, I feel like this is more equitable now because anyone with an accent can use it and get the same experience. In addition, with Siri available in many languages, I can see that there are no barriers to achieving the benefits.

2) I have an old fashioned electric cooking range at home that has 4 burners. There is only one red light to indicate if the cooking range is on. This light turns on irrespective of the number of burners that are on - one burner, two burners etc... I often place my vessel for cooking on one burner and turn on another burner in front or behind it. I usually find out that I have made a mistake the hard way – touching the one that is on accidentally, seeing some light smoke come from the burner because it is on for too long without any vessel on it, placing my vegetable cutting board on the burner that is on and realizing that it is getting burnt, patiently waiting for a long time to find out that my pasta is not getting cooked at all. I have always felt that the interface is conducive to errors, even if you are an expert cook.

   I would like to improve the interface by having constraints that would prevent me from committing an error. For example, the burner shouldn't turn on if there is no vessel on it. Currently, the mapping that shows which knob controls which burner is not clear at all. I would like to improve that to clearly indicate the relationship between a knob and the burner controlled by it. It would help if the knobs are numbered from 1 to 4 and the corresponding number displayed near the burner to see the association. Above all, I'd like to fix this error by having better affordances – a push button right next to each burner that also lights up if the burner is on. This would clearly mean that to turn on a burner, I'd need to push the corresponding button and since there would be one button for each burner it would also clearly indicate which burner is controlled by which button.

3) As someone who loves sports I play the Madden NFL game in my PlayStation. I usually select the plays given in the playbook of the team that I represent. Each running play is designed for the running back or the ball handler to run between the holes created by the offensive linemen. For

example, if the play is designed for the half back to run between left-guard and tackle the corresponding arrow key on the console has to be pressed to direct the running back accordingly. Though I clearly understand this and is what I would intend to do, in the excitement, I would often press the incorrect arrow key resulting in the running back missing the hole he was intended to go through. Thus the play would fail and result in my team losing yards. I would like to redesign the interface so that I can use my fingers to indicate which direction the player should go to. Overall, I want to eliminate the need to press different keys and use fingers to draw the required motion path.

In another instance, I often like to override the plays I have already chosen because of the opposition's response. For example, if I am on offense and decided to throw the ball to a wide receiver but see that someone else is wide open, I would like to change the play at the last second by calling an audible (new play). Though I know exactly what to do, once the ball is snapped I can never execute my audible well. This is because I don't know how to override my chosen play and use the keys to select a different wide receiver to throw the ball to. I would like to redesign the interface in such a way that just selecting a player by touching using the finger should automatically override the previous selection and make the current selection active. Overall, I would like to have direct manipulation to accomplish my task of playing football.

It is extremely difficult to score touchdowns while returning a punt or a kick-off using the interface provided. This is because when many players tackle the ball carrier, multiple keys need to be pressed to break the tackles and continue the running motion. I wish the interface would be designed in a way so that fingers to draw the actions required to break tackles and enable the ball carrier run all the way to score.

4) I own a Toyota Prius hybrid and feel that the dashboard interface is an example of a good representation. This is because of two reasons: good mapping between the different options in the interface and the underlying functionalities, and no extraneous details are displayed. The interface enables the user to listen to radio, play a CD or connect the cell phone via the Bluetooth. Also, there are options to view the energy consumption of the vehicle over a period of time. In addition, when the car is backed up the interface automatically provides the user with a wide rear view of the car. Moreover, the interface has a navigation system that displays the directions to the user as needed. All of these options are easily accessible with clearly labeled text in addition to pictures of the corresponding feature. In addition, these options are disabled while the vehicle is being backed up preventing the user from any distractions. Also, this interface is not cluttered in the sense that the user doesn't have access to other information such as weather, daily news or games.

   On the other hand my Apple watch is an example of an interface with a poor representation. My Apple watch is synced to my iPhone so displays all the apps in my phone alphabetically, in a list. This is a poor representation because I have to scroll through the list from top to bottom to access apps at the end of the list. The iPhone has a wide screen so scrolling through the screen to access an app is not difficult. However with a smaller real estate, I wish the watch displayed apps in an order that is based on usage. This way the frequently used apps will always be at the top. Also, there are a few things that are difficult to do in a watch, so having all the apps in a phone makes certain information unnecessary in a watch. Also, my watch doesn't expose the inherent constraints such as limited life

of the battery as it needs to be charged every day and can only be found out based on usage. Also, the watch is heavily dependent upon the phone and what we can accomplish just with the watch is not apparent unless discovered through trial and error.