**Unlecture 1**

1. Part1:
2. Embedded Interaction: Interacting with the Internet of Things:

In this paper, the author talks about the state of embedded interaction device with the internet of things. He also gives a brief overview of the challenges faced at the end of the paper as well as different things we learned in the past that could help us develop better devices.

The author gives several examples in different areas where application have been experimented: context-aware kitchen utilities, capacitive touch input on clothes, embedded computing for entertainment and sports as well as small embedded objects.

For the kitchen aware appliance, the author gave the example of the netget a cutting board equipped with camera, sound sensor, as well as scale through which a person can weigh the object being cut as well as control a computer given that the board can act as a mouse. All these components make it useful in that environment as well as less invasive.

The author also gave an example of touch inputs in clothes or other wearable objects like bicycle helmet. Adding these interaction options to such object can make it easy to control other devices without the need of caring extra objects.

We also have people using these embedded devices for entertainment and sports and one of the most important experiment done in this case was for rehabilitation. They equipped fitness devices with sensor hardware as the ones used in the cushion, and patients could use it to help them perform various physical activities that was helping in monitoring leg muscle strengthening as well convalescing. For the challenges, the author listed problems like the invisibility dilemma. For the invisibility dilemma, the author was talking about the necessity of making these new devices blend with the environment and old devices as well as their functions. Another challenge the author touch based on was designing these devices while making a difference between implicit and explicit interaction so that we can design devices while thinking about how people will use it.

The author also talked about different tools that facilitates the design of new embedded like the development support like API’s, Toolkits and Frameworks. They also gave a brief description of the toolkit they designed the EItoolkit. At the end of the paper the author looked at the different experiments they tried and gave a list of guidelines that each person designing embedded devices should keep in mind. Those guidelines are:

Information when and where it’s useful, information provision without explicit interaction, avoiding overprovisioning, using specialized components, visibility for the control, anticipate accidental use and short and long-term life cycle when it comes to battery life and finally rapid prototyping and modeling support.

1. Wearable Computers Will Transform Language:

In this paper, the author talks about how given the addition if iot s in our everyday life and electronic devices and components getting smaller and smaller the way we interact with them will need to change. They start first with touch and how the work done at Carnegie Mellon University helped create new touch technologies that understand more than the usual point to point touch technology and going more for new screens that will take more gestures than what we are accustomed to. They also talk about voice and using brain inputs and how it will change everything. All these technologies might have been something exciting at that time in 2014, but during the past 4 years since that paper a lot has changed in this field. Studies have shown that people use more and more voice commands instead of touch or other traditional interaction modes. Given the size of wearable technologies it makes more sense to use something like voice instead of touch for interaction. Seeing that interest in voice interactions, companies started focusing more in that and that's why Companies have been accelerating the deployment of voice interactions with examples like: Google Voice, Alexa, Siri and Cortana. Voice recognition systems nowadays are more powerful and can detect more characteristics from a voice. With the advances in AI combining the two give some impressive results with some systems like Google home capable to recognize the voice of each individual in a household and only giving them information that relates to them. For example, if I ask Google “what's on my calendar” it will only give me information about my calendar. On the other hand, if my brother asks the same question Google assistant will only provide them information related to his calendar. The reality is that given that speech is the way that people naturally communicate it feels more natural and people find it easier. The one problem that might people face is interacting with these devices when we are in places where it might not be comfortable to speak in. What about people with disabilities that prevent them from talking? We have seen people using some technologies to track eye movements in order to translate that to text, then from text to speech.

Wearable is definitely changing language and it already started. Google also has a google translate app that can translate conversation where the people talking don’t speak the same language. With more and more wearable technologies coming to the market and people advancements in artificial intelligence we will get to the point where people will use wearables to interact not only with other technologies but also with people.

1. Part 2:

If there is an embedded interaction device that I would won’t to build it will be a smart glass like the google glass that can also measure brain activities and take commands using the brain. It will be coo to have a glass that will not need touch inputs for command but rather just think about the action in my head and have it realized. We have devices like the NeuroSky MindWave Mobile EEG that can use one single electrode in order to read brainwaves. It will be amazing to use that and control devices and interacting with the environment just using the brain. This can be amazing for people with disabilities as it will help them interact with the environment and perform a lot of tasks they can’t right now. It could also help blind people perform tasks easily because instead of using touch they could just think about a task and have it performed.

1. Part 3:

Reading the papers and throughout the discussion in class, I learned more about embedded systems and the challenges they face. One of the most important point that was coming on all the time was the problem of privacy. These devices getting more and more close to us and holding confidential information, the main problem people think of due to the cyber-attacks that happens often is the safety and reliability of using these devices. These devices are becoming more and more important and they will be a time when we won’t be able to live without them. To me, I think that the only solution will be localizing the data and giving each person the ability to store they data where they want it to be and access it directly from there. This will make attacks harder and can prevent people’s confidential data being exposed to companies for economic benefits. Computers are getting more performant every day and cheaper as well as smaller. Just the power packed in a raspberry pi zero W that costs $10 can have enough computational power for language processing, computer vision can also act as a personnel server. We just need to develop technologies that will help integrate such solution to the existing ecosystems. We cannot stop this afflux to iot’s, but what we can do is develop solutions that will make them more secure and help protect consumers privacy. I think the biggest challenge when it comes to embedded systems and Iot devices is security, and I think that’s where the next advancement lies in.