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AME 394

AME 394: How to Build a Physical-Digital System Final Paper

Prior to this class I was somewhat ignorant regarding digital-physical systems; I had a basic idea of the concept, but I didn't fully understand the extent of their use and reach. Obviously the name implies that these are systems are created through digital means, they have an effect on the physical world around them, but they can effect that world and be utilized in many different ways. In some cases these systems can be so effective that they can actually change everyday behavior and how we live our lives. Therefore many factors must be taken into consideration when developing a digital-physical system; such as what type of system will it be, who is going to be using it, how will they interact with the system, and what kind of feedback will the system provide.

Depending on what the goal of the system is there are many different ways the system can be incorporated and interacted with. Is the system something that people will experience a lot of interaction with? Or is it a system that requires very little interaction and should be very simplistic and user friendly? Once this factor is determined there are many different ways to accomplish both of these tasks, so the most effective method for the system must be determined. For example, tangible installations such as touch-screens are very effective for systems that require a lot of interaction because touching is a very natural action for people, thus making it easier for people to interact with a complicated system. On the other hand, ambient installations are effective for systems that require very little interaction as these types of systems change and provide feedback with very little effort from the user. However, there are also other external factors that can determine the most effective system.

Many systems are being developed to augment already present situations and must be designed to fit into the settings already in place. Our final project this semester is a great example of this; we were to

develop a system for an automobile in order to satisfy some goal assigned to us, from improving safety to enhancing entertainment. However, the system had to be developed into the automobile and thus had to fit seamlessly into and integrate effectively with the automobile. Thus we were somewhat limited by the constraints of the setting of the automobile and the actions that the users are partaking in while operating the automobile. So the system could not involve and actions that were overly complex and distracting to the driver as to not cause a safety hazard. So all of the systems had to be very simplistic and almost ambient in a way. These same principles can be applied to the development of any digital-physical system; the system should integrate seamlessly into the world around it.

Another factor that comes into play when developing a digital-physical system is the user; who is the intended user for the system? The intended user must be identified and the system must be developed so that the intended user can easily operate the system. A great example of this is the SMALLab installation at ASU. A lot of the projects being developed for the SMALLab system are intended for mentally handicapped audiences, and therefore must be very simple to use. These projects often use simple hand-held instruments that are implemented as remotes or pointers that are used to control the environments in the projects. The only action that the user actually has to make is moving the instruments to the location they desire; a simple task that is easily achievable by the intended user. If this system were overly complex than the intended user would likely not be able to accomplish the desired goal and would get very frustrated with the system.

Along with identifying the target audience, the most effective way of interacting with the system must also be determined. Depending on the goal of the system and the intended audience there are many different factors to take into account when determining the interaction method. A good system should be easy to use and should not require extensive instruction in order to use it, and good systems can often be ruined by

ineffective interfaces. An example I came across in my life was at an electronics retail store where they had a touch screen installation where you could use the software to create musical beats and rhythms by drawing lines on the touch screen, and then input your phone number to have the song sent to your cell phone. At first it sounded like a really cool idea to me; however, when I tried it out the touch screen was so unresponsive and slow that it ruined the whole experience, and after struggling with it for a few minutes I gave up and walked away. If the system had been portrayed more effectively and been easier to use I could see myself playing with it for 10-15 minutes, but a bad interface ruined my whole experience.

Finally, even if the system is effective and the interface is engaging, the system must also provide interesting feedback to keep the user interested. The user needs something from the system to tell them that they are doing a good job or that the system is performing its intended task correctly. I would have liked to create a song on the touch screen system and tried to send it to my phone, and if it worked then not only would I have gotten a cool ringtone for my phone, but I probably would have made another one or two. Instead, due to the interface issues, I never got to that point. However, this concept is excellently portrayed in video games, systems that traditionally drew people from the physical into the digital world, but have lately been experimenting in blending the digital and physical worlds. Video games have to continuously provide the player with effective feedback in order to keep the player engaged, and it's the perfect ration of effort to reward/feedback that makes a great game. People love to have some sense of accomplishment, and it's that sense of accomplishment that keeps that coming back to the system.

There is so much consideration that goes into designing these digital-physical systems and I'm sure I didn't cover everything that really needs to be examined. But throughout this class I really learned a lot about

all the parts that must mesh together in order to create an effective system, something that may prove to be very useful in my future career.