

### Process of Building a Digital Physical System

This semester has been an effective way of demonstrating the makeup behind a digital physical system. We explored several different aspects behind not only the making of a system but the ability to do so efficiently. We explored great works as well as talked about poor instances. Several different items need to be derived from not only your goal, but also the people involved. Through out this class I not only learned about all of these concepts but also learned how to implement them into an effective digital physical system.

We first need to take a look into what exactly a digital physical system is. This entails so many different aspects of so many different areas. To put it more specifically I see a digital physical system as a technology that incorporates a bodily structure behind a program or interface. This concept can be conveyed as art, entertainment or even information. With as many things as can be placed within this area it leaves open several paths, new and existing, that can accompany this definition.

First off you need to look into what you are trying to accomplish. You need to look at the people that are going to be using the product as well as the setting that it is going to be a part of. In looking at our project we had to work with entertainment within the vehicle. We started off by looking at how vehicles are used and the connotations associated with them. We did this as a class breaking it down into several groups. As our small group we took this idea of car entertainment and broke it down even further. We looked at who primarily used the vehicles we were targeting. In breaking this down we looked at how adults are normally in the front seats and kids are in the back. We then had to make a decision on which aspect we wanted to target. Entertainment is tough when it comes to a moving vehicle, as any distractions could become deadly. You have to constantly be monitoring the road so even a minimal distraction could be dangerous. We looked into entertainment in the front seat of a car but realized that especially on long trips it is the kids in the back seat that need to be entertained. We found our target audience and could then take this one step further. Everything needs to be considered, including the audience and the setting as a first step to a good system.

Now that we have found our target and our setting we can begin to brainstorm ideas. We then sat around the drawing table, figuratively of course, and began to come up with ideas, keeping the priors in mind. We jotted out everything that came to mind, no concept being left out. No matter how silly the idea seemed at the time we knew we could thrive off of some of these and fine-tune them. Keeping the entertainment of kids in mind we came up with several ideas, everything from a vehicle artificial intelligence to projected images on the windows. After deciding on a concept we then re-refined our idea and began to bring down the broadness of it. Looking at the larger scheme of things we examined several different aspects of each object at hand and began to point out pros and cons to each. We incorporated the positives into our final project while trying to alleviate the negatives. Specifically, with an automobile in mind, we knew our entertainment could not be too loud as to distract the driver. We also knew that it needed to be versatile, looking at a child's attention span. The entertainment had to be easily stowed as to not take up too much space when not in use and had to be able to be interchanged so all ages could be applicable. In refining our ideas we came up with a direction to head with our ideas and set our minds on a particular system, the window game.

Now that we have a setting, audience and an idea we looked into mocking up our particular system. We started by photoshopping concepts and setting up the aesthetics of our device. With more time, and in a real world scenario we would test out our idea with the consumer to see if anything needed to be refined or whether this would be a plausible idea. Forgetting about this aspect for the time being we refined our mockup and began to think about how exactly we could integrate this with a vehicle. As a mockup we wrote up some code to get a simple idea going and used a projector to simulate the game at hand. This mockup is a necessity when building a digital physical system as it gives you a real look as to what problems you may encounter with the real system. Mocking up gives you an edge to things that may have been overlooked on the drawing boards. After hours and hours of testing and refining our mockup we honed in even further on our system and began to work out flaws changing not only the games involved but also the input at hand. We went from using just color as a tracking object to light which would be more precise. We also decided that in later concepts this light could be changed to an object with an

accelerometer making the system even more accurate. This is all part of the mocking up process and in doing this you learn about several pros and cons with your original idea.

Then next step would be to submit a later version of your working mockup to an experimental evaluation team. One thing that always comes to mind when I look at this is something that I once heard. With any new idea or technology you should first submit it to your mother. You should give her no context on how to run it and watch which particular items she struggles with. These are the things that need to be worked on and changed so that the context is clearer. With or without your mom, the test group is going to give you feedback on things that need to be worked out as well as any changes that need to be made. In letting a group test your system you can easily see the issues before things go to a broader scale. In testing and retesting, and building and rebuilding the system can be refined to make sure that your goal is being accomplished, your subjects are being sufficed and the actual system is working the way that the builder envisioned it. Only through several of these feedback loops will the system be developed to accomplish everything at hand.

Digital physical systems convey a broad spectrum within their definition, yet when broken down, the making behind these systems is everything but broad. It takes careful planning and a reliance on the given goal. Only when the goal is considered within every aspect of the making of a system can a particular system be successful. It takes careful planning and thought when building a system and every aspect needs to be considered. A feedback loop should be assessed at every level from the drawing board to the mockup. In careful consideration of all that is at hand one can go about building a successful digital physical system.