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AME394

12 December 2011

Final Reflection

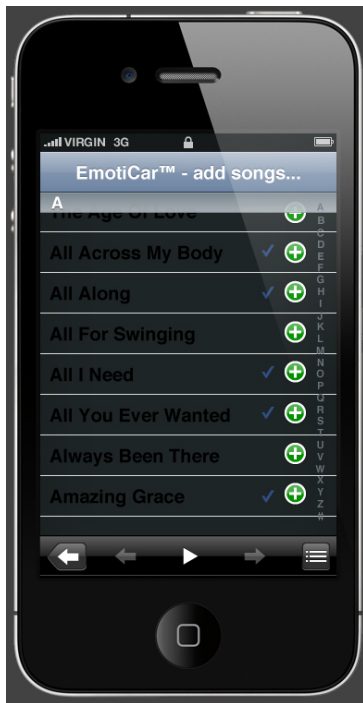
Building a Digital-Physical System: The EmotiCar System

The process of building a digital-physical system involves a great deal of consideration and iteration. In our group's experience, collaborating on a basic functioning artifact, we utilized our course lectures and practicals to make informed decisions regarding the types of digital-physical systems, constraints, affordances, ethics, code, technology and most importantly – design – to implement a system which would become an intuitive and valuable automobile entertainment system.

As design should be the first consideration in building a system, versus the technology behind it, we strived to understand the kind of user that would want this kind of system in their automobile and what features they would find valuable in the long run. In the hopes of not making the mistake of generalizing the consumer, we decided to make our system aimed toward a more specific group of users who entertain cutting-edge audio technology in their automobiles to be entertained themselves to the fullest. We examined the current trends in "intelligent" automobile music technology to ascertain what virtues these users would find valuable and what insufficiencies these users could be craving. Existing premium services such as XM/Sirius satellite radio delivered a plethora of channels that played uncensored music from a variety of styles, but came at a premium subscription cost. High-end systems from Pioneer improved on the satellite option by offering the ability to interact with Pandora through their own on-screen interface, which afforded predictive algorithmic technology to personalize their music queues, but required streaming through a 3G enabled phone at costly data usage rates, with possible dropouts in low-service areas. Both existing systems still lacked the ability to deliver exactly what music you know you enjoy, required long-term service fees and furthermore, required distracting interaction with the technology to accurately choose your stream. We found our mission.

The next step was to consider what kind of system we would like to build upon. While our primary objective was to entertain the driver (not necessarily the driver's passengers), our ethical considerations first and foremost revolved around safety for all drivers, passengers and pedestrians on the road. Naturally, we chose to develop an ambient system, which would entertain the discriminating consumer with a truly intuitive and personalized experience, but also require virtually zero cognitive input from the driver while in use: to set our system apart from the rest and to provoke improved safety habits of the target driver over time. The next challenge was to determine just how we would receive input from the driver, and how it would play music the consumer was guaranteed to enjoy.

Our initial idea was to utilize a smart bracelet that would passively detect galvanic skin response, quantify the data to an associated mood level, and then determine what music was most appropriate to play next from the users own music library. If the user was exhibiting stress or road rage, or on the other side of the spectrum, extreme listlessness, the music system would play a selection from the user's pre-defined library of favorites to



level those extremes...all without cognitive (and distracting) input from the user. The logic was sensible, but the interface was not. A bracelet seemed to lack an obvious affordance and had the cumbersome and intrusive qualities of some wearable systems. We noted the ease of use in the Breakaway system, as it only required sitting in a chair, something you would do anyway at the desk. Keeping your hands on the wheel was something you would do anyway while driving, so that became the logical place to apply our biometric sensor, making the system truly ambient while driving. A bonus to this new placement of the sensor was that the palms of the hands, offered the perspiration to accurately detect galvanic skin response for more intuitive music selection. We considered

the physical constraints of the object, that the material would have to be flexible to fit over just about any steering wheel, and would have to non-slip surface, giving the affordance to the object that it was supposed to be gripped.

We created a logic flow chart to refine how we would begin to program the electronics involved for the object. In doing so, we determined that some sort of interface apart from the steering wheel sensor and stereo unit would be needed to interpret the data from the sensor and store the user's pre-approved music library. We also considered that while we were aiming for a specific hi-tech music aficionado, we did not want to completely alienate those curious at trying out the product, so to keep material cost low and accessible, we chose to use the existing predominant iOS and Android platforms to run a free app, which would use your existing music library built into the phone. The only piece of hardware you would need to purchase and install would be the biometric sensor itself.

Fabricating this utopian sensor -- which in one thin elastic band would house the GSR sensor, a small Bluetooth transmitter, a solar sensitive strip and small power source -- was going to be difficult, or nearly impossible to achieve, which our budget and resources at the fabrication lab, so we decided to build a prototype which would simply get the point across for eventual case study, so that we could further iterate our design process. The bulk of our iteration, however, occurred before we could even get to the case study stage. We were lucky enough to acquire a galvanic sensor device with a supposed working Max patch to aggregate the data. This patch proved faulty, however and we were forced to use a pulse BPM sensor to quantify a mood level. We spent a great deal of time on the Max code, but with assistance from other professors, we were able to get a working patch.