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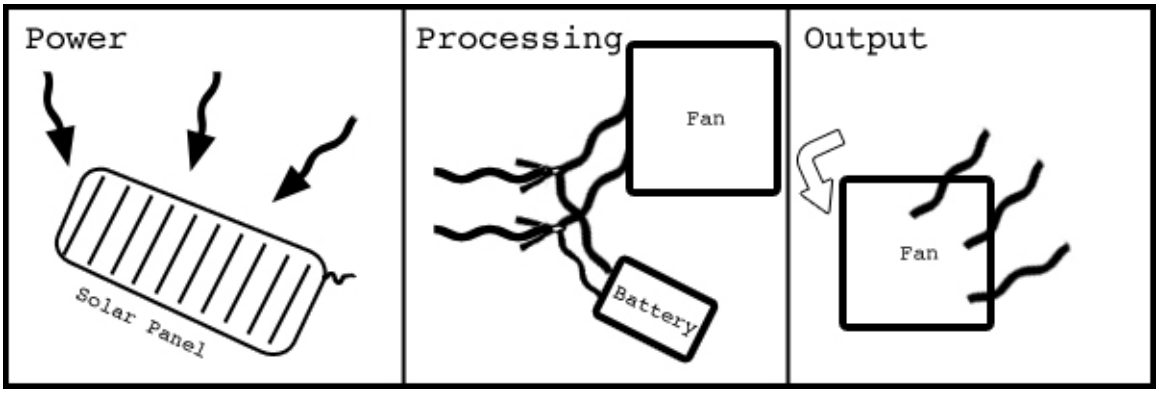
Dig. Phy. Systems Final Report

Due: 12-12-2011

Going into the final project, my original ideas all revolved around the *entertainment* aspect of the project. I had already modeled some ideas that I submitted with the pressure project when I took pictures of my personal vehicle. It was for that reason that I chose to do the *control and comfort* section instead. I wanted to challenge myself to think critically and to work outside of what I found to be comfortable and more towards a real life challenge I could experience in my future place of work.

When working in groups, it's hardly ever seen where one person's idea is chosen over others. Often times there are several great ideas and the most reasonable has to be chosen. In this case, my idea of creating a system that would cool a vehicle seemed to be the best system to go with. Some of Ben and Josh's designs involved ideas we later incorporated in, but the main concept was from mine. I thoroughly enjoyed working in this group because we all came from different backgrounds. Ben comes from a programming/gaming background and was the connector between Josh and I. Josh knows how to program as well, but was essential in the hardware side. I used my previous experience in wiring to help bring everything together, as well as my modeling skills to create a housing that allowed for the system to run effectively and safely without any exposed wires.



The fact that the system was scalable and could be modeled easily made it highly desirable, as we wanted to have a working prototype for our final presentation. We could have just made a poster or virtual animation of the full-scale system, but something physical that still illustrated the idea and made it easy to comprehend seemed more ideal. We broke the system down into three parts: power, process, and output.

When looking at the powering of the system, we wanted to make something efficient that wouldn't lessen the comfort or control of the vehicle. Being students of ASU, sustainability is always a desirable implementation that we wanted to hone in on. Being that the sun was generating the heat that lessens the comfortableness of the vehicle, we wanted to use the sun to fix it. Essentially, take the problem and use the cause of that problem to create/power the solution. We were lucky enough to find a 12 Volt solar panel designed specifically for cars, making our prototype much easier to create.

Getting the solar panel to power the system was probably the most challenging part of the project. Taking the solar panel outside and wiring it to the desktop computer fan we used to represent the cooling unit, the light from the sun was enough energy to power the fan with a little help kick-starting it with our finger. It was a great start, but not quite as functional as we needed. It was because of this that we got the sun lamp, which allowed for indoor lighting and a much stronger direct power supply. As a backup, we wired the solar panel to charge a nine-volt battery while still powering the fan, providing an alternative in covered areas or less sunny days.

The processing part of the prototype, although we expected to be the most difficult to get working, actually worked rather easily. Originally we had planned on connecting it to a battery and than using the battery to power an Arduino, which would then be used to control the power to the fan. Coming from the solar panel is two clips, one positive and one negative. Clipping those to the match wires for the fan and the battery was all that we needed to do in order to get the energy from the light to power the fan and charge the battery.

The output of the prototype was rather simple. Lamp sends light to the solar panel, panel converts and sends the electricity to the fan, and the electricity powers the fan. The solar panel didn't send a constant amount so the fan would fluctuate in speed and strength unless the battery was connected as well. In this way, the battery was the predominant power source, and the solar panel kept the battery charged. The fan itself worked as both an air intake and cooled the interior of the housing, which represented the interior cab of the car.

Altogether, the system turned out to work rather successfully. All three segments of the system functioned. The only hardware that didn't work was the thermostat, although we still left it in the housing for demonstration purposes. If we were to use an Arduino, I think we could have wired and programmed the thermostat to be the temperature sensor and controller it represents. The prototype could easily be mounted into a car as is and begin to work immediately with little to no changes. Further implementation could see a similarly designed system being integrated in to the design of new sustainable vehicles.

I feel like I learned a lot with this project. In terms of the physical work, the wiring and powering of the system was something I've never attempted before, as most of the projects I've created have been things that have been done before by other students. With this project, we wanted to try to compile things ourselves rather than work off of someone else's model. I felt like this approach was highly useful to my development and career goals, as this is the key to innovation in the future. There are not many people today who want to use an old, outdated system. Consumers want the latest and greatest and the design of the system has to address those ideas, and that was the foundation of our project.