  
**Design Studio #4 - Weekly Progress Report #7**

DS Instructor: Gülbin DURAL

Partners:

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In the previous week, we were so excited because we were about to try our FPV camera setup. As mentioned in previous week’s report, we have tried the controller with large distances and it works properly. Coming to FPV setup, we first tried to establish the receiver and transmitter connections. Then, we charged up our batteries because we wanted our setup to be portable for testing in different environments and distances. Also, for this purpose, we have done some soldering for connections as well.

At the weekend, first trials were done in Design Studio. When the camera, receiver and transmitter modules were set up properly, we immediately observed the live video on a portable monitor. We first tried the system without an obstacle present in the way of transmission. The result was satisfying. Later on, I took the monitor out with the receiver module and started to test whether the system works outside and through obstacles. When I went upstairs from DS floor to E block floor -1, the live stream video was lost because there were lots of walls and obstacles between the receiver and the transmitter in DS and it was quite far away. However, it is observed that the overall system works in a very efficient way when there is no obstacle between the receiver and the transmitter. We also thought that the problem occurs because of the DS buildings structure. It should be noted that even our own cell phones do not work properly as the signal is interfered with DS walls which are made of lots of irons. We guessed that they may behave like a Faraday Cage somehow.

Then, we made some modifications to the configuration of the overall system in order to improve the testability of the system by making it more compact and more portable. Previously, we were supplying voltage to the camera via the DC supply we borrowed from the department because the camera works with 5 Volts supply. In order to carry the system around more easily, we implemented a Switched-Mode Power Supply(SMPS) converter whose brand name is Pololu ,which is one the best converters available on the market, together with Lipo battery which supplies 5 Volts to the camera. Our battery is capable of giving 12.6V since it is composed of three cells of Li-Po batteries. It is suitable to supply the transmitter within the range from 7V to 24V. After some soldering and circuit design, we had our portable system. It was the time to test the system in another place. For this purpose, we went to D block. Recep was holding the camera and transmitter system in front of the VLSI lab. Fatih Çalış and I were to move inside the building and check the video stream. Our system works properly with no delay from the entrance of the D building in the E building side until we reach the corner of the C building. It is actually a great range for our system because there were dozens of walls and obstacles between the transmitter and the receiver. Later on, we tested the system when Recep was inside the VLSI lab and we were on top of it at the 1st floor of the D block. Although there was 1 big wall between us as in the case of the first trial in the E building, the performance was amazing. As we guessed, the problem at DS is because there are significantly thick walls probably made of a different material which may make it behave as a Faraday Cage. The problem is solved when we tried it at D block.

Furthermore, we tested the system outside the buildings. I started to go in front of the F building and Recep and Fatih went to opposite side where we had the whole D building between us. Once I reached the F building, the system was working properly in fresh air. When the weather is rainy or snowy, we may try it in different weather conditions as well.

We also tested the controller system with RC controller we have and 2 servo motors. The controller works efficiently with larger distances. We tested it from Çatı Cafe to DS. The controller system performs greatly.

Note that all tests are video recorded as well.

As a final note, we have done a budget analysis and our products are a bit expensive. Thus, we need to sacrifice from something to reduce the cost because there are more things to add to budget as battery, motors, chassis etc. For this reason, we are now thinking of building our own Radio Controller with 2 Arduino, low cost transmitter and receiver and a joystick. By this way, we might reduce the controller mechanism cost from 50$ to 15$. Also, we are going to use a low-cost camera. Our FPV costs 50$ and we can do our project with low-cost cameras as well. The resolution may be a bit decreased but it does not affect our system that much and we can sacrifice from it. It may even increase the range of the video transmission since lower quality video means less data to transmit. We do not want to change the transmitter and receiver modules because they are very powerful and the performance of the system may be significantly reduced if we changed one of them. Finally, we will obtain a converter which converts composite video format to VGA format to stream the video on a monitor since the one integrated with our system now is included in the total budget.

We are delighted with the results and tests. Also, making real-life experiments and trials, we face with the problems themselves face to face through which we gain more hands on experience in the field. (Huzeyfe)