We met with Dr. Ortega on September 14th, during which we examined a digital stethoscope designed by ThinkLabs. Additionally, we discussed with him what we believed we could accomplish over the 2 semesters we would be working with him. We decided that we would try to build an array of digital stethoscopes, possibly connected to each other with a strap, and write software that is capable of digitally recording the signals from these stethoscopes. We would then write and apply a classification algorithm that is capable of differentiating between different types of lung sounds. Dr. Ortega also ordered a CD of lung sounds for us to use in the future. From this meeting, we refined our need statement, developed our project scope and decided on initial design specifications.

In addition, we began reading literature about sound classification methods. Although this reading is still ongoing, we found from Piczak and Karol 2015[1] that for environmental sound recognition, convolutional neural networks (CNNs) can perform as well as other feature learning methods and better than manually engineered feature algorithms. However, CNNs are computationally expensive and require labeled data. From this article, we also identified other papers of interest that we will read in the future. Meanwhile, in Casey 2001[2], we found various probabilistic classifiers, including finite state models, multidimensional gaussian distributions and hidden markov models that are incorporated into the MPEG-7 international standard.

Future directions of research that we will pursue in the coming week are the functions of stethoscopes in telemedicine.

1. Piczak, Karol J. 2015. “Environmental Sound Classification with Convolutional Neural Networks.” In *2015 IEEE 25th International Workshop on Machine Learning for Signal Processing (MLSP)*, 1–6. Boston, MA, USA: IEEE. <https://doi.org/10.1109/MLSP.2015.7324337>.
2. Casey, Michael. 2001. “General Sound Classification and Similarity in MPEG-7.” *Organised Sound* 6 (02). <https://doi.org/10.1017/S1355771801002126>.