**2.1) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare.**

As drones is more widely used nowadays, it has become a very useful tool for entertainment, photographing, and monitoring. However, it has never been used in providing immediate medical service. Drones have great flexibility and can travel a distance of half a kilometer in a few minutes. When an urgent medical situation occurs, a drone can reach the scene and carry a moderate amount of medical supplies in a few minutes. Meanwhile, an ambulance may take 15-20 minutes to reach the scene and provide help. There is a huge potential for drones to help dealing with simple but urgent medical situation like heart attack, asthma, epilepsy. When facing a complex medical situation, drones are not capable of delivering better help than ambulances do, but in other cases, drones can provide more instant service than ambulances do, which may be crucial in saving peoples life. Instead of replacing the current ambulances distribution system, we plan to build a medical drone system that aims to be a supplement to the ambulances distribution system, which can remarkably reduce the workload of system and provide more effective service. The system is great for places like schools, park, shops malls and can provide medical supply (mainly medicines) for medical situations including heart attack, asthma, epilepsy, etc. The Air Life project is a medical drone system which can provide the users with the medicine they need with the access of 200 meters and in a fast speed. It’s a convenient method for users to get the medicine by using an mobile phone application and a drone. The Air Life project applies engineering principles to met it’s technical needs while safeguarding public health, safety and welfare. We build this project by using the DJI drone to deliver medicine, Android application to control the drone and receive the picture and locations of the drone, and cloud servers to communicate the drone and the controller. Since this project is mostly used in the in-door environment, the path could be very complexed. The most important part of the medical drone system is the computer vision of it.

Considering the public health and safety, we use a high-developed DJI drone and a drone landing pad for the testing. In this way, the drone can land properly without any security concern. And in the further landing test, our team will do more flying tests to make sure that the drone is stable during the delivery and won’t cause any harm to the users.

By using this kind of self-navigated medicine delivery drone, those patients who are disabled can get the medicine conveniently by sending the message through the mobile application.

**2.2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of global, cultural and social factors.**

In our Air Life medical drone delivery system we used products and service in the world. First we used DJI drone. DJI is a Chinese technology company which provides high quality drones. And our server is build on Amazon cloud server, which is an American company. And the mobile application platform we use is Android, which is developed by Google. These various collaborators from around world contributed to this application according to their unique abilities.

We plan to use DJI drone as our primary device. DJI is the world's leader in commercial and civilian drone industry, accounting for over 70% of the drone market. (Wikipedia, 2018) DJI`s drone product is widely considered to be safe and reliable, with a mature developer’s toolkit for developers to deploy their application. DJI provides us a mature developer’s toolkit-MobileSDK, providing full access to all DJI drone`s capabilities. With MobileSDK we can simplify low level functionality developing such as flight stabilization, battery management or signal transmission and focus on our application. (DJI Company, 2018)

And the cloud server we choose is Google Cloud Platform. GCP, offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search and YouTube. Alongside a set of management tools, it provides a series of modular cloud services including computing, data storage, data analytics and machine learning. Google Cloud Platform provides Infrastructure as a service, Platform as a service, and Serverless computing environments. By using GCP, we can build a better and more stable connection between the medicine delivery drone and the user application.

As for the user application, we use Android as our platform. Android is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touchscreen mobile devices such as smartphones and tablets. Initially developed by Android Inc., which Google bought in 2005, Android was unveiled in 2007, with the first commercial Android device launched in September 2008. The operating system has since gone through multiple major releases, with the current version being 9.0 “Pie”, released in August 2018. We choose Android because it is convenient to build and test. It’s the best platform for us to build this open source medicine delivery system.

**2.3) An ability to apply engineering design to produce solutions that meet specified needs with consideration of environmental and economic factors.**

Emergent medical situations happen every day and everywhere and require proper treatment. However, the current ambulance distribution system is far from effective on providing emergent medical service due to the restriction of time, location, traffic situation, etc. In this case, many people who encounter emergent medical situations do not receive proper treatment and may face threats to their lives. A more effective way to provide urgent medical service is required.

Because the Air Life project is built with a drone, an user application and a cloud server, we can say it is very environment-friendly. This system is a electric-driven system, thus this system will cause no waste or pollution problems. The user application will only cause a little battery during the usage and the charge of drone is also very quick and efficient. Furthermore, the medicine delivery drone some times can reduce the call of an ambulance, thus it may be a good way to save a lot energy and human force.

As for the economic aspect, the medicine delivery drone system is affordable for most of the family and it’s also very necessary for those families which have disabled people. In a reasonable price and intelligent way, people may save a lot of money on hiring a people focusing on the medicine care. The user only need a smart phone which has the controller application installed to get the medicine.