* **Scope and limits** 
  + Scope: our plant was building a virtual assistant (VA) with full function that can control not only all user devices but also the applications in those devices by voice command with artificial intelligence (AI) and machine learning (ML) engine. In the AI part, we wanted it to able be communicate with user by its own natural language processing unit. That unit should be able to communicate and execute complex command and response to the user as a real person. Beside of AI, we wanted to use the ML to create a VA has ability to learn users’ character such as user voice recognition, habits, routine to support user as much as possible.
  + Limitations: because the project we chose required a huge amount of knowledge, our team are all newbies, it was extremely difficult to create a fully functional VA. we encountered a lot of limitations in building the app.
    - AI natural language processing: this took a lot of time to build and load the language data for the software, with limited knowledge, we couldn't achieve the desired goal, however, the VA was still able to communicate and interact in simple sentences with users
    - Programming language: Limited knowledge in programming languages ​​has limited us from creating the app we want. for almost every function of VA we have to learn new knowledge and the code doesn't always work. so, we had to omit many functions as set out in the plan and keep only the functions that can work relatively well.
    - Machine learning function: The unexpected thing in the initial plan to design a VA application that has the ability to learn is the algorithms. This requires a lot more in-depth knowledge than we thought. Not only that, to test the learning ability of virtual assistants also requires a lot of practical time as well as input data sources. that's why current ML will still be a successor or in the future which my team can't immediately adopt right now.
    - License/ access right: Licenses and access rights are also a difficult part of the project. it is a prerequisite for the VA software to be able to access and control not only the device, the applications within the device, and the available data sources. not all sources are open so we can only give VA access to free open-source sources to the best of our knowledge such as Spotify, Wikipedia, and weather forecast…
    - Time: The time limit is probably the biggest obstacle for us. While implementing the project, we almost did not have a solid knowledge to proceed, so learning while doing is a common occurrence. and with limited time, perfect project completion is impossible.
* **Tool and techs:**
  + Pycharm:
  + API:
  + Voice recognition:
  + Transfer between text and speech:
* **Risk:**
  + Lost track data: we work as a team on GitHub repository platform, there was a mistake in pushing and pulling data causing some data to be lost and had to start from scratch
  + Information security: VA's access to software as well as user data is also our inexperience with information security, so it is possible that our current software may cause information leakage.
  + Lack of knowledge:
* **Individual reflection**