如果看不出來有沒有空格，可以在Word中按「顯示標點符號」。

接下來我開始使用追蹤修訂提供第一回合的修改建議。

購買服務項目列表 (包含潤稿/翻譯，文件類別，各文件字數)，如：  
  
SOP 1000~1500 words  
  
  
欲修改的文件是用來申請哪一間學校、系所、學士/碩士/博士:  
Carnegie Mellon University/ Robotics Institute/ PhD, MSR <- 底稿請以這間MSR為主。  
University of Michigan/ ECE/ MSR  
University of Oregon State/ EECS, Robotics/ PhD, MSR  
  
  
  
另外，也請把第一間要申請的學校的文件內容、格式、字數頁數限制等等要求寄給我。  
Statement of Purpose  
Prepare a concise one or two page essay in PDF format that describes

記得要轉成PDF版再上傳。

your primary areas of interest,

記得除了申請什麼學位課程，還得再深入一層寫你對哪一個次領域 subdiscipline有興趣，甚至還得再追下去，說明你對哪些研究題目 topics 有興趣。

學校有特別提到要說明你對哪些特定的次領域有興趣。可以的話，次領域再深入一層，標出你對哪些研究題目有興趣。

最好是可以提到幾位想跟的指導教授，並說明為什麼想跟這幾位教授。

Field /discipline/domain 通常是比較大的學術領域。

再往下分是area/subdiscipline/subdomain。

再往下分，是「研究題目」topic。

Research fields/disciplines包含 Finance, Mathematics, Accounting, Engineering等等。介系詞用in，像是do research in finance。

Finance 這個 research field 再往下分 investment, stock markets 等等areas，介系詞用in。

Investment 這個 research area 再往下分 options trading, mutual funds 等等topics，介系詞用on。

your related experiences, and your   
objective in pursuing a graduate degree at Carnegie Mellon. Your essay   
should be specific in describing your interests and motivations. When   
describing your interests, you should explain why you think they are   
important areas of study and why you are particularly well-suited to   
pursue them. You should describe any relevant education, research,   
commercial, government, or teaching experience. If you are applying to   
more than one program, you may (but are not required to) submit a   
separate Statement of Purpose for each program. If you are submitting   
different statements, please upload as one file and include a table of   
contents page.

記得如果同一間學校有申請兩個program，他們希望你各寫一份statement，但是上傳一份檔案，還需要加table of contents目錄。

Include your name and User ID on the essay.

記得要加name and User ID，下一次請記得加。  
  
  
Notes for specific programs:(同一系所不同program，但會一併申請)  
Master's in Robotic Systems Development applicants: Provide some   
background information on your academic/industrial career to date, and   
why/how that leads you to be interested in CMU's unique   
industry-oriented MRSD program.  It would be helpful for the committee   
to understand your career aspirations, how you imagine the mix of   
technical/management education from MRSD would assist you in achieving   
these, and what you see yourself doing five to ten years after   
graduation.

要說明為什麼對這個program的綜合technical + management 的訓練有興趣。並且要說明你的五到十年工作計畫。

Statement of Purpose

Chi-Yao Huang

R04522840@ntu.edu.tw

My primary research objective and interest is in the area of robot perception. I am currently a research and design engineer for three years in HTC VIVE, which is one of top VR/AR companies in the world.How long have you been working here?

Is HTC VIVE a unit/team/department at HTC?

如果文中提到的公司、機構、活動、獎項等等名稱不太確定評審有沒有聽過，需要加一點說明。

參考以下文章中的「要考慮評審的專業或文化背景」的部份：

<https://www.cantabenglish.com/blog/sop_writing_tips>

and I am actively involved in a research project that is developing object recognition for VR/AR. My work focuses on analyzing point cloud from stereo-scene to recognize objects and obstacles in the indoor environment and lining up a safe playing region for VR/AR players. This project links up my SLAM (Simultaneous

左邊括號前面要有空格。

Localizationa and Mapping) and Robotics background, and some ideas spring in my head. For example, “How to make point cloud (or other sensor data) become semantic for robot?” and “How to use dynamic objects or semantic objects in the map to benefit SLAM?” These ideas stimulate me to undertake further study through your research program.

Before joining the object recognition project, I was a SLAM researcher for two years in “Advanced and Creative Team”(AC-Team) in HTC VIVE, focusing on localizing VR device. How long were you working as a SLAM researcher? Give some background information of your work experience. The special effects in VR’s virtual world depends on users’ motion in the real world. Though SLAM becomes well-studied in these years, the robustness of SLAM for VR devices are a still challenging topic. Unlike robot or self-driving car, the SLAM algorithm on VR device has to tolerate fast scene changing because human head move in this way. Therefore, in order to conquer it, we implemented tightly-coupled visual-inertial SLAM. The performance of IMU generally is powerful in fast moving situation. Also, IMU’s speedy update rate compensates camera frames’ duration. Furthermore, we developed “Multi-Frame System”, which means that our SLAM is able to handle multiple cameras and IMUs at the same time, and estimating an optimized state of VR device in the environment. I studied comprehensive SLAM and VIO papers such as ORB-SLAM, DSO, LSD-SLAM and VINS,

使用for example或such as的時候，後者一定要是前者的「例子」。

比如不要寫 I took many courses such as learning how to use computer programs. 因為 learning how to use computer programs是一個「動作」，不是一個「課程」。

可以改成 I took many courses such as An Introduction to Programming. An Introduction to Programming用大寫表示是課程名稱。

或是可以改成 I learned many things such as learning how to use computer programs. 學到的東西，其中一個例子是learning how to use computer programs。

and combining their strengthens into our product. For example, for the front-end of SLAM, we used direct method to efficiently obtain camera’s state. Nevertheless, the feature-based(ORB) SLAM still be in our algorithm because the robustness of ORB help relocate the camera’ state. On the other hand, for the back-end, we also adopted IMU pre-integration to our state estimation. The Jacobian of IMU’s bias are considered. These research results are implemented to HTC VIVE’s newest VR product, “VIVE COSMOS”. Not sure what you mean here. A ‘career milestone’ is a very vague term. It could be a device, a project or almost anything. Say that it is a VR device. THEN say that this device is your career milestone.

In AC-Team experience, I distilled my communication skill and organizational capability. My communication skill is to record every meeting via e-mail, making sure that every member sees discussion result and have consensus. For example, in many projects, I was the leader or the core engineer. Developing a commercial product requires an immense of consideration. In order to fit my SLAM algorithm into each product, I had to discuss with firmware team to secure CPU’s computing resource, evaluate sensors with multi-media team to make sure that the data are stably offered by sensors, and inform the mechanical team how important is the location of cameras for SLAM’s robustness. Recording discussion in e-mail help me handle these complicated tasks. Also, based on the e-mails’ date, I could efficiently trace the working progress in different teams and confirm the projects will be accomplished on time. On the other hand, I prefer integrate my team by sorting the priority and explaining why. For instance, cameras’ positions on VR device are always critical because we have to make sure that the scene obtained by cameras is broad enough to keep VR devices tracking in any environment. In this case, I would like to tell my teammates that the camera position issue is at high priority and explain the reason why I do that instead of directly command them. And because they know the reason, different teams can communicate based on the reason and make decision based on the priority. I believe that sorting the priority can keep all members at the same direction, and explaining the reason make the direction clear. Until today, based on my communication skill and organizational capability, I have accomplished “VIVE COSMOS”, which is the newest VR product in HTC VIVE, and the other AR device, which is originally planned to show in MWC (Mobile World Congress) in 2021. Although MWC has been cancelled because of epidemic, my other projects are on the way to debut.

HTC VIVE Don’t say a team or department taught you things. Say ‘in XXX experience, I learned …’ taught me that collaboration and communication are the disciplines What do you mean? to accomplish a mature product. Rewrite your topic sentence. You should state what skills you have. If you want to say you have collaboration and communication skills as demonstrated in your work, then say this. I handled many projects in HTC VIVE, and in some of them, I was the leader or the core engineer. Developing a commercial product requires an immense of consideration. Finishing personal research is just a part of a product. Conversely, organizing a team to be productive is a big thing. The parts I marked in light blue, you seem to be repeating the same thing again and again. For example, my SLAM algorithm has to be implemented on different VR/AR products. Different products have different requirements. Part I marked in yellow highlight, this is where you get into details. You need to get t this part as soon as possible. In order to fit my SLAM into each product, I had to discuss with firmware team to secure CPU’s computing resource, evaluate sensors with multi-media team to make sure that the data are stably offered by sensors, and inform the mechanical team Mechanic是技工的意思，如果你是想表達機械的，要寫mechanical這一類的字。how important is the location of cameras for SLAM’s robustness. These members all comes from different background and different professionals. I prefer integrate my teammates by sorting the priority and explaining why. For instance, cameras’ positions on VR device are always critical because we have to make sure that the scene obtained by cameras is broad enough to keep VR devices tracking in any environment. 這裡你有提到你的communication skill的一個很重要的部份是說明什麼是priority，建議這一點可以擺在主題句。In this case, I would like to tell my teammate that the camera position issue is at high priority and explain the reason why I do that instead of directly command them. And because they know the reason, different teams can communicate based on the reason and make decision based on the priority. I believe that sorting the priority can keep all members at the same direction, and explaining the reason make the direction clear. 這一段有提到幾個soft skills，建議主題句標出二到三個soft skills，然後各提各一個例子證明。這一段有幾個意思有一點重覆說明，「XXX很重要」的這一類的句子最多一句，我標淺藍色，當做背景說明，要馬上切到STAR method中的action句子，進入例子。

The competition in HTC VIVE stimulated me to keep to improve my research ability and problem solving ability. The management of HTC VIVE prefers to allocate a topic to different teams, and only one team’s research result can get financial support. In order to be outstanding in this environment, 標綠色的地方是在說明公司文化，講有一點太久，要快一點講到你做了什麼。縮短成一到兩句，一句最多兩行，只需要說明你們的teams的research results，只有一個會變成產品。另外，沒有變成產品有什麼後果嗎？單純就是research results浪費掉，還是會影響你的薪水之類的？In order to be outstanding in this environment, I often watched ICRA, IROS and CVPR’s videos to update my professionals. For example, I recently studied *“Guided Stereo Matching”*, which provided the ideas that using sparse LiDAR point to guide CNN converse a dense depth image. This paper fit the requirements of my object detection project. I replaced LiDAR point by robust feature-based SLAM’s point, and got precise depth estimation in the indoor environment. The depth estimation result is planned to use in obstacle detection and object recognition. The habit of watching top conferences’ video has been kept three years. 太過籠統，需要有例子，要寫你學習一個什麼樣的topic的例子，看了什麼影片，看了什麼論文，學到什麼。The habit of updating top conference has been kept 5 years. In the first 3 years, I concentrated more on SLAM and robot perception. However, I gradually change my focus to machine learning and robot reasoning because machine learning become powerful in computer vision in these decades. I consider that machine learning will be broadly applied, and I expect to combine it with SLAM and other robot perception field.

My research journey started from Robotics Lab under Prof. Han-Pang Huang in the graduate school of Mechanical Engineering at National Taiwan University (NTU). 如果你有碩士學歷，這是你的申請優勢，建議在statement前面一點就要提到。

提的方式是提供工作/研究經驗的summary。

可以在一開始先跟評審介紹你有什麼學術/研究/工作背景，寫一個背景的summary。

學術/研究/工作背景的summary要「簡短」，但是不要「籠統」。

籠統寫法：

* 我碩論研究探討很多很重要的議題，使用了很多分析方法。
* 我的碩士學歷對未來的研究非常有幫助，為我奠定良好的學術基礎。

簡短寫法：

* 我碩論研究探討A方法是否可以用來改善B狀況。
* 我有J公司 (公司是做I的) 三年的工作經驗，我的職位是K。我在工作經驗之中獲得L、M、及N能力，但是我發現我還缺乏O、P、及Q的能力，因此我想要申請貴校，打好O、P、及Q的基礎。

另外，Graduate school 是研究所，包含碩士、博士及其它學士後的學位。不要把graduate school 等同於碩士，或是graduate degree 等同於 master’s degree。

如果研究所的名稱是 The Institute of XXX，不要把「我進入某institute」等同於「我唸了碩士」。Institute只是機構的意思，可以是指研究所，研究機構，慈善機構，政府機構。

同樣的，lab也可以是大學中的實驗室，碩士博士等級的研究，有做R&D的公司的實驗室，化妝品公司的實驗室。

如果你想表達你大學是唸XX系，不要只寫Department的名稱。評審可能看不出來你是在講這個Department中的大學或碩士或博士課程。

不需要提到指導教授、授課教授、同事、同學的名字，因為主角是你。可以寫「我的指導教授」，不需要寫「在王小明教授的指導之下」。

不要寫「我的teammate，王小明，跟我做了XXX」，也不需要寫「實驗室中的一位博士生，王小明，跟我做了XXX」，只需要寫 My teammate (a PhD student) and I did XXX。

如果你有碩士學歷，或有擔任過全職的研究員，指導教授的名字可提一次，但不要把主角變成指導教授，你變配角。

指導教授的名字如果要寫，寫於STAR method中的situation句子。通常為段落中的第二句。

Robotics Lab equipped me with diversity robot-related knowledge because it is the largest lab in the graduate school of mechanical engineering. 「最大」不見得就會給你robotics knowledge，要跟robot 有關才會給你robotics knowledge。

要注意使用since/because/so/therefore/thus這一類表因果關係的字，或是although/though/however/but這一類表相反關係的字。

有時兩者之間沒有直接的因果關係或是相反的關係。

「因為A，所以B，B又的造成C」，不要寫成「因為A，所以C」。

像是不要寫「因為台灣的technology manufacturing很發達，所以我就想修A課程」。

要寫「我想修A 課程，因為A課程中，我可以學習B，而B是台灣的technology manufacturing industry中很需要的能力」。

不要寫「由於financial markets會快速變動，所以我去修了D課程。」

要寫「由於financial markets會快速變動，所以我去修了D課程以學習financial markets中的什麼樣的變動。」

Robotics Lab contain many fields, including manipulation robot, humanoid (biped) robot and mobile robot. 你是想表達你的lab做哪一些研究嗎？要快一點講到「你」做了什麼研究。The most attracting thing in Robotics Lab is that the members like to discuss and are glad to share research result and give suggestion. During the discussion, my robot knowledge is broadly extended, and some idea and research are figured out. 淺藍色的太淺，需要快一點講你的碩論研究。For example, my master thesis combines SLAM and humanoid robot’s path planning. 標黃色的是這一段的重點，要快一點抵達這一句，然後提供碩論研究的細節。This research is beholden to 這個字，數百年沒有人用了。太古老，改掉。碩論的細節，不能只說「別人幫助我很多」。完全沒有證明到你的研究能力，整段只說你的lab很強，很大。對你的申請沒有幫助。the researchers of both humanoid (biped) robot and mobile robot. The experience in Robotics Lab constructed my research foundation. Until today, in HTC VIVE, I use Robotics knowledge on my work. What did you do? What did you learn? How did you apply what you learned in the lab in your work?

For these reasons, the Robotics Institute at Carnegie Mellon University is especially attractive to me. I am intrigued by several interesting research projects carried on by its faculty members. In particular, Professor Sebastian Scherer’s research in autonomous aerial robots is fascinating. His research recently tends to integrate robot perception and automatic control with machine learning. This integrated research is what I desire to do. For example, Wang, Chen, et al. “Visual Memorability for Robotic Interestingness via Unsupervised Online Learning.” Computer Vision – ECCV 2020 Lecture Notes in Computer Science, 2020, pp. 52–68.

Is this a project name or paper title? Why italics AND quotation marks at the same time?

書、期刊、文章、論文名稱等等如何寫，請參考：

<https://www.cantabenglish.com/blog/citations>

尤其注意斜體、引號、大小寫如何使用。

introduces the concept of interestingness detection. We know that “how to decide keyframe or keypoint?” 盡量用間接問句，不要用直接問句，不要自問自答，或是用rhetorical questions。is always a critical issue for robot mapping, especially in repeated monotonous scene case. Air Lab beautifully conquered the problem by three learning strategies. In addition, Air Lab is good at You need to say you are interested in XXX. Don’t say they are ‘good at something.’ fusing SLAM and path planning. *Dubey, Geetesh, et al. “DROAN — Disparity-Space Representation for Obstacle AvoidaNce.” 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2017*describes

標淺藍色的，不需要用很多形容詞稱贊學校或教授如何優秀，outstanding, excellent, impressive等等形容詞基本上都可以刪掉，只是很佔空間，讓句子廢話很多而已。

consensus of mapping and obstacle avoidance. Therefore, Air Lab is the reason why I apply the program in CMU RI.

My career goal is to develop a robot system that senses the world like human beings. Robot perception becomes powerful in these years. However, there is still challenges. For example, human beings sense objects in the environment directly by objects’ location instead of point cloud or voxel. “How object recognition feedback to robot’s state estimation?” Rewrite this as an indirect question and not a direct question. is not well-defined as I know. To study this question and the questions I mentioned in the first paragraph, Talk about research topics. If you want to refer to things you said in the first paragraph, you can give a short summary. Don’t make the reader go back and reread the first paragraph. I desire to do research in advanced degree, State that you are applying to do a PhD. Don’t just say ‘advanced.’ and I believe that the Robotics Institute at Carnegie Mellon University is good fit for me. The resources and breadth of robot research performed at CMU will provide me with the experience that I need to pursue my passion in robot perception.