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| (a)  In Taiwan, it is not mandatory to finish our Bachelor thesis. But there’s multiple projects or research I’ve made which would be introduced below.  My past studies include Autonomous Mobile Robots (AMR), Unmanned Aerial Vehicles (UAVs), Propeller-Powered vehicles, and Billiard Cars. Also, I attended some international programs like the exchange student program at Aoyama Gakuin University (AGU) and participated as a high school team’s mentor in FIRST Robotics Competition (FRC), Sacramento Regional in California.  Besides, the previous contents are in a time order starting with the latest. |
| (b)  I want to integrate Robotics with AI. Thus, I choose to research the Quadruped robot as a quadruped can move to terrain that an AMR cannot do. To my knowledge, some institutions work well on quadrupeds. For instance, Spot and Mini Cheetah belong to Boston Dynamics and MIT CSAIL, respectively.  Below I propose my plan for Quadruped, including its utilizations, methodology, and how to help us improve our societies. Considering some advantages of Spot and using Mini Cheetah as a supplement, it will be invaluable to my research and future applications.  To start with, Boston Dynamics showcased the application of Spot in self-inspections in hazardous areas such as tunnels and nuclear facilities. For example, as Paris turns to night, the Autonomous Parisian Transportation Administration utilizes Spot to scrutinize metro infrastructure. Therefore, it can avoid accidents during an inspection and work a night shift without inspectors.  Concerning a further application for the robot, it can be used as a rescue robot, which would play an important role in countries near seismic zones like Japan, Taiwan, and Turkey. Besides, the lab of Prof. TSUKAGOSHI is also working on rescue robots although there seems to be no robots like Quadruped, it’s still appealing to me.  Additionally, there is a comparison of the learned controller and the human-designed one in the demo of Mini Cheetah. MIT demonstrated the learning-based method that outperformed the previous human-designed one. Therefore, the learned controller can adapt the system behavior to diverse fields, such as gravelly hills or slippery ice, to prevent the robot from stumbling in those challenging terrain.  For methodology, integrating components with the robot, including thermal, temperature, and depth sensors, and manipulators to support the rescue team's search for survivors under quake rubble within a crucial 72 hours. Furthermore, we can use a simple neural network as the controller. Then, let the robot learn to run in a simulator and overcome adversity in severe onsite-rescue spots. However, this technique isn't exclusive to Quadruped. AI can also apply to other fields such as Mobile Robots, Soft Robots, and Bio-Robotics.  In conclusion, following my statement at first, I'm intent on combining Robotics and AI to make robots work better and benefit the world ultimately. |
| (c)(d)  In relation to past studies, I’ve learned related courses which are very useful in my prospective research in Quadruped. For instance, Automatic Control Theory, Mechanism (Kinematics), Dynamics, Computer Programming, Practice of Mechanical Engineering (for past project Propeller-Powered vehicles) Machine Design Theory (for past project Billiard Cars), Data Structure.  For ability, I have researched some robots that play significant roles in the Robotics field such as AMR and UAVs. I believe I have the capability to develop these robots from scratch if I don’t need to worry about the cost. Below I'll explain the reasons for two important aspects of Robotics, hardware, and software respectively.  Firstly, since I graduated from Mechanical Major, hardware design, sense application, and relative theoretical calculation can’t be my obstacles. For software, I won’t say it’s also my advantage. However, since I acquainted myself with the community of Robot Operating systems, I’m able to learn, implement, and feedback to have an improvement on capacity accompanied with my positive impact to the field.  Lastly, I would like to share my past experiences. For example, we sacrificed our sleep time to make our own robots the best in the competition field, when working on the Propeller-Powered vehicles project as a Capstone Course in our department, every classmate including me. There are still many experiences that when I get into the research on Robotics, then suddenly the sun has already risen and passed rest time. Equipped with the professional knowledge, capability, and passion, I’m confident that I can continue my dream to make robots work successfully and influence and amaze the world eventually. |
| (e)  My final goal is to impact the Robotics field in Taiwan. Therefore, I regard Prof. Li-Chen Fu as my example. He’s the supervisor of my first lab, the IR lab, who devoted his life to Taiwan’s Robotics research and education. I’m thankful and perceive him as my target to chase or beyond. I want to become influential in my expertise in Taiwan and even the world someday.  To fulfill my ambition, I will study and work in the US after I graduate from Japan. If possible, I would directly work there for five years or more to save 1-2 years for study. I want to work in a company such as Boston Dynamics or iRobot for tasks related to Robotics. After getting enough experience, I’ll bring back knowledge and technique to Taiwan, then positively impact the Robotics industry, research, and even education in Taiwan.  For industry and research, instead of working on robots like manipulators, which is just the big trend in Taiwan, I aim to find my unique way and think of other robots that are also useful in my country. I dream that when it comes to Taiwan, people won’t just know about our semiconductors or bubble tea.  In education, I don’t want to teach students in person. Alternatively, it’ll be more efficient and prevalent for the public to get information from the Internet in this generation. Through Youtube or other platforms, I aim to convey engineering education to make more people in Taiwan interested in Robotics. I can also affect the audience and let them know what I think about the industry or education, so the possibility is infinite.  Above is the short-term goal I want to achieve in 10-15 years. In the long-term, I hope to connect the world with Taiwan.  For instance, I’ll know people from Japan or America after I finish my study and work there. Likewise, I still want to learn more, such as German, even though I know three languages. Accordingly, I can gain more expertise in Mechanical Engineering from different countries. At that time, I might have the ability and property to cofound a Robotics company that gathers expertise from the world. |
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