Hannah Yeom

Human and Integration. These two words compelled me to explore the fascinating field of Human Systems Integration (HSI). Humans are at the center of technology - technology develops to cater to the needs of humans and is initiated by humans or through problems affecting humans. Despite this, many mechanical and technological sciences had failed to consider humans in the design of systems. HSI, however, provides steadfast support for the idea that humans are central to the system, which inspired me. Directly involved with human welfare, this field carefully incorporates humans and their limitations when constructing systems.

The motive for the field is evident - and the technology behind it is awe-inspiring. HSI is incredibly diverse and one of the most interdisciplinary sciences. A multitude of scientists works on hardware and software, such as electrical engineers and computer scientists. What makes HSI unique is that human body experts and medical scientists are also working by their side. The Navy is a perfect environment for developing the HSI field, as it has scientists from a broad spectrum of disciplines. HSI becomes of paramount importance when applied to the Navy and Marine Corps as it is responsible for the gear and technology that the physical Marines and officials utilize. Due to the strict limitations of humans in underwater settings, HSI technology must be able to protect Marines and divers. Additionally, it should empower them to surpass the constrictions of the human body and make groundbreaking discoveries. Whether in warfare or exploration, machinery will need to be designed to successfully capacitate humans and ensure their safety and facilitate exploration.

Among the many dedicated scientists, Dr. Sandra Chapman stood out as someone who was both passionate about their work and possessed ideas that captivated me. As the program officer of the undersea medicine program, she works to ensure the safety of divers underwater. In parallel with my attraction toward human-centric sciences, Dr. Chapman researches ways to improve the mobility of divers underwater while ensuring their safety. Additionally, the work she does is very interdisciplinary - the undersea medicine department contains many intersections between sciences such as chemistry and engineering.

As an aspiring scientist in the chemical and biological fields, I find Dr. Chapman to be an inspirational figure. She shows the engaging research she conducts and also the possibilities of a career in applied biological/chemical sciences. Previously, I had felt that I had a limited number of paths when pursuing a field in biochemistry, but through Dr. Chapman's research, I was able to realize that my perception could have not been farther from the truth. I was particularly impressed by Dr. Chapman’s unconventional approach to challenges, such as utilizing electrolysis to provide for oxygen underwater instead of the more traditional method of extracting dissolved molecular oxygen in the water. Finally, her career goals aligned with mine, in making humans stronger, healthier, and more capable than we can imagine now - or in Dr. Chapman's words, “turning normal mortals into a superhero like Aquaman".

The work done in the present serves as a pathway to developments in the future. First, it is important to recognize the contributions of HSI in daily life. The cars we ride in are specially designed to minimize the damage dealt to the human body in the event of an accident. In the future, HSI will enable the technology we use to be more sensitive, more responsive to our actions.

Human systems integration is bound for expansion. The human lifespan will increase significantly with improved medicine and technology. Though this is good news, this also leads to a rapidly growing elderly population. As humans age, they become frailer than in their younger years and possess diminished autonomy. This is precisely where human systems engineering plays a role in their day-to-day lives. Prosthetic limbs and even organs will be able to provide a better quality of living, with many elderly suffering from arthritis and bodily pain. Elderly populations are only one example of the impact human systems engineering will have on the human population. With major advances in neurology and such technology, there may be devices constructed that allow for the visually impaired to gain sight and advanced treatments for other disabilities.

Just as humans will not lose prominence with developing technology, HSI will only continue to expand as long as humans are around. For example, in the future with the emergence of autonomous vehicles, HSI will still be needed as humans will still be riding the cars.

As for HSI's future applications in the Navy: any device or equipment operated by or containing a human will need HSI. In other words, the evolution of HSI is necessary to make advances in other fields as well, science is not separate. Just as how HSI can help physically disabled people regain mobility, it will also be capable of allowing humans to gain superhuman qualities - when incorporated into a system. Divers will be able to stay underwater longer and go deeper, which has positive implications for both exploration and warfare. In the event of a battle at sea, U.S. Marines will be advantageous in using underwater mobility as an additional weapon. Just as Dr. Chapman said - "turning normal mortals into a superhero like Aquaman".