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The United States Navy is currently the most advanced and capable blue-water navy in service today. Boasting 11 aircraft carriers, sixty-six guided-missile destroyers, twenty-two guided-missile cruisers, a fleet of silent and deadly nuclear-powered submarines, and hundreds of fighter aircraft and other supporting vessels, the U.S. Navy can respond to any situation anywhere in the world promptly. However, with countries like China that have competing interests with the U.S. increasing their influence abroad, the need for the U.S. Navy to be technologically superior to its foes has never been greater since the days of the Cold War. Retaining this technological superiority can only be secured by the next generation of Americans who are dedicated to wanting to serve their country in STEM careers; Americans like me. Although the needs of the Navy are innumerable, an area that I envision myself contributing to is in the development of autonomous ships to protect what is perhaps one of the most strategically important assets in the entire U.S. military arsenal: the aircraft carrier.

Since its inception in the years following WW1, the aircraft carrier has demonstrated itself to be the mainstay of true naval strength. Replacing the gargantuan, antiquated battleships along with their stupendous guns as the capital ships on which naval strategy was to be based, the aircraft carrier completely transformed naval warfare and thinking, shifting battles from being fought in a line-of-sight manner to over-the-horizon. Carriers essentially act as a mobile airbase, intending to quickly establish air dominance in their deployed regions. Consequently, it is why countries such as Russia and China have invested so heavily in the development of anti-ship missiles designed to defeat this advantage for decades, such as the DF-21, the 3M22 Zircon, and the Kh-59. With an older brother currently deployed on the USS Ronald Reagan (CVN-76), ensuring the safety and security of our carriers is more than just a field I am interested in; it is an opportunity for me to help protect thousands of American men and women, including my brother. With the twenty-two Ticonderoga-class guided-missile cruisers set to be decommissioned within the near future and with no dedicated successor currently in development, the role of the Aegis cruisers will fall to the upcoming Flight III Arleigh Burke-class destroyers. However, as it becomes increasingly clear that the Arleigh Burke's are simply running out of the space and power on board to keep up with the ever-changing environment of modern naval warfare, an entirely new hull for a large surface combatant is required if the Navy is to stay a state-of-the-art fighting force. Witnessing the testimonies of some of the men and women who have dedicated their lives to solving the problems that a modern navy faces have opened my eyes up to potential careers in the U.S. Navy in which I believe I could be of use. Dr. Bob Brizzolara in his interview on the development of autonomous boats and ships has provided insight into this new technology that has inspired me to innovate some of my own ideas of incorporating it into a carrier strike group. One such idea is an autonomous ship dedicated to acting as the air defense commander (ADC) of carrier strike groups, which could prove instrumental in defending these vital assets when needed most. Not only would the concept of a dedicated autonomous ADC ship provide engineers with unprecedented room for creativity in filling the space that would normally be occupied by sailors, but it would also relieve other ships like the Arleigh Burke's of the burden of the duties of air defense. Furthermore, it would allow them to focus on a specific group of threats to defend against such as submarines or other surface vessels. In my opinion, it is better to have many different classes of ships that are exceptional in their category rather than one or two classes that are simply mediocre in all categories. Additionally, by not having to accommodate a crew of sailors, engineers could allocate this space in the ship to equipping it with a wider range of weapons and systems. The possibilities are seemingly unbounded. Of course, the associated challenges of such an audacious engineering endeavor are not to be taken lightly. Air defense in itself is already a complex subject, never mind having to take into account the fact that the ADC ship would have to be able to

perform in this area without any direct human control, or at the very least without a human on board to manage it. Moreover, other non-combat-related challenges such as programming the ship to navigate, or how maintenance would be conducted out at sea further complicate the matter. However, I believe the benefits of such a ship would more than outweigh the costs. There will always be challenges and there will always be doubters when discussing which role new technologies will play in the future of naval warfare. For instance, just a little over a century ago, the notion that airplanes would be the decisive factor in many battles to come had both army and navy officers scoffing. As a matter of fact, American military leaders were so obstinate in regards to the idea of a dedicated military branch for airpower, that they court-martialed who was perhaps the most prominent proponent of said idea, Billy Mitchell. Nowadays, maintaining a modern air force to establish air superiority over the battlefield is not even a question. Full and partial autonomy is the future, and the future is where I want to be.

For decades, the U.S. Navy has been the most capable navy on the oceans. However, with growing powers like China expanding their fleet's capability and ship count to fuel their rapacious desire to extend their borders, the future of America's ability to maintain order in hotly contested areas such as the South China Sea grows uncertain day by day. The aircraft carrier has played a vital role in securing these areas and exercising freedom of navigation, but with newer and more lethal threats emerging, uncertainty has grown around the strength of our carriers' defense. However, with new technologies such as autonomous ships and boats improving each year, potential solutions to these problems have surfaced. By involving myself in this new STEM field, I can truly make a difference by serving my country and helping protect American lives such as my older brother.