

## Research Strategies and Reflection

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The First Year Innovation and Research Experience (FIRE) provides undergraduate students with authentic research experience. The FIRE program consists of 3 semesters of research classes. The first class, FIRE120, explores fundamentals of research, such as how to read research papers, how to process data to find results, and finally how to compile your own research into a fully-fledged paper. Following the introductory course, students choose a research stream to enter based on their interests. My stream, Autonomous Unmanned Systems, run by Dr. Derrick Yeo, focuses on building decision-making electronic and computational systems. The second semester involves completing several labs to familiarize yourself with materials necessary in performing your own research. Finally, the program concludes with a full semester dedicated to researching a related topic of your choice. As a Computer Engineering major, I chose a topic I am interested in, namely computer vision. As someone who worked in New York City last summer and traveled hundreds of miles on public transportation, I saw an opportunity in guarding the safety of public areas. This idea bloomed into my final research question: can a mobile system with a camera be used to detect and prevent terrorist attacks?

Being a novel research project, many of the experiments and data used in my paper are of my own device. I built software to detect objects and track their motion and gathered data from several simulations that I built. However, backing the experiments I ran, and decisions I made throughout the research process were several papers and sources that I had studied. Through my experience in FIRE120, I learned about several library resources that I could access online from anywhere on campus. Online databases that contain listings of hundreds of thousand journals and

papers provided me with more than sufficient research to back my ideas. Mainly, I was able to read papers through the Web of Science Core collection, which I found through the UMD Libraries Database Finder. With a plethora of academic papers at my disposal, the next challenge became sifting through them and discovering which applied to my research topic. To do this, I once again employed my research skills developed in FIRE 120 and looked towards their references. Not only could I determine their reputability through the number of citations each paper used and how often other researchers cited these papers, but I could follow their citations to discover even more researchers investigating topics similar to my own.

When searching for academic references, I discovered that my specific research topic was unique, so the sources I used span multiple disciplines, supporting each aspect of my combined project. Having to find relevant sources soon became an issue, as I rifled through dozens of academic journals, trying to locate papers that directly supported ideas or conclusions that I arrived at. While this was difficult, my research educator, Dr. Derrick Yeo, was able to offer some advice. As an experienced researcher, he knew that you can't always find what you are searching for in academic journals. He directed me towards several government handouts and announcements. I located several sources from the Department of Homeland Security and other non-academic writings that I was able to apply to my research. One document included statistics regarding terrorist attack planning and behaviors. These auxiliary documents brought to my attention by Dr. Yeo gave me some of the most useful information I found throughout my research and created a solid foundation for my system's path-planning algorithm.

With several verified sources backing my decisions and conclusions, I am confident in my research assertions. Over the past three semesters, I have learned a great amount about the research process. First, I learned that without standing on the shoulders of others, your research cannot be

fully developed. I needed to use the work of researchers before me to build a strong foundation for my work. Without this foundational support, my research would not have as impactful of a meaning since I would be the only one with relevant arguments. I also learned that the University of Maryland Libraries provide access to hundreds of databases. Access to these search engines allowed me to easily access the academic journals, articles, and papers that were necessary for my research to be fully developed.

Reflecting on my research experience, there are several decisions that I made that I would alter. For one, I would have spent more time researching others' opinions, and less time formulating my own. Using the work of other researchers to guide your own work, and to support your assertions, is fundamental in formulating a strong argument. I spent the majority of my time working on the technical aspects of my project, but I should have developed a deeper list of references. This should have also included physical references from the library. While databases are convenient, the libraries at this university contain a different spectrum of information that I could have used to support my work. One system that the library could put in place is to recommend physical sources that relate to the databases you search and articles you find. Adding this functionality to the Database Finder tool would allow researchers to simultaneously locate digital and physical resources, both relevant to their work.

Overall, this research experience has been anything but linear. I have had to navigate my way through the world of academia, and University of Maryland's library resources alleviated some of the pressures involved.