Thesis Project Portfolio

A Survey of Automatic Vulnerability Detection and Repair Systems in Software

(Technical Report)

How Advanced Technologies in Astronomy Affect Human Mythology and Beliefs

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

The two main topics presented within this thesis portfolio are not directly related to each other. They are, however, both important subjects within the science and engineering. The technical portion deals with automation within cybersecurity, specifically the automated detection and repair of software vulnerabilities. The STS research portion of this thesis portfolio discusses a history of Astronomy, humanity's oldest science, and its relationship to mythology and technology throughout the ages.

The technical portion of this thesis showcased and discussed several automated cybersecurity systems and algorithms. Each system or algorithm was designed to automate an important process within software defense, or to reverse engineer programs, helping cybersecurity professionals gain insight into how certain malware works. All of the systems discussed were evaluated by their authors. These evaluations all generally yielded positive results, however some systems performed better than others. My STS research looked at the history of technologies in Astronomy and how it related to humanity's currently held beliefs and mythologies. As technology advances throughout time, so do myths and religions. Using STS frameworks, my research identified key actors in the relationship between astronomy and beliefs throughout history and evaluated the repercussions and benefits of the relationship.

While the technical and STS research portions are in no way related to each other, they both provided me an opportunity to gain a better appreciation for the advancement of technology. The technical portion of this thesis shows how important it is for state-of-the-art defense systems to improve and adapt so as not to fall behind malware. The STS research portion shows the significance and consequences of going into science with previously held beliefs, rather than an open mind.