

Thesis Project Portfolio

Developing a Reliable and Economical Web Portal for Meals on Wheels

(Technical Report)

A Curricular Analysis of Computer Science at the University of Virginia

(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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Designing an undergraduate curriculum is challenging work for any field of study, since coverage of the material must be balanced with four-year attainability and accreditation board expectations. This is especially true for computer science (CS). CS is highly dynamic, with new technologies and subsets of the field frequently developing, making it challenging to design a curriculum that sufficiently covers important topics in both breadth and depth. The STS component of this research focuses on analyzing the undergraduate UVA CS curriculum because it is currently being reevaluated. Important characteristics of an ideal CS curriculum are identified and then used to examine the advantages and disadvantages of UVA's program. The future of the UVA CS curriculum hangs in the balance during this critical time, and since modifying a curriculum is a long and arduous process, the CS department has a prime opportunity to revise an antiquated curriculum.

The basis for the ideal CS curriculum was the curricula recommendations report produced jointly by the Association for Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE). A joint committee of experts in the field periodically develop a set of curricular guidelines for undergraduate CS programs, with the most recent report having been published in 2013.

One characteristic of an ideal CS curriculum is an integration of at least one practical application of theory. The 2013 report prescribes that students should complete a project that translates theory to practice via a large technical project, ideally spanning at least an entire semester. Experts argue that this experience is important for preparing students for work post-graduation.

UVA satisfies this component of an ideal CS curriculum, and the technical component of this research details one manifestation of this. In order to graduate with a B.S. in CS, students may complete a year-long implementation project for an actual customer. The technical research centers around redesigning a website for Meals on Wheels Charlottesville, a local nonprofit organization that delivers meals to elderly and at-risk people. The staff at Meals on Wheels used a website designed by a previous team of UVA students, and became difficult to use over time. For example, some features of the legacy system became obsolete over time, and the website grew slow and unstable over time as unused data accumulated in the database component of the system. My team redesigned the system from the ground up, improving the usability and efficiency of the system so that Meals on Wheels can be prepared for the future.

Although the technical research does not focus on CS education, it works together with the STS research to identify the best path forward for the UVA CS program. From personal experience, a large technical project is a valuable piece of a CS curriculum, and both the STS and technical parts of the research emphasize this.