

## **Thesis Project Portfolio**

**Web Development: How Web Development Can Elevate Local Businesses**

(Technical Report)

**Integration of Artificial Intelligence into Healthcare Administration Systems**

(STS Research Paper)

An Undergraduate Thesis

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## **Executive Summary**

Artificial intelligence and web applications both have so much potential to automate tasks and increase productivity in businesses, and the COVID-19 pandemic has shown the need for improvement in both the restaurant industry and the healthcare field. Even before the COVID-19 pandemic, over 40% of physicians reported being burned out, with the top contributor being having to complete too many bureaucratic tasks. A 2022 study also predicted that the United States will face a clinician shortage in the coming decade, putting further pressure on the healthcare system to find new ways to combat these issues. Through my STS research, I hope to learn about how artificial intelligence can be used in healthcare services to reduce burnout in staff and reduce costs for hospitals and create an optimized administrative workflow. I hope my technical research project is able to establish greater bonds and a greater sense of community among Charlottesville citizens and that it is able to use technology to boost businesses by fostering connections. I think this project could provide information on how to use web applications to reach more of the public and what features make new technologies less intimidating and more appealing to smaller communities. These projects can together help improve the health of communities through technology by applying different technologies to make businesses more efficient.

Following the recent global pandemic, many smaller, local restaurants found themselves struggling to stay afloat. During this time, many restaurants found a strong online presence to be a vital outreach for connecting to customers. One way to aid many local restaurants in their efforts to expand their customer base and simultaneously drive more potential business was to create a local restaurant review site. To this end, a web application, Cville Eats, was created to be a centralized site where local restaurants could upload information about their websites, and

patrons could leave reviews as well as browse reviews and ratings and explore local businesses. The web application used HTML, CSS, Javascript, and PHP to create a dynamic site hosted on Google Cloud Platform. The site allowed users to add their restaurant to the site or to add, delete, modify, or search reviews using a variety of parameters. It also featured restaurants based on the highest rating or recent review in addition to a random generator for people interested in trying new cuisines. This application could provide great value to restaurants that may not have a prominent online presence as well as to the local community by bringing together both restaurant owners to collaborate with each other and potential patrons to inform one another. Future work on the project could include expansion by adding a gallery for each restaurant, where customers could add more than one photo, along with separate logins and controls for restaurant owners and customers.

The COVID-19 pandemic has also highlighted gaps in healthcare management and the need for better resource management as well as the shortage of healthcare workers. Health care providers have shown that they recognize the potential value in adopting artificial intelligence within their administrative systems in the interest of reducing physician burnout, increasing efficiency, and reducing costs. The STS research paper analyzed the roles that artificial intelligence can take in healthcare administration and what factors need to be considered before it can be successfully implemented. The research found that artificial intelligence in healthcare management has the potential to resolve these issues by increasing the efficiency in hospitals through better management of resources and staff along with the automation of repetitive administrative tasks. There have been many AI tools developed for hospital administration as solutions for logistical areas such as appointment planning, resource and patient scheduling, and predicting demand. There are also tools that have been developed to better manage the revenue

cycle and reduce the time and cost for bill estimates, pre-authorization, and other tasks. Although there are many technologies that have been developed, the incorporation of AI into healthcare systems has been slower due to barriers such as human acceptance and hospital readiness. Hospital systems that have incorporated AI in some form have been doing so in small steps, starting with one system and seeing the results rather than engaging in larger overhauls. It appears that what stands in the way of greater usage of artificial intelligence in healthcare systems is not a lack of technology or tools but rather how prepared hospitals are to adopt AI in terms of staff, finances, and existing technology.

I was able to achieve what I envisioned with my technical project and I think it could be used to help bring the community together and promote businesses within Charlottesville. I would have liked to be able to take it further and I think the work on local restaurants in Charlottesville could be picked up by others by working with restaurants to offer discounts for certain weeks for specific restaurants to highlight businesses and allow customers a more focused look at local businesses. They could also work in collaboration with the university to give students a discount given the high volume of students who reside in Charlottesville for the majority of the year. For my STS research project, I would have liked to be able to do more research with hospitals that had implemented more widespread AI in order to look into how it affected their day to day work and overall structure. The research into the incorporation of artificial intelligence in administrative systems in the healthcare field could be extended by looking into how patients are also affected by these changes and if their experience has been significantly changed by AI tools in the administrative system.