

## **Thesis Project Portfolio**

### **LLM Implementation Inside of Software Development Work Environments**

(Technical Report)

### **The slow and cautious integration of LLMs into the education system**

(STS Research Paper)

An Undergraduate Thesis

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

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

**Jason Ton**

Spring, 2024

Department of Computer Science

## **Table of Contents**

Executive Summary

LLM Implementation Inside of Software Development Work Environments

The slow and cautious integration of LLMs into the education system

Prospectus

## **Executive Summary**

### **Introduction:**

For my STS research paper, I delve into the integration of LLMs into the education system. The main goal of my research is to look at which experiments and steps educators are taking to adjust and change the network of the education system to accommodate LLMs being introduced. For example, we look at how educators are using LLMs to make learning activities more interactive, manipulating LLMs to fit education environments better, and the type of precautions being taken to accommodate data privacy. For my technical report, I analyze the struggles that companies must face when implementing LLMs into their own environments. I link it to my own experience with my summer internship at the company LinQuest and the struggles we ran into when attempting to integrate LLMs into our infrastructure. Both of my projects are connected as they both explore the integration of LLMs into existing systems, whether that be in the education system or in the workplace. While both have their own caveats with unique paths and things they must consider. The two have the same general obstacles they must overcome to make the integration process successful. Both projects have a bit of focus on the struggles of data privacy, the obstacles of LLM integration, and the steps that both sides need to take.

### **Summary of Capstone Project:**

For my capstone project I am exploring an experience in which I got to work hands-on with LLM integration and implementation. During a summer internship with LinQuest, another intern and I experimented with implementing LLMs in a software development environment. The main model we attempted to implement was the BLOOM LLM with around 176 billion parameters. We had to do extensive research in the lab and close analysis of the resources

available and what we needed to deploy the model. In my case this was not possible as the company resources allocated to my section's resources were not powerful enough to practically deploy the model. In terms of moving forward, my group worked on different solutions that could be more plausible, such as implementing models less computationally expensive.

### **Summary of STS Project:**

Large Language Models (LLMs) are complex, advanced machine learning tools that use training data to learn and replicate human text. For my STS research project, I am going to look into the impact of LLMs in the educational environment. Software development workplaces, businesses, and, most importantly for my paper, classrooms have slowly started implementing LLMs to increase productivity and efficiency. My research question is: How are schools currently using LLMs in teaching, and what kind of experiments are they running? I am using the ANT Framework (Actor Network Theory) to explore my research question. The education system is a network of actors with students, teachers, and faculty being the main actors. With the integration of LLMs, I want to see what kinds of relationships in this network will change, in addition to what new actors will be introduced. Things such as AI engineers, IT teams, and big AI companies will most likely join the network due to the newfound challenges brought by LLM implementation. Through my research, I hope to find out more about what kinds of efforts are being put in to slowly integrate LLM technologies into the classroom. This is significant to STS as it will change the way the actor networks of school's function. New actors may be introduced, and existing ones will have a shift in responsibility. This type of shift in the education system will affect not only us, but all future generations to come as they're going to be potentially learning from these LLMs.

**Conclusion:**

Both of these projects have been eye openers to what the integration of LLMs into modern society is looking like. We can see the struggle but also the lengths that humans are going in order to implement these LLMs into their lives to make things easier. Both projects have given me more insight on the steps that are really needed and all the precautions that come with LLM integration. With how the media depicts and talks about LLMs nowadays and all the hype and fear behind it. It was important that I looked into what really goes into LLM integration. It's a good reality check and shows that there is still a lot of work that must be done before AI replaces many human jobs. In addition it proves the fact that human presence is still important and that LLMs should be viewed as complements rather than replacements for the time being. This is highlighted in the school scene where teachers use LLMs as tools or at my internship experience where LLMs were planned to be used as a tool to enhance employee productivity.