



University
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MSc CS+ Dissertation

UXNBOT : AN APPROACHABLE WAY TO LEARN BASIC ASSEMBLY LANGUAGE

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Abstract

Assembly Language is the most terrifying programming language for computer science students, and it becomes more intimidating when it is for Chinese students because language barriers and limited learning resources.

This project aims to build an **UXNBot** to make it easier and more interesting for Chinese students to learn about basic assembly language instructions.

The **UXNBot** is build on the most popular Chinese social media platform **WeChat** and uses an interactive way to talk with the users, it is implemented using Express framework on Node.js environment.

This is particularly interesting as the ChatBot and UXN virtual machine and Uxntal Assembly language have never been used together on WeChat.

(Real evaluation data to be added afterwards)It was found that subjects using **UXNBot** achieved an average of 98.5 out of 100 which is much better than subjects reading materials tested an average score of 83.8, though it is less suitable for advanced learning purpose.

Acknowledgements

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1 | Introduction

This chapter firstly introduces the motive and context behind this project, answering why UXNBot - the assembly language teaching ChatBot, is developed. Then the basic work of the project is briefly mentioned, with a last section giving an overview of the dissertation structure.

1.1 Motive & Context

1.1.1 Motive

Why Assembly Language? If learning Python is a joy, then learning Java & C/C++ may not be a great experience. But when it comes to learning assembly languages, it is almost a daunting experience.

Though assembly languages do not enjoy a large share of popularity in industry, they are still useful in embedded systems, kernel development and optimization part of compiler. According to StatisticTimes (2022), assembly languages are ranked 9th by TIOBE Index. They are certainly an important component in current industry.

What's more, learning assembly language is a perfect way to deepen our understanding of computer architecture, a solid computer science education process shouldn't be lack of learning some assembly language.

Why Uxntal & UXN ? Not like other assembly languages, Uxntal is a much more simpler one with only 32 instructions, yet it possesses very complete abilities to build games, electrical instruments and various range of applications on UXN virtual machine, which is a very light weight one with only 100 lines of ANSI C code.

Its simplicity provides strong educational capabilities.

Why ChatBot ? To further bring close the students with assembly language, this project builds a ChatBot on major social media, enables the students to talk with the UXN virtual machine and get immediate feedback on their input instructions without sitting in front a computer and setting up an development environment or install any more apps.

1.1.2 Context & Innovation

By investigating related works about using ChatBot on social media platform to instantly run instructions in an interpreter fashion and provide results and grammar feedback, no literature or projects published are found.

This project may be the first social media ChatBot to instantly run assembly language instructions and give instant feedback.

Some other related work about educational ChatBot and Uxntal & UXN project can be found on literature review chapter.

1.2 Main Work

1.3 Outline

2 | Literature Review

2.1 UXN & Uxntal

2.2 Educational ChatBot

3 | Related Technologies

3.1 UXN Virtual Machine

3.2 WeChat Open Dialog Platform

3.3 Node.js & Express.js

3.4 Docker

4 | Analysis/Requirements

5 | Design

6 | Implementation

7 | Evaluation

8 | Conclusion

8.1 Summary

8.2 Reflection

8.3 Future work

A | Appendices

Bibliography

StatisticTimes (2022), 'Top computer languages', <https://statisticstimes.com/tech/top-computer-languages.php>. Last accessed: 18 4 July 2022.