AVION CPU

Ali Can Çalışkan - Devrim Rüzgar Türkmen - Arya Ergin

Istanbul Türkiye

e-mail: { accaliskan1064@gmail.com, aryaergin08@gmail.com , devrimruzgarturkmen@gmail.com},

***Abstract* — The Avion CPU is tailored for efficiency with eligibility for nine key functions: load, store, add, subtract, multiply, divide, along with two jump functions and a no-operation option. Crafted using Verilog software, this micro CPU adheres to the well-regarded von Neumann architecture, ensuring seamless integration of data and instructions. Its nimble design, coupled with the ability to execute diverse operations, positions Avion as a versatile solution, showcasing the power of simplicity and effectiveness in computing.**

***Keywords — FPGA, CPU.***

# Introductıon

The Avion CPU project represents a effort in creating a compact microprocessor. Fueled by the collective goal of efficiency and versatility, this micro CPU is designed to execute a range of functions, including load, store, arithmetic operations, jumps, and a no-operation option. The importance of this project lies in its capacity to deliver substantial computing capabilities within a miniaturized framework. By focusing on usefulness and efficiency, the Avion CPU offers a practical solution for various computing needs.

The Avion CPU emerges as a remarkable creation, designed with a focus on efficiency and versatility. Its compact form belies its extensive capabilities, offering a range of functions from basic arithmetic to jumps. The significance of this microprocessor lies in its efficiency – a miniature powerhouse capable of handling diverse computing tasks. The Avion CPU was conceived with a purpose: to provide a useful and efficient solution in the realm of CPU.

# System Archıtecture

The Avion Micro CPU's architecture is rooted in the von Neumann model, a pivotal concept in computer science. In this structure, both program instructions and data share a common memory space. Unlike alternative architectures, such as Harvard, von Neumann allows for greater flexibility in program modification during runtime. The Avion Micro CPU, following this paradigm, fetches instructions and data from the same memory, facilitating a sequential execution flow. This design choice not only simplifies programming but also enhances adaptability. It's this von Neumann architecture that forms the backbone of the Avion Micro CPU, enabling it to efficiently execute diverse functions and showcase the power of a unified approach in computing design.

# Software Used

The Avion Micro CPU is crafted using the Verilog hardware description language, a key element in its development. Verilog serves as the blueprint for the microprocessor, allowing for a systematic and concise representation of its digital circuitry. This software plays a pivotal role in translating design concepts into functional hardware, enabling efficient simulation and verification processes. Verilog's versatility proves essential in capturing the intricacies of the Avion Micro CPU's architecture, ensuring a seamless integration of logic and functionality. Through the use of Verilog, the development team navigated the complexities of microprocessor design, bringing the Avion project to life with precision and effectiveness.

# Results

The Avion Micro CPU embodies a range of functions tailored for versatility and practicality. From fundamental operations like load, store, add, and subtract to more advanced functionalities such as multiply, divide, and two distinct jump functions, this microprocessor caters to diverse computing needs. The inclusion of a no-operation option further enhances its adaptability. Throughout the development of the Avion project, valuable insights and knowledge were gained. The team acquired a deep understanding of microarchitecture, digital circuitry, and the intricate interplay of functions within a compact framework. The project not only honed technical skills but also fostered teamwork, problem-solving, and a hands-on appreciation for the nuances of creating efficient microprocessors.

##### Project team

Ali Can Çalışkan

9th grader at Bahçeşehir Science and Technology High School

Professional in 3d CAD design

Completed the education of hardware and chip engineering lesson with Dr. Vecdi Emre Levent

Professional in python

Devrim Rüzgar Türkmen

9th grader at Bahçeşehir Science and Technology High School

Professional in 3d CAD design

Completed the education of hardware and chip engineering lesson with Dr. Vecdi Emre Levent

Professional in python

Arya Ergin

9th grader at Bahçeşehir Science and Technology High School

Professional in 3d CAD design

Completed the education of hardware and chip engineering lesson with Dr. Vecdi Emre Levent

Professional in python

##### Reference Files

<https://youtu.be/hrzJvUbp2LA>

##### References

1. Smith, JO and Abel, JS, ``Bark and ERB Bilinear Trans forms'', *IEEE Trans. Speech and Audio Proc* ., 7(6):697-708, 1999.
2. Lee, K.-F., *Automatic Speech Recognition: The Development of the SPHINX SYSTEM,* Kluwer Academic Publishers, Boston, 1989.
3. Rudnicky, AI, Polifroni, Thayer, E H., and Brennan, RA "Interactive problem solving with speech", *J. Acoust. Soc. Amer* ., *Vol. 84, 1988, p S213(A).*