PATRICK KAMBA

Portfolio Website: https://pat0kamba.github.io/myPortfolio/

1460 8th Street | Brookings, SD 57006 | patrick.kamba@jacks.sdstate.edu

EDUCATION

South Dakota State University – Brookings

Bachelor of Science in Computer Science — May 2025

Relevant Courses: Data Structures and Algorithms, Assembly, Digital Logic, Foundations of Software Engineering

TECHNICAL SKILLS

Programming Language: C++ (Advanced), Python (Intermediate), JavaScript (Advanced), C# (Intermediate).

Frameworks: System Verilog, DOSBox, Html, CSS, React, Redux, Node JS, MongoDB, Rest APIS, Git.

PROJECTS, *please check my portfolio for more details, diagram and demo of the projects*

10-bit Processor with Immediate Instructions

Problem: Design and build a 10-bit processor using System Verilog (SV) and demonstrate it on a DE10-Lite board based on the following requirements:

- The Data bus is 10-bits wide and is used to pass data between different elements of the processor.
- The 10-bit processor takes in data and instructions via an external source. Depending on the current instruction and the current timestep (saved in a 2-bit counter), the controller drives the control signals of the multi-stage processor circuit.
- All data is saved in one of four 10-bit registers (R0–R3) within the register file.
- To perform arithmetic and logic operations on the stored data, a multi-stage arithmetic logic unit (ALU) is used.

Electronic Devices: Multi-stage ALU, Processor controller, 4 10-bit Registers, Counter, 4 Seven-Segment decoders, Switches, LEDs, 2 Debouncers, all implemented on a DE10-Lite board and programmed in System Verilog.

Solution:

- Each of the 4 10-bit registers has 2 operations: Write-operation and Read-operation.
- Based on the processor's instruction received on the data bus; data can be moved from one register to another or manipulated in other ways.
- The multi-stage ALU performs useful arithmetic operations on data held in the registers, and the ALU takes one common operand through the OP input.

Vending Machine Design

Problem: Design and build a vending machine system that takes a fixed amount of money and dispense a rotten tomato based on the following requirements:

- The vending machine has a single coin slot that accepts farthings (0.25d), half pennies (0.5d), and pennies (1d), and dispense a rotten tomato when a penny and farthing (1.25d) has been received.
- the machine dispenses the correct change (per farthing) for amounts greater than 1.25d using farthings and half penny coins.
- The vending machine is implemented using a Moore-style finite state machine (FSM) using System Verilog (SV) and demonstrated on a DE10-Lite board.

Electronic Devices: 4:2 encoder, Clock Debouncer, Reset Debouncer, D Flip Flop, 2 Seven-Segment decoders, all implemented on a DE10-Lite board and programmed in System Verilog.

Solution:

- The output (Current state on the vending) of the D Flip Flop combines with the encoded input (user's money) helps to generate the next state.
- The previous step will keep ongoing until the target amount is reached, and the user gets their rotten tomato along with the change.

WORK EXPERIENCE

South Dakota State University, **Brookings, SD** — **August 2022 – April 2023**

Division of Information Technology and Security

Student IT Programmer

- Worked in team with supervisors to create, update forms and documentation based on different University's departments demands, using formSite and JavaScript.
- Completed a wide range of web development projects using C# and .Net.
- Used MySQL to send and retrieve data to / from the University's Database.

Parkland college, **Champaign, IL** — **June 2018 – May 2019**

Academic Resources **Peer Tutor**

- Conducted group and one on one tutoring sessions to community college students in science subjects such as Math, physics and chemistry all level for three semesters.
- Developed meaningful and long-lasting relationship with students and coworkers.