DigiLog: A Digital Logic Design Calculator

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Research Plan

Purpose of the Study

General

1. To develop a calculating device using the Intel Galileo board for conversion and for computation of numerical entities across different number systems such as binary, octal, and hexadecimal.

Specific

1. To develop a calculating device capable of accomplishing its task with utmost efficiency possible.
2. To ensure that the developed device could render correct and precise calculations (floating-point operations).
3. To determine if the experimental device could compare well against its existing comparators.

Null Hypothesis

1. The device is not capable of accomplishing its task with utmost efficiency.
2. The developed device could not render a correct and a precise calculations.
3. The experimental device is not comparable against its existing comparators.

Materials and Equipment

The materials that will be used in this study are the Intel Galileo Board, an 8-GB micro SD Card (for storage purposes), a scientific calculator, a USB client connector, an AC-to-DC adapter, a 2.1 mm center-positive plug, and a personal computer (desktop/laptop; for programming purposes; Microsoft Windows OS and/or GNU Linux, Ubuntu 14.04 LTS).

Procedures

1. Preparation of Materials. Connect the Intel Galileo board to a power source using the AC-to-DC adapter and 2.1 mm center-positive plug. Then, connect the board to the client computer where the programming will be done using the USB client connector.

2. Installation of required IDEs. Download the official integrated development environment (IDE) of Arduino for Intel Galileo boards (gen 1 and gen 2) from the official website of Intel.

3. Construction of the Software. The following algorithm shall be the basis of the construction of the software to be implemented in the Intel Galileo board:

1. Get the user input (expression, base, and target base)
2. Convert the given expression to its base-10 equivalent
3. Perform the operation asked by the user to perform on the expression
4. Convert the answer to the target base
5. Display the converted answer to the output device

4. Integration of Software and Hardware. At this phase, the schematic diagram of a scientific calculator must be thoroughly studied. Only then that the scientific calculator could be integrated into the Intel Galileo board. Afterwards, the “bigger Linux image” will be installed in the micro SD card by extracting the downloaded file (*SDCard.1.0.4.tar.bz2*) into it. Lastly, the software developed in procedure 3 (Construction of the Software) will be installed in the newly-installed Linux system.

5. Testing of the Experimental Device. A series of tests shall be initiated for the experimental device. The tests shall include inputs in integer form and floating-point form. In addition, different arithmetic operations on the input shall be used.

6. Testing of Existing Comparators. The same series of tests done in the experimental device shall be done for the existing comparators.

7. Data Analysis. The data to be gathered in this study are the user input (mathematical expression), the result, and the time it took to complete the calculation.

8. Statistical Treatment. The average time it took the experimental device and its comparators to finish the calculation shall be recorded.

References

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