Personal project

Simple calculator

Table of Contents

[Description 2](#_Toc70368012)

[Circuit Diagram and Fritzing Schematic 2](#_Toc70368013)

[The program 3](#_Toc70368014)

[Testing 5](#_Toc70368015)

[Conclusions 5](#_Toc70368016)

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## Description

For this personal project I am going to make a simple calculator. This simple calculator should be capable of doing the four basic arithmetic operations, addition, subtraction, multiplication, and division. TinkerCad will be used for this project as the main workspace. Arduino Uno will be the processing power for this project to process the information and calculate the outputs. A liquid crystal display (LCD) will be used to display instruction and result to the user. A suitable resister is used to regulate the supply of power to the LCD’s LEDs. A potentiometer is also used to control background brightness in LCD.

When using this program, the user will be prompt to enter a number, this will be displayed on LCD for the user to see. Then the user can use the Serial Monitor in Arduino IDE to enter a number. This number will be displayed to the user on the LCD after the first prompt. Then the cursor will be move to the next line on the LCD and prompt the user for a second digit. Again, the Serial Monitor can be used to enter a second number and then again, this number will be displayed after the second prompt on LCD for the user to see. After receiving the second number, the program will prompt the user to pick one of the four arithmetic operation it can do. If the user chooses anything else, the program will display a useful error massage and start again. If the user chooses one of the four basic arithmetic operations, the program will work out the result and display on the LCD for the user to be able to see.

## Circuit Diagram and Fritzing Schematic



The above diagram shows the hardware layout for the project and it is assembled in TinkerCad.



The above diagram is the schematic representation of the project and it has been drawn using the Fritzing utility.

## The program

The program (code) has been embedded as text object; you may not see the full code. To View the code in its entirety just double click anywhere on the box (code).



## Testing

|  |  |
| --- | --- |
| **Edge case** | **Tested result** |
| 0 + 0 = 0 | 0 |
| 12 + (-13) = -1 | -1 |
| 0 – 12 = -12 | -12 |
| -12 – (12) = -24 | -24 |
| 12 x 0 = 0 | 0 |
| -12 x -12 = 144 | 144 |
| 12 / 0 = Not defined | INF |
| -12 / -12 = 1 | 1.00 |

The table above show some of the edge cases with simple arithmetic operations. The program is programmed to work only with whole numbers and the user enters a floating-point number, the result will be around up, thus not giving the expected result.

## Conclusions

This project was undertaken to design a simple calculator in TinkerCad. This achieved by using an Arduino, LCD, resistor, and a potentiometer. Arduino is used as processing power for the program, LCD to establish a visual communication with the user. The program is cable of doing the four basic arithmetic operations on whole numbers only.

This program is not the most efficient or the most advanced in mathematical operation. There is a lot of room for improvement. For starter, the capability of the program can be extended by writing more code to handle all the mathematical operations, such as powers, square root, logarithmic and so on. The code that I have written itself is not the best. The code can be cleaned up by writing functions, each handling a specific operation. This way the code can be reusable in some other projects or program.

Although the project that I have created is a simple one, but I have learned a lot. I have learned the basic of C programming language, which is a lot different to Python which we have been thought in semester one. Prior to this module, I have had no knowledge of embedded systems. This module has been completely a new topic for me, and I enjoyed a lot playing with Arduino and TinkerCad. I have pondered and understand the need for embedded systems and its place in this forever growing technological world.