Arduino Calculator

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Objective

For our project we will be constructing a calculator while using Arduino. This specific calculator will be able to operate using several basic mathematical functions including addition, subtraction, multiplication and division. Users will input values through a 4x4 keypad that will then be displayed on an LCD where the user is able to visualize the inputted operations and result. We have constructed a program for our calculator that solves all of the desired calculation for the user who is inputting specific values. The values are inputted by the user using the keypad, calculated by our coded program and the values are then displayed on an LCD screen.

- **Features/functions:** Addition, Subtraction, Multiplication, Division
- **Variables:** Two user Inputs and One output
- **Items required:** Arduino Mega; 16x2 LCD; 4x4 Keypad; 9V Battery; Breadboard and connection wires

Truth Table

Given is our truth table used to decode inputs entered using a 4x4 keypad.

First 4 bits are used to represent the location of the button vertically (ie row)

Last 4 bits are used to represent the location of the button horizontally (ie column)

a0	a1	a2	a3	a4	a5	a6	a7	O	Symbol
1	2	3	4	5	6	7	8		
1	0	0	0	1	0	0	0	1	1
1	0	0	0	0	1	0	0	2	2
1	0	0	0	0	0	1	0	3	3
1	0	0	0	0	0	0	1	A	ADD +
0	1	0	0	1	0	0	0	4	4
0	1	0	0	0	1	0	0	5	5
0	1	0	0	0	0	1	0	6	6
0	1	0	0	0	0	0	1	B	SUB -
0	0	1	0	1	0	0	0	7	7
0	0	1	0	0	1	0	0	8	8
0	0	1	0	0	0	1	0	9	9
0	0	1	0	0	0	0	1	C	MUL *
0	0	0	1	1	0	0	0	*	CLEAR
0	0	0	1	0	1	0	0	0	0
0	0	0	1	0	0	1	0	#	EQUAL =
0	0	0	1	0	0	0	1	D	DIV /

Process

In order to create a calculator using Arduino mega that functions properly, we had to wire an LCD and 4x4 keymap into our breadboard properly. We then programmed a code that displays the user inputs from the keymap onto the LCD display. We first defined the type of keymap by dividing it into the proper columns and rows, then detected and programmed the location of the wire connections of the keymap. We also wrote functions that store user inputs and then calculates the user input by using if statements and functions. We then programmed the function that detects, calculates, converts and displays what the user inputs from the keymap by using more if statements and functions. We started to work on debugging and troubleshooting errors with the display.

Completion

After some troubleshooting and debugging we were able to construct a fully working calculator using Arduino mega that functions through a 4x4 Keypad and displays through a 16x2 LCD. The calculator properly takes the user inputs, calculates the input, then displays the result output onto the 16x2 LCD. The calculator has 4 main functions which include addition, subtraction, multiplication, and division.

Result

The picture on the right is what our project looks like completed.