

Talking Calculator

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Overview:

In this project we will attempt to create a calculator which will communicate with the dev kit, which will compute the math the calculator will also read out the computation it is to do. We will have an external board with buttons, representing numbers and mathematical operations, a screen to display the calculations and a small speaker to play recorded messages of the operations being inputted into the device. The buttons, the screen, and the speaker will be connected to the board using GPIO pins, which will allow us to perform the actual calculating operations on the dev kit itself. Our initial goal for calculations will be addition, subtraction, multiplication and division however if we get those working in time we may try to add in further operations, but we are not sure what the next additions would be. The speaker we are planning to have play recorded sounds which we will store in an SD card which can be inserted and used by the dev kit directly. All of these parts will be soldered onto an external board to create a (hopefully) clean, compact hand held calculator that will plug into the LPC dev kit.

Peripherals:

1. Push buttons (external to LPC dev kit, will get online or at ECE shop depending on price).
2. Screen (external to LPC dev kit, will get online).
3. Speaker (external to LPC dev kit, will get online).
4. Wires, to connect peripherals to GPIO pins.

Software design:

- Initialize board
- Wait for button input.
- Store input data, print number or operation to screen, and play sound associated with button.
- Return to waiting state.
- When equals button is pressed verify that it is a legitimate operation attempting to be calculated.
- Compute correct output, then print it to the screen as well as having the speaker read it out.

After initialization the board will go into an infinite loop waiting for inputs from the buttons where it will take in numbers until a operation button is pressed. It will then compute the number and save the calculation to be done with the number and read in the next set of numbers until the equals button is pressed after which it will compute the answer. The speaker, as there are too many multi digit numbers, will read out individual buttons as they are pressed, for example 63 will be read, "six, three" instead of "sixty three". When the buttons are pressed the LPC dev kit will also immediately communicate with the screen to display the button pushed. If a series of operations is pushed with no numbers in between an error message will display and the calculator will reset.

Goals:

1. Calculate very basic expressions
2. Show the user their input in real time on the display
3. Show the user their output on the display
4. Allow users to modify their expression with clear and backspace
5. Play a sound byte of the number or expression of the button pushed

Group Responsibilities:

Silas will take the lead on the hardware construction, Andrew will take the lead on the calculator code, and Jeffrey will take the lead on the peripheral LPC dev kit interfacing, however we will all be a part of the entire project helping with all parts.