Module Name: Embedded Systems

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Year 4 ECE department

Base Calculator Project

Implemented on ATMega32A as software on Proteus and hardware

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Introduction

The Number Converter Calculator is a powerful tool that allows users to easily convert numbers between different numerical systems. In this project the calculator is based on the AVR Atmega-32A microcontroller, which is a highly versatile and reliable chip widely used in various embedded systems.

The Number Converter Calculator is designed to perform conversions between the most common numerical systems, including decimal, binary, octal, and hexadecimal. It features a user-friendly interface that makes it easy to enter numbers and select the desired conversion method. The calculator also has a display screen that shows both the input and output values, making it easy to keep track of the conversion process.

One of the key advantages of this calculator is its compact size, which makes it ideal for use in a variety of applications, including education, electronics, and programming. The AVR Atmega-32 microcontroller is known for its low power consumption and high processing speed, which ensures that the calculator operates quickly and efficiently.

Overall, the Number Converter Calculator implemented in AVR Atmega-32 is a valuable tool for anyone who needs to convert numbers between different numerical systems. Its compact size, user-friendly interface, and reliable performance make it an excellent choice for a wide range of applications.

Block Diagram

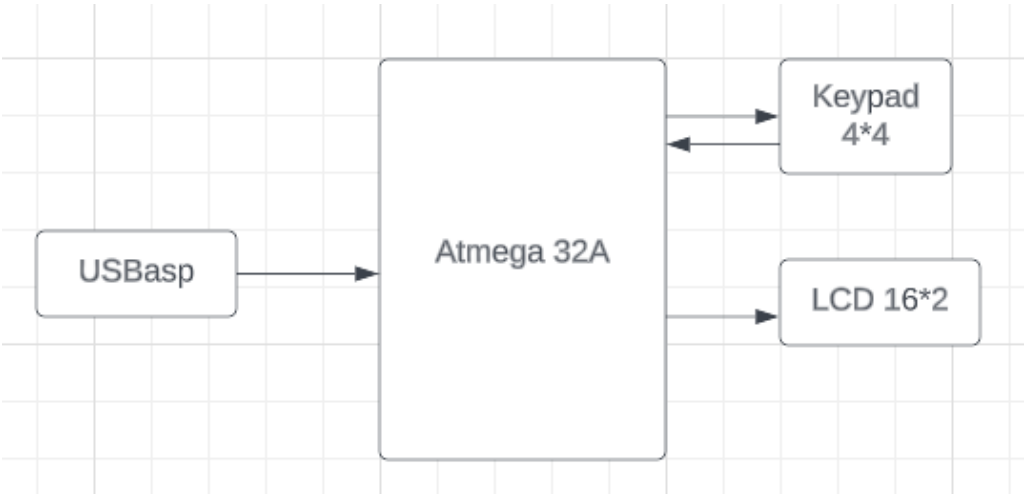

Figure 1: Block diagram of the application.

Flow Chart

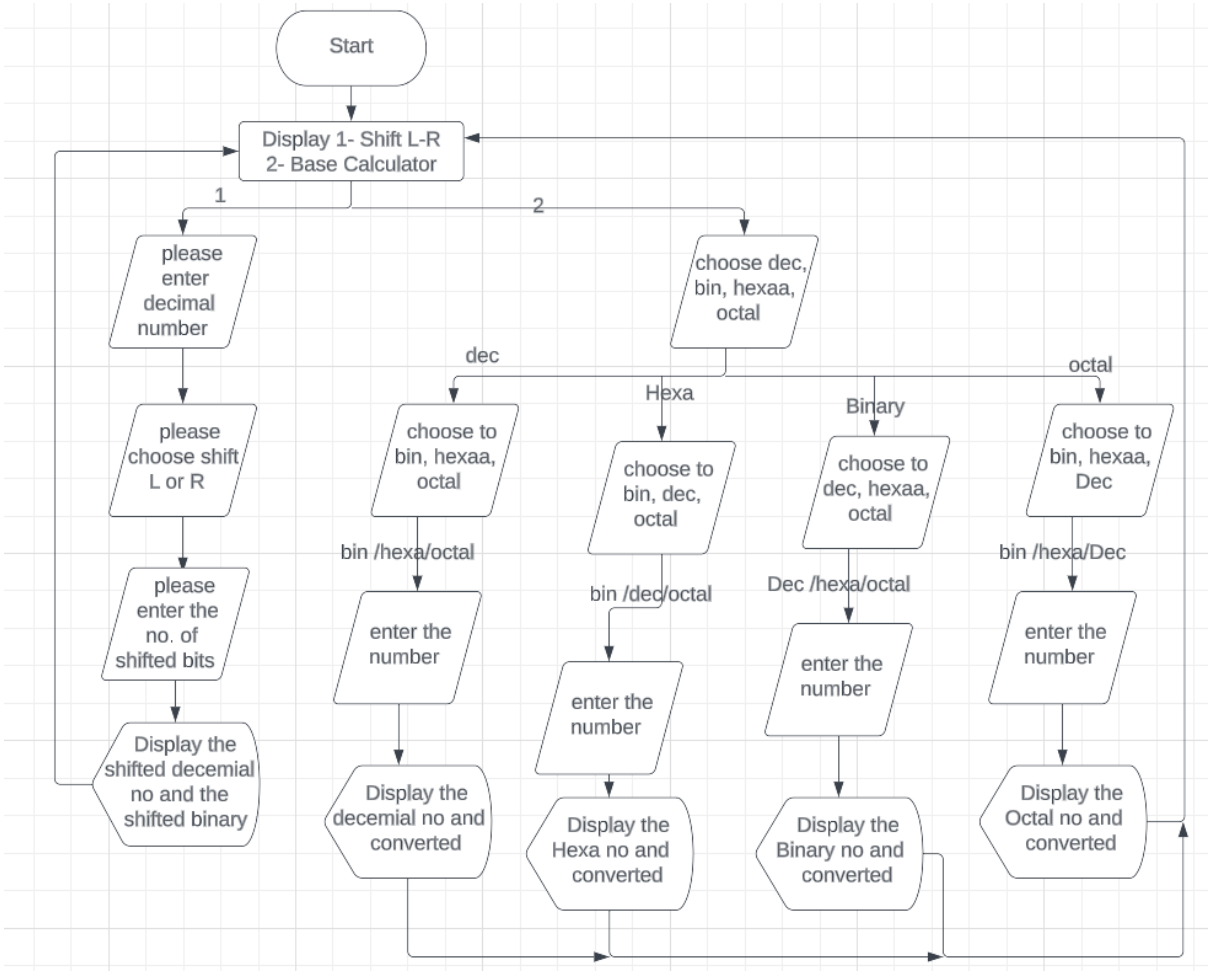

Figure 2: Flow chart of the application.

Base calculator

A base calculator is a tool used to perform mathematical calculations in a specific number base or radix. The most commonly used number system is the decimal system or base-10, which uses 10 digits from 0 to 9. However, other number systems such as binary (base-2), octal (base-8), and hexadecimal (base-16) are also widely used in computer science and engineering.

Users can easily switch between different bases by selecting the desired base from the drop-down menu. For instance, if you want to convert a binary number to decimal, you will input the binary number into the calculator and select the decimal base. The calculator would then give you the decimal equivalent.

To use the shifting feature, the user simply enters a number and selects whether they want to shift the number left or right. The amount of shift can also be specified by the user.

This feature is particularly useful for bitwise operations and data manipulation, which are common tasks in computer programming and engineering.

Code

The code are divided into three parts HAL, MCAl and the application layer. HAL is for the hardware parts that will not be affected by the change of the micro controller such as LCD and the Keypad. MCAL is for the folder that contains the files that related to the MC such as timers, and GPIO.

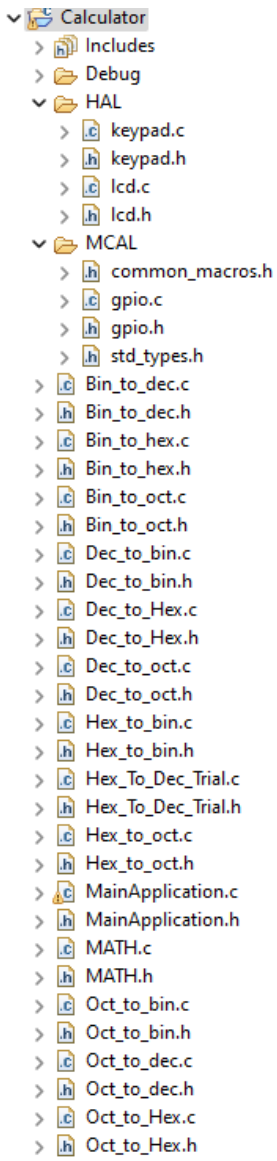

Figure 3: Folders of the project.

Simulation

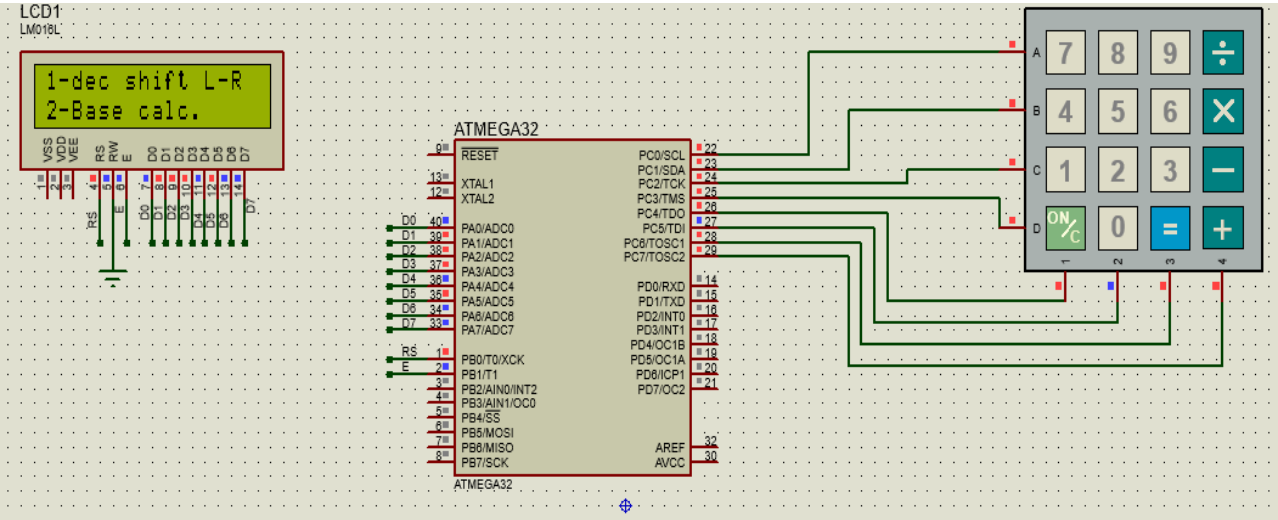

Figure 4: The circuit simulation on proteus software.

Hardware

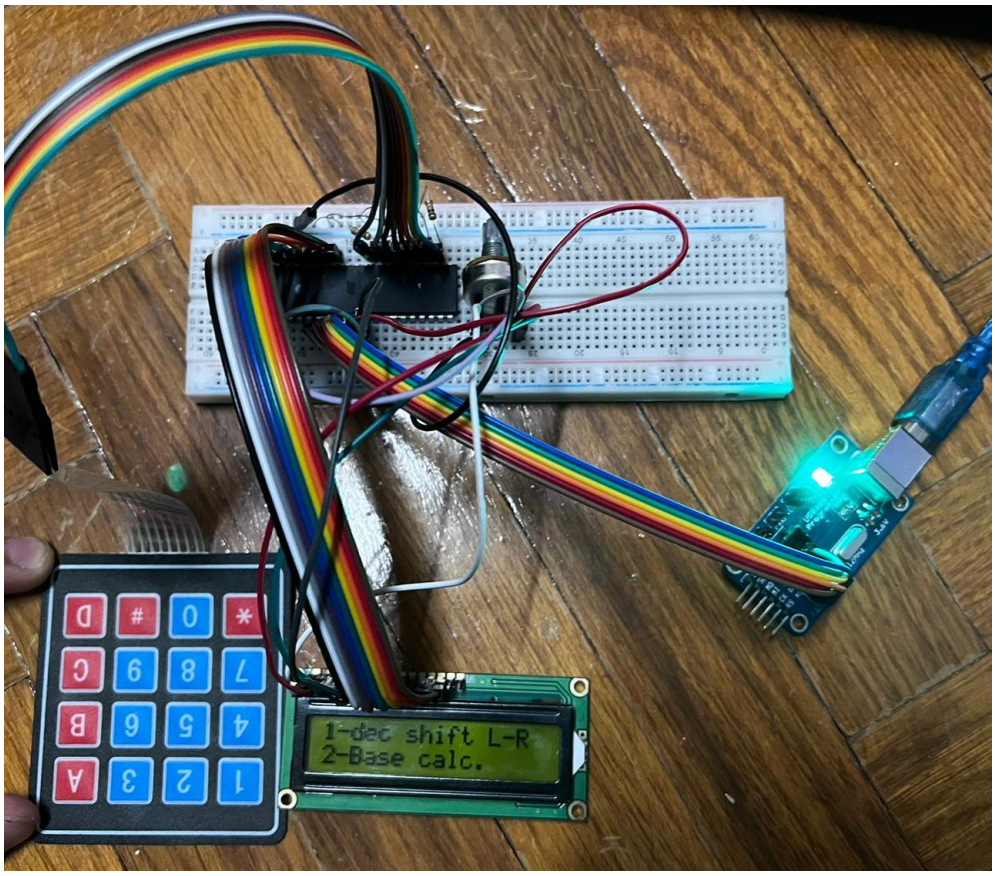

Figure 5: Hardware Implementation.