

Project Demonstration: SD Calculator

Md. Shariful Islam
Soham Khisa

Project Group: 47

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Department of Computer Science and Engineering
Bangladesh University of Engineering and Technology

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Introduction: What is our project

SD Calculator is a simulation project which can:

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- Save and access the history of previous operations

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Components

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 - Arduino Uno
 - ATmega32

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- LCD Display LM016L
- Virtual SD Card Model with SPI Interface
- IC
 - 2 AND Gates
 - 1 OR Gate

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Our project can be divided into four modules

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- Displaying expressions and result on LCD
- Communication between Arduino and ATmega32
- Memory management
- Sending commands

Module: Displaying Expressions and Result on LCD

We have interfaced LCD display with ATmega32 and used 8-bit commands.

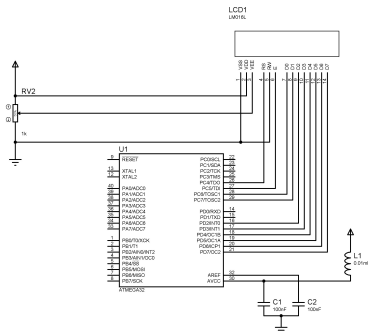


Figure: LCD Interface with ATmega32

Module: Communication between Arduino and ATmega32

For storing and loading the operational data, communication between Arduino and ATmega32 is necessary. UART protocol is maintained for the communication between the microcontrollers. The baud rate is 9600 bps.

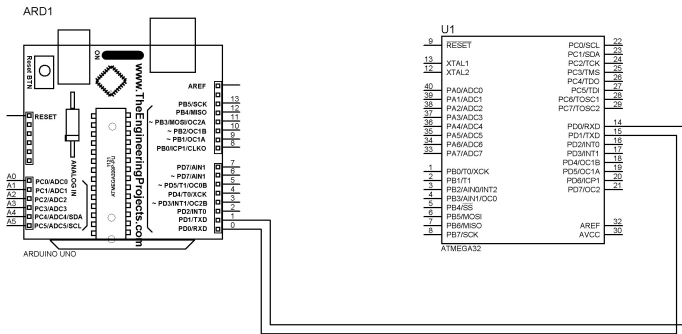


Figure: Arduino-ATmega32 Communication

Module: Memory Management

Memory Card is interfaced with Arduino. SPI protocol is maintained for this purpose.

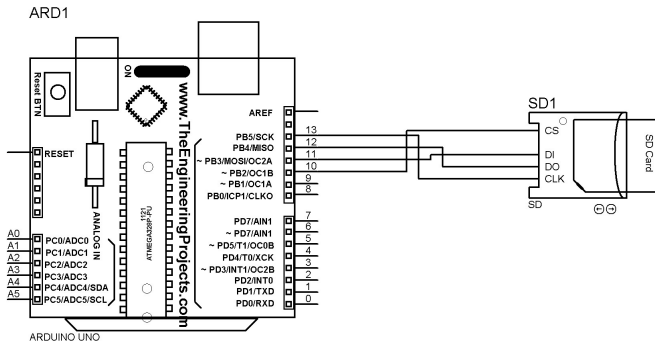


Figure: Memory Card Interfacing

Module: Sending Commands

Keypad is our commanding device interfaced with ATmega32. It sends command to ATmega32 to type the expression

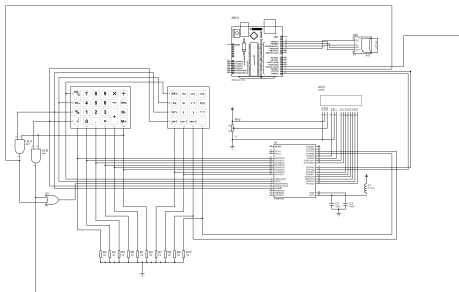


Figure: Circuit Diagram

Module: Sending Commands

When '=' button is pressed, ATmega32 sends the operational data to Arduino to save it

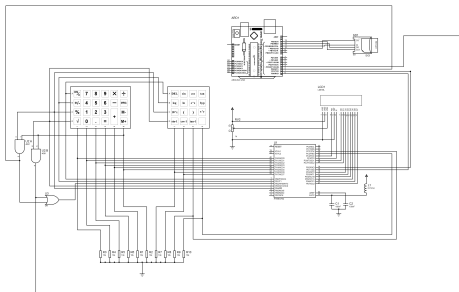


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Module: Sending Commands

When 'M-' is pressed, the interrupts INT2 (ATmega32) INT0 (Arduino, falling edge) are used to transfer SD card data from Arduino to ATmega32

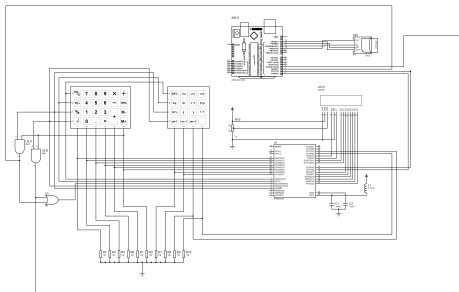


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Module: Sending Commands

For 'M+', same things happen except that INT1 is activated in Arduino.

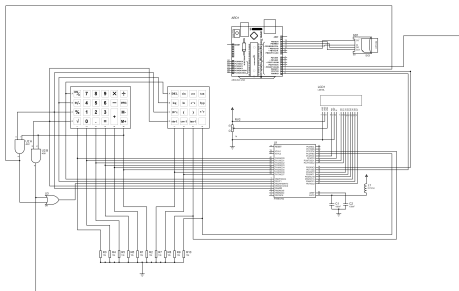


Figure: Circuit Diagram

Module: Sending Commands

Pressing 'M-' shows older data step by step while 'M+' is used to show the newer ones.

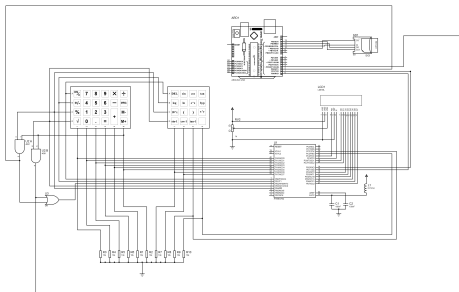


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