EE 214 Project

Task 2A REPORT

ADC to LCD via SPI

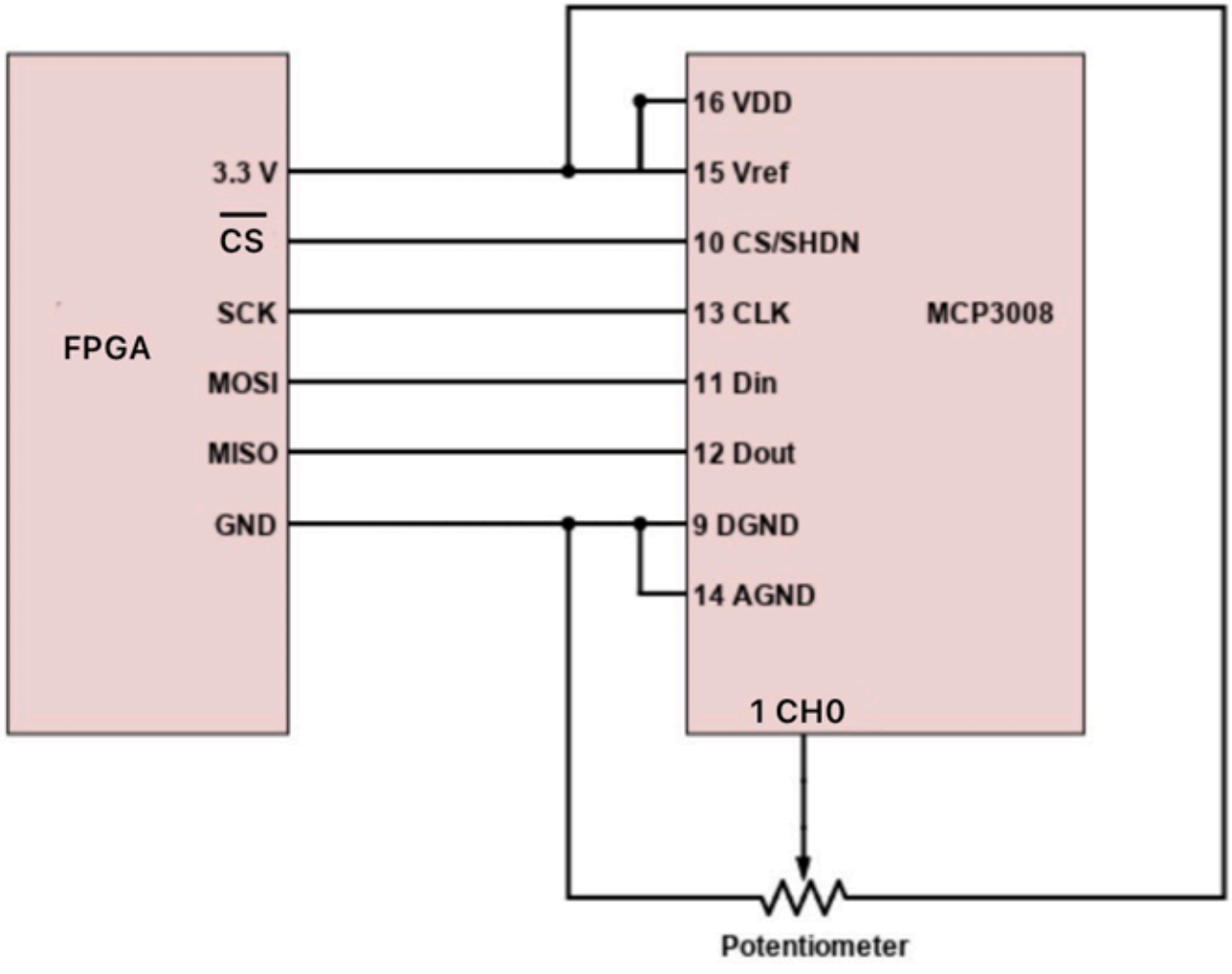
Team Members :

1. Name : Revanth Manepalli Roll No. : 23B1223
2. Name : Manasvi Kadam Roll No. : 23B1300

Introduction

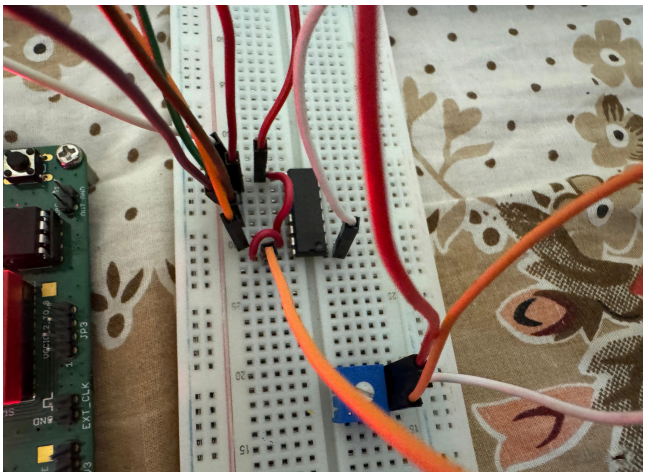
Task 2(a) involves interfacing an Analog-to-Digital Converter (ADC) with an FPGA via the Serial Peripheral Interface (SPI) protocol to capture and display digital data on LEDs and an LCD. Acting as the SPI Master, the FPGA communicates with the ADC (SPI Slave) to convert an analog input into a 10-bit digital output.

Connection diagram

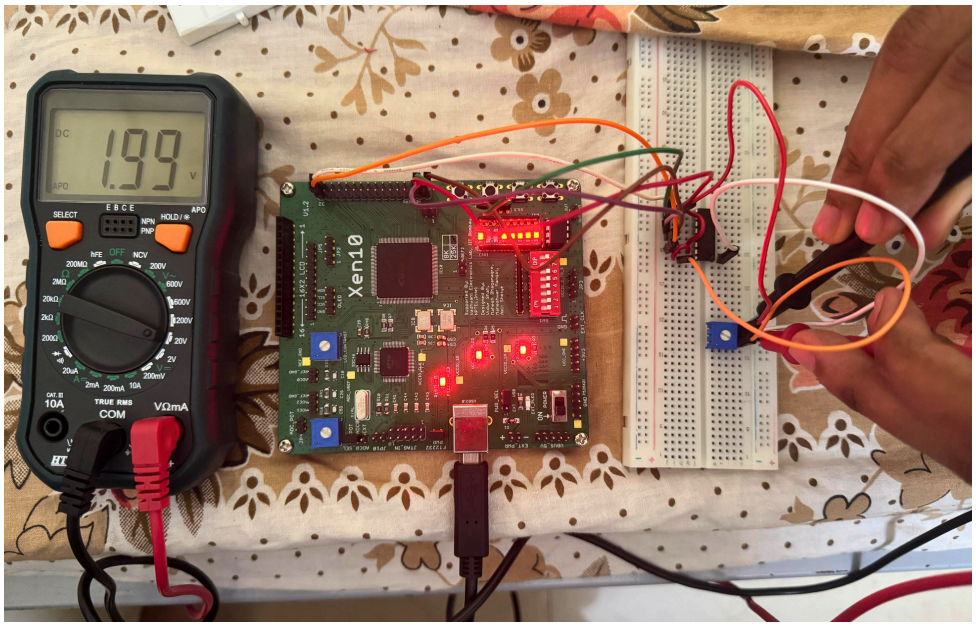


The FPGA provides a 3.3V supply and the necessary control signals to interface with the MCP3008.It controls the communication through the SPI (Serial Peripheral Interface) protocol.The MCP3008 is configured to convert analog signals from the connected potentiometer to digital data for the FPGA.The potentiometer is connected to channel 0 (CH0) of the MCP3008, providing an adjustable analog voltage. The MCP3008 reads this voltage and converts it into a 10-bit digital value, which the FPGA can then process.

Hardware Setup



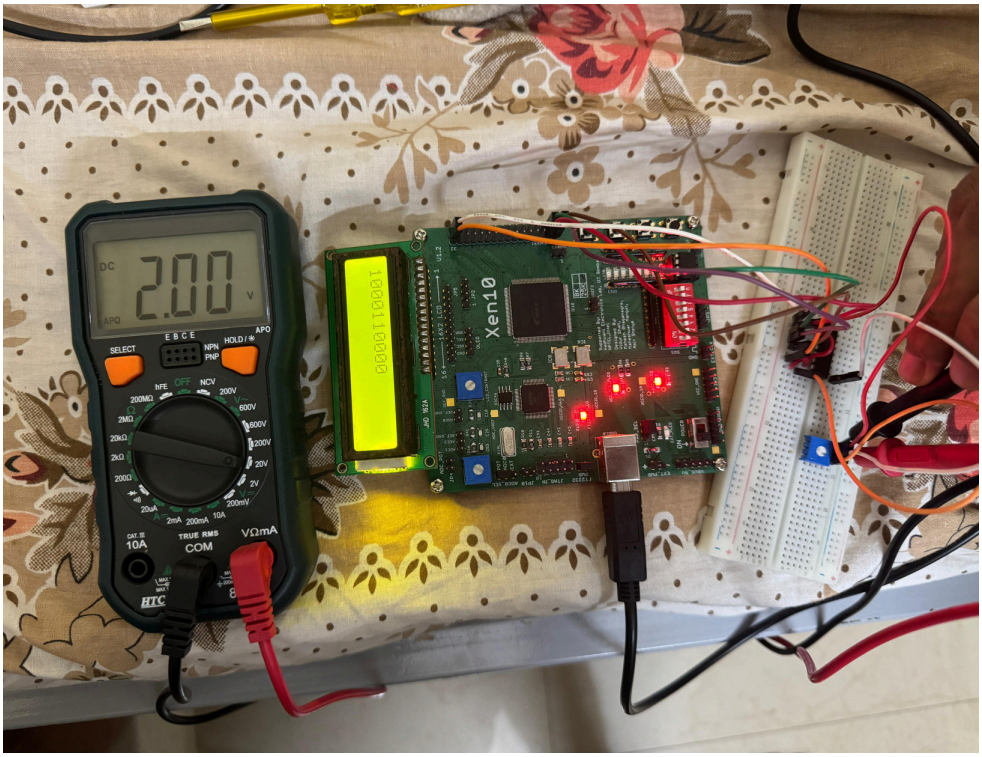
LED Output



- The LED's display binary number 1001111100 for an input voltage of 1.99 V
- The decimal equivalent is 636
- The voltage corresponding to this value with Vref = 3.3 V is

$$V = \frac{636}{\_1023} \times 3.3 = 2.05$$

LCD Output



- The LCD displays binary value 1000110000
- The decimal equivalent is 560
- The voltage corresponding to this value with Vref = 3.3 V is

$$V = \frac{560}{1023} \times 3.3 = 1.77$$