DIGITAL COMMUNICATION LAB

Electrical Engineering Department

Experiment 2: Pulse Code Modulation

AIM: Implementation of PCM using Arduino.

Components Required:

- Breadboard

- Digital Storage Oscilloscope (DSO)

- Function Generator

- Arduino Nano

- Resistors: 39kΩ

- Capacitor: 0.1μF

- Wires and Probes

- LEDs

Theory

Pulse code modulation (PCM) is the most popular digital encoding technique that is used to convert the analog information into a digital bitstream or binary sequence. The main PCM components are sampler, quantizer, and encoder. Low-pass filtering is used prior to sampling in order to avoid aliasing effect. The
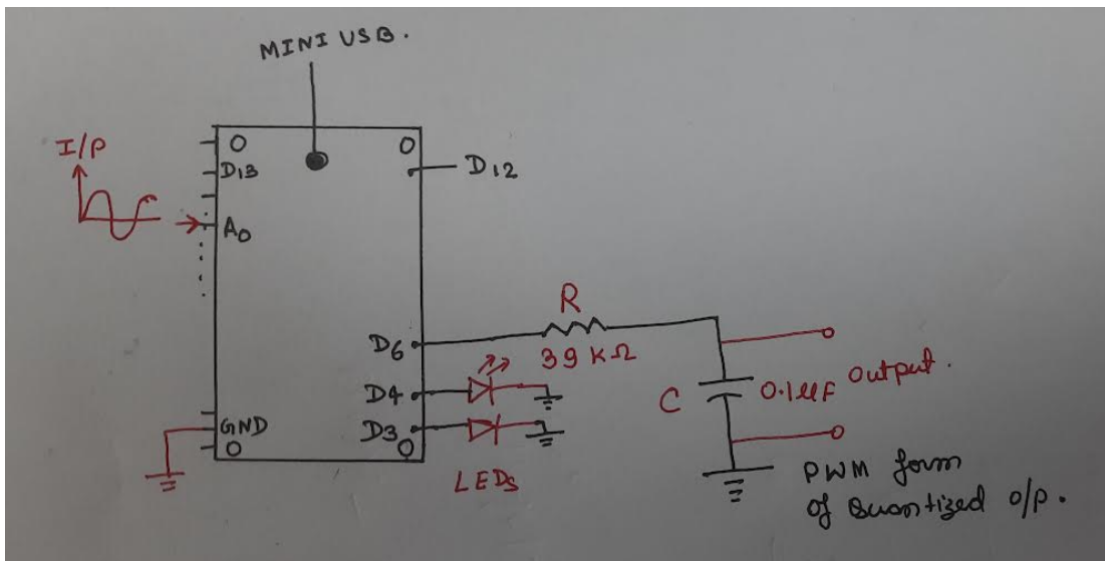
Figure 1: Block diagram of PCM

Figure 2: Circuit diagram for PCM

sampling is done as per Nyquist rate and the analog signal is converted into discrete signal. Basic elements of PCM are shown in the form of a block diagram in Fig 1. For the implementation of PCM, we will use Arduino.

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board and a piece of software, that runs on your computer, used to write and upload computer code to the physical board. The circuit diagram for the PCM is shown in Fig 2.

PROCEDURE:

1. Make the connections as per the circuit diagram.

2. Take the sine wave as input from the function generator.

3. Fix the frequency, amplitude, and offset voltage for the input signals.

4. Give the input signal at pin A0 of arduino as in fig 2.

5. Low Pass circuit and LEDs are required to connect at D6,D4,D3 pin of Arduino respectively.

6. You have to write the code for quantization and encoding on your computer.

7. Take the output through capacitor.

8. Observe the PWM form of quantization output on DSO.

9. Verify the LEDs glow for all possible states.

Conclusion: Successfully generated the digital form of analog input signal.

Plot the waveform

Observation Table

S.no.	b1	b2	LED 1	LED 2
1				
2				
3				
4				