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Week 10 Studio 2

Group 4b

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**Activity #1: Sampling theorem and Nyquist rate**

6. A0 is connected to the function generator positive output terminal and GND is connected to the function generator negative output terminal

7.

#define INPUTPIN A0

#define PERIOD 200

#define SAMPLES 50

int set\_number=1, i=0, input[SAMPLES]={0}, millis\_ref, j=0;

void setup() {

Serial.begin(9600);

millis\_ref = millis() - PERIOD;

}

void loop() {

while(i<SAMPLES) {

if(millis() - millis\_ref >= PERIOD) {

input[i] = analogRead(INPUTPIN);

millis\_ref += PERIOD;

++i;

}

}

Serial.print("Sampling Results: Set ");

Serial.println(set\_number);

for(j=0;j<SAMPLES;j++) {

Serial.println(input[j]);

}

}

12. Scaled sample values = sampling rate’s data/(1023/5) = sampling rate’s data/204.6

13.

|  |  |  |  |
| --- | --- | --- | --- |
| S.No | Sampling rate(Hz) | Sampling period(ms) | Aliasing observed |
| 1 | 5 | 200 | Yes |
| 2 | 10 | 100 | Yes |
| 3 | 20 | 50 | No |
| 4 | 25 | 40 | No |
| 5 | 50 | 20 | No |

14. Appropriate sampling frequency = Nyquist rate = 2f = 210 = 20Hz

15. Nyquist frequency for a sampling rate of 50Hz = = 50/2 = 25Hz