



School of Information Technology

Course : Diploma in Infocomm & Security (ITDF12)

Module : Sensor Technologies and Project (ITP272)

Tutorial 3 : Signal Conditioning, Data Communication

Objectives:

- To be able to perform ADC calculations to compute sensor stimulus outputs
- To be able to explain concepts of data communication within the micro-controller

Tutorial

Instruction:

Read up on Lecture: Signal Conditioning, Data Communication

Provide your answer on A4 paper and **submit** to your tutor

Question 1 (Signal Conditioning Lecture)

Steady Sensor Pte Ltd has recently bought a new ultrasonic sensor. The sensor output is connected to a processor which has an internal 10 bit Analog to Digital Converter (ADC) and takes in 5V.

The datasheet of the sensor states that it produces 9.8mV per 2.5 cm

- (a) Determine the following:
 - i. ADC Resolution
 - ii. Maximum ADC Quantization level
 - iii. ADC Full scale Voltage Range
 - iv. ADC Voltage Resolution

- (b) Determine the formula for Distance in terms of Sensor Voltage.

- (c) The micro-controller reads an ADC value of 60 from the sensor output.
 - i. Calculate the equivalent Sensor Voltage.
 - ii. Calculate the actual distance.

- (d) Determine the ADC value when the measured distance is 100 cm.

Question 2 (Data Communications Lecture)

Quantum Sensor Pte Ltd is developing an attendance clocking system that deals with a Radio Frequency Identification (RFID) reader. The micro-controller is required to interface with the reader over a UART.

- (a) What does UART stands for?
- (b) With the aid of a diagram, explain the process of data communications between 2 processors using UART.
- (c) What are the 3 communications lines of a UART?
- (d) Draw the connection diagram for these 3 lines.
- (e) Use a Table to list down and describe the 4 communications parameters of a UART and provide a valid setting for each of them.

==End of Practical_Tutroial==