

**ETEC 6414 Sensors and Wireless Communications**
**Assessment for Sensor and Wireless Communications**
**Deadline: 03/06/2014**


Lecturer's Full name: \_\_\_\_\_

Student's Full name: \_\_\_\_\_

Student's ID: \_\_\_\_\_

**Note:** When handing in this assessment I am ensuring that:

1. This evidence is my own work,
2. This assessment has proceeded as I expected,
3. Any special requirements I have been addressed.

 Signature:
 

Marks allocation:

	Score
<b>Part one: (5 marks)</b>	
<b>Part two: (40 marks)</b>	
<b>Part three: (40 marks)</b>	
<b>Part four: (10 marks)</b>	
<b>Part five: (5 marks)</b>	
<b>Final: (100 marks)</b>	

 Lecturer's comments:
 

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**ETEC 6414 Sensors and Wireless Communications**

**Assignment 1 – Wireless Sensor Node (55% of Total marks)**

**This assignment is divided into two parts as follow**

- a) Develop a Sensor Circuit using commodity components (Deadline 1<sup>st</sup> April, 2014)
- b) Design a wireless sensor node using commodity wireless modules (Deadline 3<sup>rd</sup> June, 2014)

**Assignment 1(a) –Sensor Circuit      Deadline: 1<sup>st</sup> April, 14**

**The first part of the assignment is to design a prototype of home security system with passive proximity sensor, light sensor, temperature sensor and examine its performance.**

*Note: You have to demonstrate the working of the circuit by the deadline. Report will be submitted with the second part of the assignment.*

Students are to design the security system with the proximity, light and temperature sensors. All sensors should be incorporated in one big circuit and if any sensor senses an intruder then it should trigger an alarm. The alarm could be flashing of LED or a speaker in the prototype circuit. The circuit should be designed and demonstrated within the due date (1<sup>st</sup> April). You should have a schematic of your circuit during demonstration. This prototype circuit will be used in the wireless part of the assignment. Therefore, you should keep it in a safe place for later use.

**Assignment 1(b) –Wireless Sensor Node      Deadline: 3<sup>rd</sup> June, 14**

Students are to design a wireless sensor node, which can wirelessly transfer the sensor information to a remote location. The circuit developed in sensor assignment will be used with a 433 MHz transceiver module. The receiver module of wireless sensor node should turn on an LED in order to demonstrate working of your assignment. You have to use HT12E encoder, HT12D decoder, 433 MHz Transmitter and Receiver.

**Report Submission**

The report should address following topics

- The role of Encoder and Decoder in this circuit?
- Legal implication of using 433MHz band?
- The distance coverage of the wireless node with provided components
- How to increase the range of wireless node and discuss the improvements for this circuits

The report should also provide the recommendation as how to implement your prototype circuit in real time to provide home security. The justification for real-time circuit should be in terms of extra components, voltage and current requirements. In addition, state issues related to the practical implementation of the system and provide the possible solutions.

All information from lecture notes can be used for this assignment. This assignment has **55%** marks of the total marks. The operation of the circuit for wireless part should be demonstrated in lab before

**3 pm on 3<sup>rd</sup> June, 2014** and the assignment report **should be submitted before the demonstration of the circuit.**

The marks allocation is as follows:

**a) Introduction (5 marks)**

Introduction of the assignment, your methodology (maximum 1.5 Page long approx.)

**b) Circuit design (40 marks)**

**a. Sensor Part (20 marks)**

1. Design of the circuit and explanation
2. Maths and your calculations for the circuit design
3. Schematic, components, EMI consideration for multifunction circuit. Discuss the main sources of EMI in your report and minimization technique. Support your work with authentic references.

**b. Wireless Part (20 marks)**

1. The role of Encoder and Decoder in this circuit?
2. Legal implication of using 433MHz band? (References required)
3. The distance coverage of the wireless node with provided components
4. How to increase the range of wireless node and discuss the improvements for this circuit.

**c) Circuit demonstration (40 marks)**

**a. Sensor Part (20 marks)**

1. Working of Proximity sensor circuit
2. Working of light sensor circuit
3. Working of temperature sensor circuit
4. Full circuit demonstration.

**b. Wireless Part (20 marks)**

1. Working of circuit
2. Explanation and understanding of your circuit during demonstration.

**d) Circuit for real time implementation and suggested improvements in the existing circuit. (10 marks)**

**e) Conclusion (5 marks)**

*Note: - Include formulas, calculations and your findings in order to support your circuit design. Poor explanation in the report will lead to fewer marks even if circuits are demonstrated. Support your work with references.*

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