Project – Sensor and Instrumentation BFF3302

Semester 2016/2017

General information about the project:

a. In **group of 3-4 (**refer to project-assignment group**)**. All members should participate in all activities conducted by the group to finished the project. **Individual mark** and **peer review** will be conducted.

b. Using **Arduino Uno microcontroller** as a processor. You are allowed to use **other microcontroller** (e.g. Raspberry pi, PIC), but you need to get it by yourself. Lab provides Arduino Uno as the basic microcontroller for your projects. Download Arduino IDE from the Arduino website (https://www.arduino.cc/ or http://www.arduino.org/). Use fritzing (http://fritzing.org/home/) to draw the circuit diagram. You also can go and use processing (https://processing.org/) for more exciting projects.

c. Should have **at least 1 input sensor** (based on the project number. E.g. temperature, gyroscope, pressure sensor, accelerator sensor, force/tension sensor) and **at least 1 output** (e.g. LCD display, servo motor etc.) to indicate the input/measured value. Any additional components required to complete the project could be directly asked to me. The output of the project is not limited to the mechanical output; it could be an analysis output. For analysis output, you need to describe the detail of important data that you get from the analysis.

d. Students are allowed to use their own creativity to create **additional functionalities** of their projects. The implementation of additional simulation software such as **Matlab/Simulink**, **Labview** or **Multisim/Proteus** is really encouraged.

e. All the technical specification of the used components need to be understood by students themselves. Thus, students need to find the **technical datasheet** by themselves. Make sure you have understood the functionality of the used components.

f. **After the mid-semester break,** students need to **present** their project during the lab session and submission of the project should be done with the printed hardcopy report, presentation and demonstration. The **presentation schedule** will be announced later. **Report** should be in the form of **IEEE paper** which included in the KALAM. Attachment of important pages of **datasheet** is required.

g. All components need to be returned to the lab after the final presentation and demonstration. Any fault (e.g. burned) of the components is the group's responsibility. There is no replacement of the broken component from the lab. Each group need to send me the **digital copy** of all relevant document (e.g. report, program, image and video of the

project, presentation slide, program code) together with hardcopy report during the presentation/submission.

Project 1: Temperature sensor

Use your own creativity and resources from internet to construct the project. Basic components given:

- Arduino uno
- temperature sensor (TMP36 or LM35)
- transistor P2N2222AG (other transistor may also compatible)
- Servomotor or LCD display

Project 2: Gyroscope /Gyrometer and humidity sensor

Use your own creativity and resources from internet to construct the project. Basic components given:

- Arduino uno
- Gyroscope/gyrometer - 5 Degrees of Freedom IDG500/ADXL335 or any available gyroscope in the lab
- Humidity sensor
- LCD display/LED/7 segments/other components

Project 3: Accelerometer

Use your own creativity and resources from internet to construct the project. Basic components given:

Basic components:

- Arduino uno
- Acceleratormeter - any available Acceleratormeter in the lab
- LCD display/LED/other components

Project 4: Gyrometer and accelerator sensor

This component integrated both accelerator and gyroscope into a device sensor. You are required to use both values of acceleration and location to produce a creative project. You can

refer to the other available project (e.g. http://www.instructables.com/id/Use-an-Accelerometer-and-Gyroscope-with-Arduino/).

Basic components:

- Arduino uno
- Acceleratormeter + gyroscope
- LCD display/7 segments/LED/other components

Use your own creativity and resources from internet to construct the project.

Project 5: Force/tension sensor or strain gauge

Try to produce an application from the force/strain gauge given.

Basic components:

- Arduino uno
- Force sensitive resistor or any available force sensor in the lab
- LCD display/7 segments/LED/other components/servo motor/DC motor

Use your own creativity and resources from internet to construct the project.

Project 6: Infrared sensor/ultrasonic sensor

In this project, you have option to use infrared sensor to control either the distance of mobile robot (i.e. control DC motor) or you can control the servo motor from the input of infrared sensor. But it is just a suggestion and you have your own option to develop your own project.

Basic components:

- Arduino uno
- Ultrasonic/Infrared sensor (MH sensor series) or any available infrared sensor in the lab
- LCD display/7 segments/LED/other components/servo motor/DC motor

Use your own creativity and resources from internet to construct the project.

Project 7:   Gas sensor

Basic components:

- Arduino uno
- Gas sensor
- LCD display/7 segments/LED/other components/servo motor/DC motor

Use your own creativity and resources from internet to construct the project.

Project 8:   Inductive/capacitive sensor

Basic components:

- Arduino uno
- Inductive / capacitive sensor
- LCD display/7 segments/LED/other components/servo motor/DC motor

Use your own creativity and resources from internet to construct the project.

Project 9:   Photo resistor

Use your own creativity and resources from internet to construct the project. Basic components given:

- Arduino uno
- Photo resistor sensor
- LCD display/7 segments/LED/other components/servo motor/DC motor

Project 10:   Speedometer / encoder

Basic components:

- Arduino uno
- Speedometer or DC motor with built-in encoder
- LCD display/7 segments/LED/other components

You can use these devices to measure the speed of a moving object such as the speed of motor rotation. Use your own creativity and resources from internet to construct the project.