Texas A&M University at Qatar
Electrical and Computer Engineering Program

ECEN 403-502

Electrical Design Laboratory I

Semester: Fall 2014

Project Proposal

"Data Logger for Mechanical System"

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Due Date: Sept 9th, 2014

"On our honor, as Aggies, we have neither given nor received unauthorized aid on this academic work."

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Abstract

Our project is an industrial collaborative project with an objective to design an electronic subsystem to work with harsh-environment mechanical systems in order to log their performance while performing the various tasks they are designed to carry out. This electronic subsystem will act as a data logger that measures system parameters against time and stores them into memory for easy retrieval using a computer program we will develop.

Our project has direct industrial application, and impact and we will be working with engineers from various disciplines on final system integration and testing, which will add value to our design experience.

Project Description

a. Summary

This project is an electronic add-on to mechanical systems that is designed to work in harsh environments. It will constitute of a printed circuit board that is approximately 6 inches long, and will contain a microprocessor for control, flash memory for data logs, and sensors as input. Among the various sensors that may be included are an accelerometer, hall sensors, and temperature and pressure sensors. The final sensor configuration and selection will be carried out throughout the project. A list of possible system components is shown in the budget section.

A product similar to our project is the H.E.A.T. Board from Texas Instruments[1]. It stands for Harsh Environment Acquisition Terminal, and it is a module designed to work in temperatures up to 200 °C. It is, however, big and provides more capability than we would need in our project since it is designed as a demonstrator for TI's high temperature capability. It can, however, serve as a good guide to our project. A picture of the circuit board and a block diagram of the H.E.A.T. Board are shown in Figure 1.

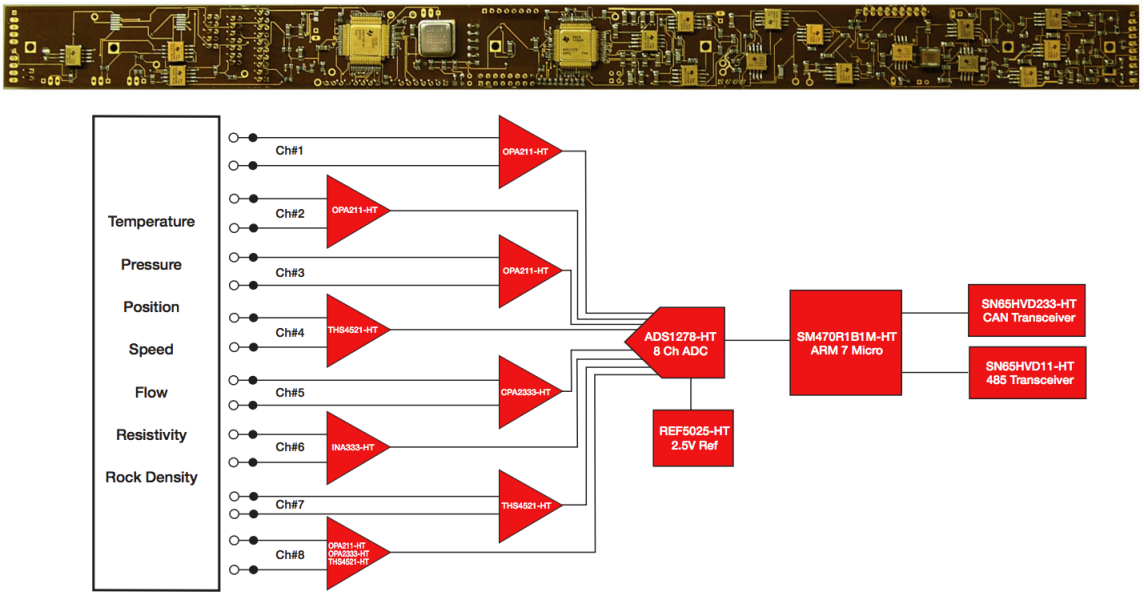

Figure 1: The H.E.A.T Board design and schematic

[1] http://www.ti.com/tool/heatevm

b. Estimated Budget

The components in Table 1 below are projected as a possible bill of material for our project. It is envisioned that this will change significantly as we progress, but is a reasonable starting reference.

Polyimide PCB (Printed Circuit Board): The circuit board for the project should be made from special material for better performance in different thermal conditions. As stated above the size of the board is estimated to be 6”x1.5”.

Microchip Processor and memory: The processor used in the project should be small and have low-power consumption and also operate efficiently at high temperature. Specifications of the processors are: 16Bits, +20MHz, preferable to have CAN connectivity and built in ADCs.

Sensors: The sensors are the main input to the processor board. Position and direction sensors are essential to the project. Size and accuracy are two main considerations.

Minimal extra cost is added for possible extra components. Shipping and taxes are accounted for in the project budget.

Table 1: The estimated prices of our components

Component	Estimated Price
Polyimide PCB (Printed Circuit Board)	~$500
Microchip Processor (16Bit)	~$50
Flash Memory (512Mb)	~$100
Sensors Total:	~$1000
• Linear Variable Differential Transformer	~$400
• Accelerometers	~$100
• Other Sensors	~$500
Miscellaneous	~$100
Shipping & Taxes	~$200
	Total = ~$1,950

c. Timeline

	Project Timeline															
Month	**Aug**	**September**					**October**				**November**				**December**	
Task/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17
Select Group and a Project																
Project Proposal			10-Sep													
Project Proposal Presentation																
Research Project Components																
Create basic website				17-Sep												
Team Working Agreement (TWA)				17-Sep												
Customer/ User needs					23-Sep											
Design Software-Based Real Time Clock																
Ethnographic study video									21-Oct							
Circuit design/System archeticture																
Benchmarking											4-Nov					
Concept Generation and Evaluation													18-Nov			
Functional modeling														25-Nov		
Progress report and Seminar															3-Dec	
Presentation																
Peer evaluation																10-Dec