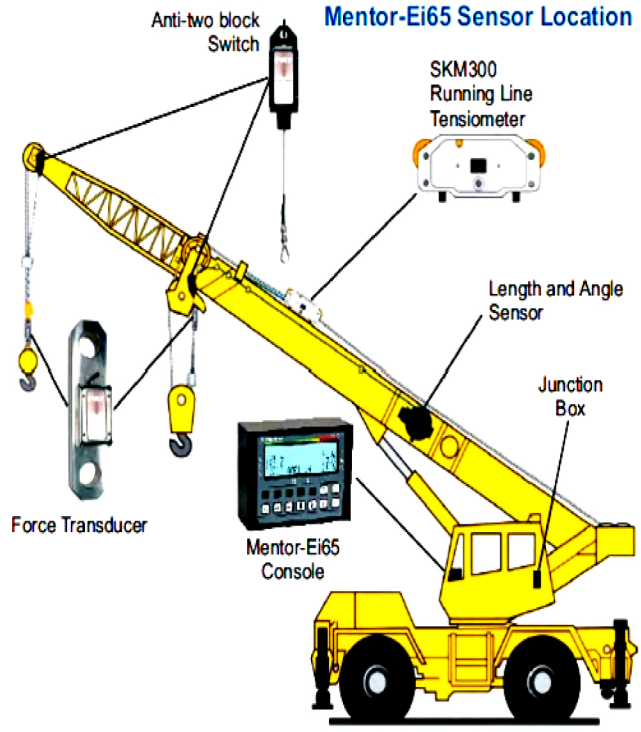
Task:
'Global-Technologies', is a system engineering company that develops measurement systems for different industries to support a wide range of applications.



You have been asked as an engineer in the 'Global- Technologies' company, to design and develop a measurement system that is able to demonstrate the operation of crane **'Load Moment Indicator' (LMI)** system using sensors model. The measurement system includes the measurement of crane boom length, boom angle, load, outrigger position, and driver cabinet temperature.

Provide a detailed, professional report for your director that contains the following:

1- A review of different LMI systems used in cranes industry including their main elements.

2- A design of a typical LMI system that incorporates the measurement of crane parameters including boom length, boom angle, load, outriggers position, and temperature. The system design should include DAQ/ microcontroller and any other required elements for a typical LMI system.

3- A measurement software program (LabVIEW/ C++) that can be used to provide the following parameters, log the measurement data, and give warning alarms when limits of the following parameters are exceeded.
   - Boom length
   - Outriggers position
   - Load
   - Driver cabinet temperature

4- Experimental results and critical analysis that evaluate two sensors of the LMI system using the NI DAQ/ Microcontroller and NI LabVIEW/ C++ software.

5- An evaluation of signal conditioning elements that are required to measure the load using strain gauges.

6- Proposal for the next phases of development to include the following:

   A. Using of a low-cost controller instead of the current one

   B. Other methods of data transmissions; wireless or wired data transmission, and use of the Internet of Things

Assessment Criteria

The Department's Principles of Assessment will be used to determine grading levels.

1	A review of different LMI systems used in cranes including their main elements.	20%
2	A design of a typical LMI system that incorporates the measurement of crane parameters including boom length, boom angle, load, outriggers position, and temperature of the driver cabinet. The system design should include DAQ/ controller and any other required elements for a typical LMI system.	10%
3	A measurement software program (LabVIEW/ C++) that can be used to provide the following parameters, log the measurement data, and give warning alarms when limits of the following parameters are exceeded; boom length, outriggers position, temperature and load	20%
4	Experimental results and critical analysis that evaluate two sensors of the LMI system using the NI DAQ/ Microcontroller and NI LabVIEW/ C++ software.	10%
5	An evaluation of signal conditioning elements that are required to measure the load using strain gauges.	10%
6 - A	Proposal for the next phases of development to include the use of a low-cost controller instead of the current one.	10%
6 - B	Proposal for the next phases of development to include the use of other methods of data transmissions; wireless or wired data transmission, and Internet of Things.	10%
7	Report presentation, structure, clarify of information, use of references.	10%