

Iwan Griffiths

by Iwan Griffiths

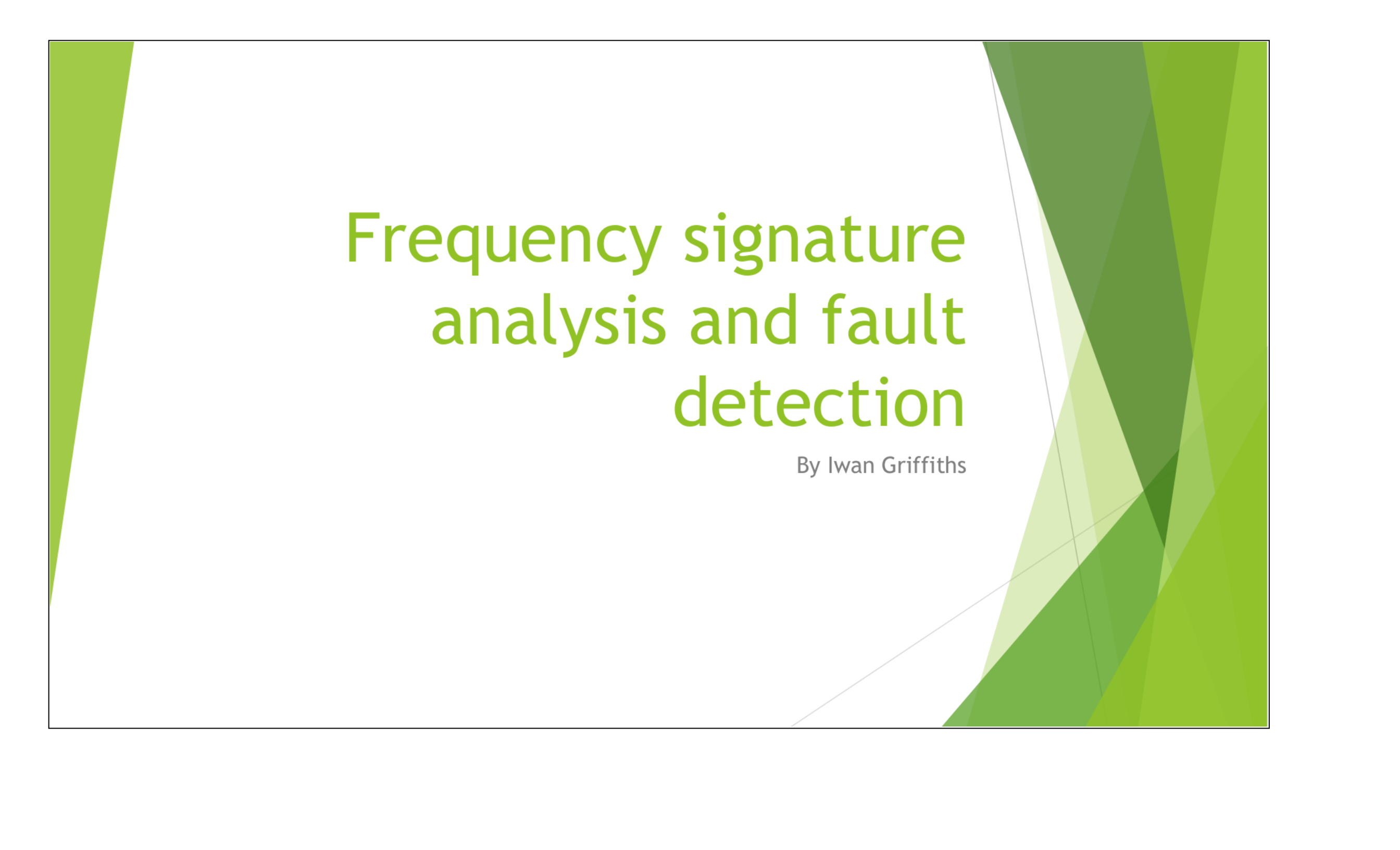
Submission date: 10-Jan-2023 02:05PM (UTC+0000)

Submission ID: 194365136

File name: 17369_Iwan_Griffiths_Iwan_Griffiths_172461_773538726.pdf (229.43K)

Word count: 261

Character count: 1376

The background of the slide features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

Frequency signature analysis and fault detection

By Iwan Griffiths

Relevance of project to industry

- ▶ This project will allow for the detection of faulty mechanical parts based on significant changes in their frequency signature
- ▶ i.e. a worn bearing in a conveyor shaft could be identified and replaced before causing a break down and loss of time

Identify the problem to solve

- ▶ Worn mechanical part may hard to identify when performing visual checks of a system
- ▶ When a worn component fails, downtime will typically be ensued causing either shortages in production or lost profits

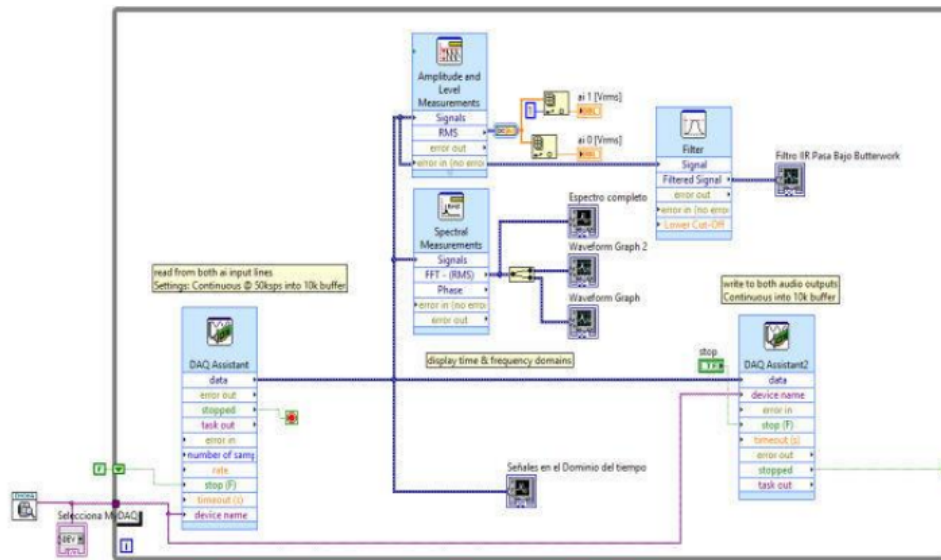
The objective

- ▶ Design a program to analyse different frequency signatures
- ▶ Create a fault detection system when frequencies go outside the “healthy” range
- ▶ The system will have to pass all healthy ranges

Solutions

The two possible solutions for the problem are

1. PC, Microphone, Labview programs
2. Arduino, Microphone, C++ program



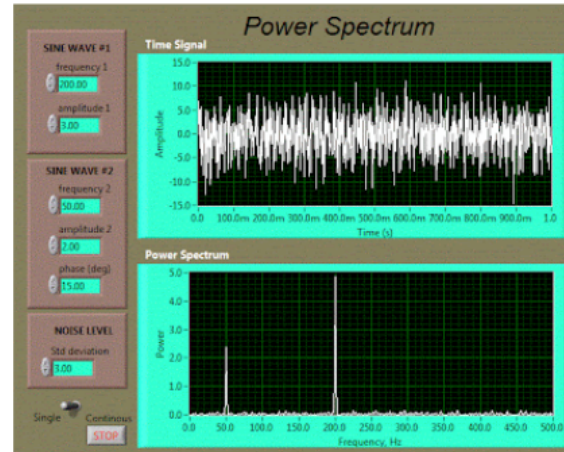
Solution 1

Pros

- ▶ Can be loaded on any PC
- ▶ No programming required as available in software Package
- ▶ Highly expandable
- ▶ More user friendly

Cons

- ▶ Expensive



Solution 2

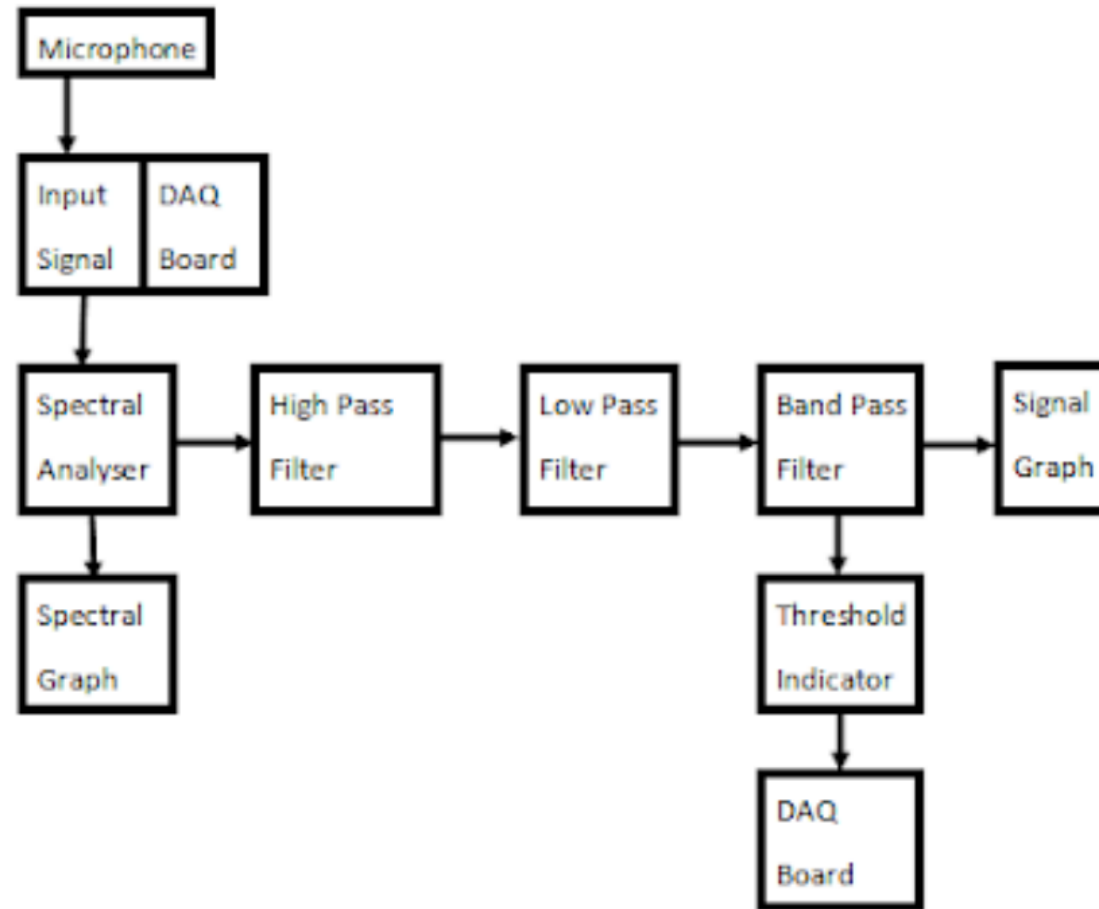
Pros

- ▶ Small Footprint
- ▶ Inexpensive

Cons

- ▶ More complex programming
- ▶ Not expandable

How It Works



Test Plan

- ▶ The test plan will indicate the result of the spectrum analysis to identify the frequency required.
- ▶ The HP filter is necessary to stop the anti-aliasing due the sample frequency.
- ▶ The LP filter is to eliminate any low frequency noise and clear the required signal.
- ▶ The frequency filter output will be displayed in a graph and the frequency (HZ) will be displayed.
- ▶ The test will either have a pass or fail status as a final result.

Test No	Test Frequencies Identified (Spectrum Analysis)	LPF Result P/F	HPF Result P/F	BPF Result Result P/F	Fault flag Enabled Y/N	Test P/F
1	697HZ					
2	770HZ					
3	852HZ					
4	941HZ					
5	1209HZ					
6	1336HZ					
7	1477HZ					
8	1633HZ					

Time Management

Task	Week	20/09/2022	27/09/2022	04/10/2022	11/10/2022	18/10/2022	25/10/2022	01/11/2022	08/11/2022	15/11/2022	22/11/2022	29/11/2022	06/12/2022	13/12/2022	20/12/2022	27/12/2022	03/01/2023	10/01/2023	17/01/2023	24/01/2023	31/01/2023	07/02/2023	14/02/2023	21/02/2023	28/02/2023	07/03/2023	14/03/2023	21/03/2023	28/03/2023	04/04/2023	11/04/2023	18/04/2023	25/04/2023	02/05/2023	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
Project logs																																			
Project proposal					Finish																														
Decide on project					Finish																														
Decide on solution							Finish																												
Research required parts												Finish																							
Research software												Finish																							
Buy Parts																																			
Buy software																																			
Project presentation																																			
Create program																																		Finish	
Compile frequency banks																																	Finish		
Test																																	Finish		
Asses final Solution																																	Finish		
Present final report																																			Finish

Completed
 Too be completed

FINAL GRADE

GENERAL COMMENTS

Instructor

49 / 100

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IWAN GRIFFITHS

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RESEARCH-INFORMED LITERATURE

-  Background research should have been more in depth to explain the purpose of the project. Some examples of application would have helped in this section. 4/10
- Research for solutions should have included more detail and examples of applications for context. However, there is an evaluation carried out. 5/10

9/20

KNOWLEDGE AND UNDERSTANDING

-  Problem definition was explained but an example application in the research would have helped here. 2.5/5
- Constraints and codes of practice were identified with software licencing, Standards and intellectual property were recognised. 2.5/5
- Environmental issues have been included in the form of software replacing hardware, and sustainable program structure will enable expansion of the system. 3/5
- Functional design was explained with a block diagram and backed up with planned testing. 3/5
- Response to questioning was good in parts, some confusion with test procedures. 4/10

15/30

ANALYSIS

 Problem definition has been identified and there was an understanding of the objective and procedures needed. 2.5/5

9/20

Functional design was understood and the specification was explained from the block diagram. This needed more details. 4/10

Good justification for final solution with environmental and sustainability issues used in the justification. 2.5/5

PRACTICAL APPLICATION AND DEP.

 Design spec needs more details; however, this was explained from the block diagram. 2.5/5
Critical choice and justification showed a good understanding of why LabVIEW was a better method. 5/10

11/20

Project plan with breakdown of activities was included and explained with management methods proposed. 3.5/5

SKILLS FOR PROFESSIONAL PRAC.

 Quality of slides was satisfactory and included some good content. 2.5/5
Delivery could have been improved with better preparation and background reading. 2.5/5

5/10