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**Integrating the Frequency Domain Functionality of the  
EMONA DATE<sub>x</sub> into the iLabs Shared Architecture**

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## **Abstract**

This dissertation presents the background, rationale, objectives, analysis and design, and the results of Integrating the Frequency Domain Functionality of the EMONA DATEX into the iLabs Shared Architecture. In this research, a requirements analysis was done to establish the needs for a fully functional laboratory prototype that will supplement courses in the curricula of Electrical, Telecommunications and Computer Engineering Undergraduate Programmes, where the study of signals using the frequency domain is vital.

The researcher then derived the physical and Logical Models for the Laboratory, from which a prototype was developed. With the Amplitude Modulation experiments as a use case, the developed laboratory provides an interface where four instruments (Function Generator, Oscilloscope, Variable power Supply and the Dynamic Signal Analyzer) can be used to analyze the circuit under test.

The user is able to observe, in real time, the effect of changing various parameters of the message signal and the carrier signal to achieve the desired modulation. The results are displayed in both the time and frequency domains and the user is able to vary the Oscilloscope and the Dynamic Signal Analyzer settings, to get the desired output. The laboratory also provides options for Power Spectrum and Power Spectral Density analyses. Once integrated into curricula, the developed online platform shall supplement the conventional Laboratories where the requisite infrastructure has been established.