6 SUMMARY

The main purpose of this thesis was to develop an integrated system that allows a user to remotely study mechanical deformations in a cantilever experiment. The thesis starts off by giving an introduction into the concept of deformation and an explanation and purpose of a cantilever. A declaration of the various hardware components and sensors was also established in this section.

The next chapter highlights the theoretical background of the experiment. Physics and mathematical relations are expressed in such a manner that fits this project. A detailed description and function of the various hardware components are presented. The testing of the load sensor was done at this point. The load cell for the project was made from the portable electronic scale where the load cell components were extracted from. The load cell reading was obtained with the help of the I2C interface protocol known as the HX711 A/D adapter module. Another important component was the Mitutoyo Absolute Digimatic which was essential to obtain the deformation reading. Also, to allow for the integration of the Mitutoyo Absolute Digimatic with the overall project, there was the need to fashion a connection interface to relay the signals from the Mitutoyo Absolute Digimatic Indicator to a readable signal for the Arduino IDE.

Next is to go through various stages of prototyping. This was done in order to ascertain the functionality of each hardware component. This was achieved mostly with the help of the Arduino IDE and required some programming. The software aspect of this project utilized multiple programming languages from C/C++ programming languages and HTML. Coupled with the programming languages involved the use of a WebSocket which is an advanced API that enables the establishment of two-way collaborative communication between the user and a server or host (ESP8266).

Finally, was to assembly the entire project together, and this required the integration of various modules of the project along with the fusion of the software aspect. This came with a series of challenges and took lengthy research to get right. Some of the challenges encountered throughout this project included the defective hardware which took a bit of troubleshooting to spot such hardware. Next was calibrating the sensor, the load cell also proved challenging in order to attain the required sensitivity.

This thesis has shown how learning and teaching in a sense are rapidly evolving and allowing for a platform that allows remote experiments and monitoring of live data of such an experiment. It is evident that going forward, such technology could enhance

the teaching and learning experience for a wide range of users regardless of the distance between the physical experiment and the user.