

CENG 317 Proposal	Daniel Bujold (N01241627)
Submission Date	9/10/2019
Project Name	Greenhouse Health Monitor
Student Names	Daniel Bujold, Ryan McAdie, Aiden Waadallah
Project repository	https://github.com/DBoo92/317Hardware
SensorsEffectors choices	BME280 - for temperature and humidity STEMMA Soil Sensor - for soil moisture level Solenoid Valve - for dispensing water
The database will store	Temperature, humidity, and soil moisture levels from the device. As well as the date/time of each reading and the location of the device (different result sets for different plants/areas).
The mobile device functionality will include	The app will allow employees to login, select a desired plant/area, and view those measurements online. It will display the current readings, along with recent min/max readings (all readings time stamped). The user will be able to monitor the health of the greenhouse and even share these results online or through social media. There will be an option to press a button to water the plant if the soil moisture is low. As an added feature, the user will be able to take a picture from the app and share it on social media.
I will be collaborating with the following company/department	I will be collaborating with the Humber Arboretum/nurseries and prof. Kristian Medri on this project.
My group in the winter semester will include	Daniel Bujold, Ryan McAdie, Aiden Waadallah
50 word problem statement	The Humber Arboretum and various other nurseries are lacking a system to monitor temperature, humidity, and soil moisture levels. A system like this would be vital in ensuring the optimal health of the plants. This would allow employees to view and monitor greenhouse conditions in real-time. Data acquisition will help with adjusting the environment and future planning. This system should theoretically improve plant health, increase yield, decrease resource use, and minimize human error.

	<p>This project solves the need for a measurement/monitoring system in the Humber Arboretum. Such a system will help monitor the health of the plants. Theoretically, this system has the potential to make the greenhouse more efficient. Existing products on the market include Monnit Greenhouse Monitoring, Sensaphone Greenhouse Remote Monitoring, and Growtronic. I searched through Humber's IEEE subscription and read various articles relating to this topic. The research paper listed below proved to be the most insightful. Having gone through 4 semesters of the Computer Engineering Technology program, I have learned:</p> <ul style="list-style-type: none"> - Java programming from CENG 212 - C programming from CENG 252 and CENG 153 - circuit design from CENG 215 - application development process in CENG 216 - SQL and database from CENG 254 and CENG 256 - wireless and connectivity from CENG 253 and CENG 152
100 words of background	These skills sets will enable me to design and build the system required for this project.
Current product APA citation	Monnit Corporation. (n.d.). <i>Greenhouse monitoring</i> . Retrieved from https://www.monnit.com/solutions/greenhouse-monitoring
Existing research IEEE paper APA citation	Kumar, A., & Hancke, G. P. (2014). Energy efficient environment monitoring system based on the IEEE 802.15.4 Standard for low cost requirements. <i>IEEE Sensors Journal</i> , 14 (8), 2557 - 2566. doi: 10.1109/JSEN.2014.2313348
Brief description of planned purchases	We will need to purchase a Raspberry Pi, BME 280 sensor, STEMMA capacitive soil moisture sensor, solenoid valve (rated for liquid), and materials for a device enclosure (for waterproofing/protection).
Solution description	The solution consists of a Broadcom development platform (Raspberry Pi) connected to various sensors/actuators for monitoring. A BME280 for temperature/humidity, a STEMMA soil moisture sensor, and a solenoid valve for dispensing water. This system can be placed in a specific plant or area in order to take measurements. The device will connect to enterprise WiFi in order to send/receive data. It will store these measurements in a database for analysis. These measurements will be able to be viewed from an app to assist nursery employees. If the soil moisture reading is low, the app will allow the employees to dispense a controlled stream of water into the soil.