# **Chapter 1: Overview**

### **1A. Introduction**

This is the “Theory of Design” document for the Plant Monitoring System. This document describes the entire system theory and design in great technical detail. In this document one will find theoretical descriptive text, figures, schematics, block diagrams, program code and much more. This is all provided so that a technical professional can, not only build this system from scratch but also modify it as they see fit.

This product is a plant monitoring system, which means that it constantly takes different measurements in order to make sure that the environment is compatible with the optimum environmental needs of any specific plant.

***Note:*** *This device does not contain a database of optimal environmental needs for specific plants. This means that it is up to the user to properly define the environmental needs of the plant, that they wish to be monitored. Once the user has defined the specific needs for their plant, this product will monitor the environmental conditions.*

If the conditions that the user had defined are not met, then the product will set off an alarm to notify the user of what conditions are not being met. This plant monitor is part of the anti-noise pollution line of products. This means that instead of ringing a buzzer for the alarm, this product makes the display blink in order to get the attention of the user. The LCD display in the front panel will show the user the measurement values that triggered the alarm to go off, as well as the time that those measurements were taken.

This product uses the ATmega128 microcontroller, of the AVR 8-bit family. Our microcontroller was programed in IAR Embedded Workbench Integrated Design Environment (IDE). This is important to note because, as will be discussed later, some IAR specific functions were used in the code. We are able to monitor conditions because of the different sensor we have connected to the microcontroller.

### **1B. Purpose**

This product was designed to monitor the environmental conditions of a plant. We are able to monitor the following conditions:

* Temperature: The user can decide to monitor temperature in Celsius (C) or Fahrenheit (F).
* Humidity:
* Carbon Dioxide (CO2) levels: CO2 levels are monitored using the unit of Parts Per Million (ppm)
* Time: we can monitor time with a resolution of 1 second.

In order to facilitate communication between the product and the user, the product has an LCD screen, and a keypad. The keypad allows the user to input data to the microcontroller and the LCD screen allows the microcontroller to output data to the user.

### **1C. Definitions**

* **Sensor::=** A device that receives a signal or stimulus and responds by changing an electrical parameter or signal
* **Stimulus::=** The quantity, property, or condition that is sensed and converted into an electrical signal
* **Noise Pollution::=** The propagation of noise with harmful impact on the activity of human or animal life
* **Electrically Erasable Programmable Read-Only Memory(EEPROM)::=** A type of memory chip that retains its data when its power supply is switched off. However it can be erased by applying an electrical charge to it.
* **Static random-access memory: (SRAM):=** A type of memory made up of flip-flops, that requires a device to be powered on in order to retain its data. If the power is lost then any value being kept in the SRAM is lost.