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ECE 388

Team 3

Design Requirements

**Overview**

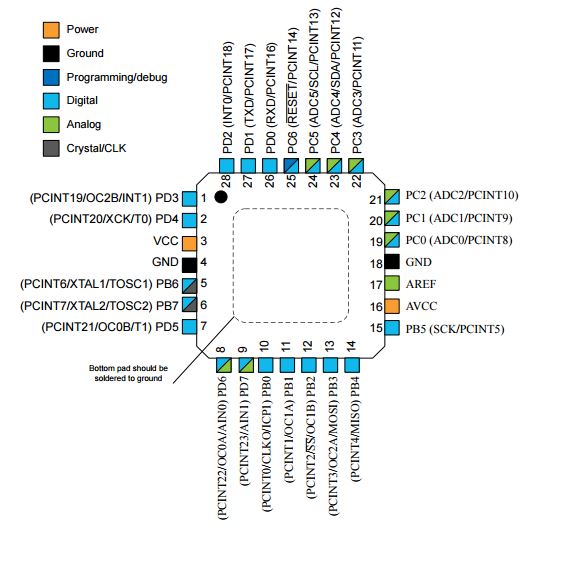
The room occupancy and climate control system aims to detect motion and temperature within an enclosed environment. The system will display temperature and humidity readings for the user to observe and control using a simple interface system. Motion within the environment will be detected and used to control the lighting system. This prototype will focus on a scaled environment and will use inexpensive components1.

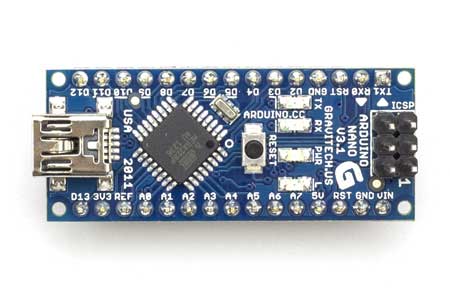
**Component List**

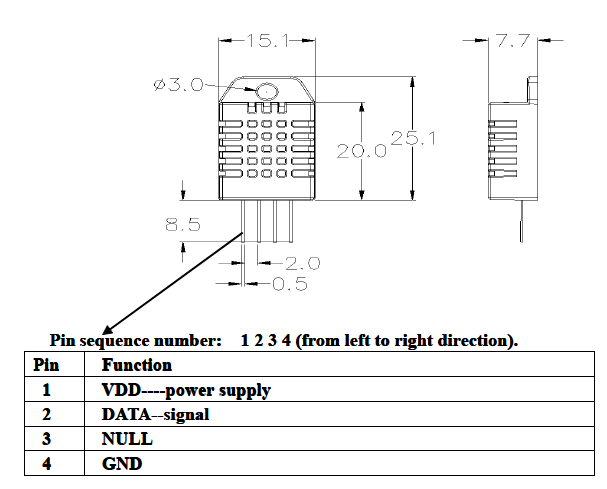
The following components will be utilized in the prototype of this design:

* ATmega328p microcontroller
* DHT22 digital temperature and humidity sensor
* PIR Motion Sensor
* Character LCD 1602A
* Tactile button (2)
* 50x50x10 mm 5V Fan (2)
* LED

**Microcontroller**

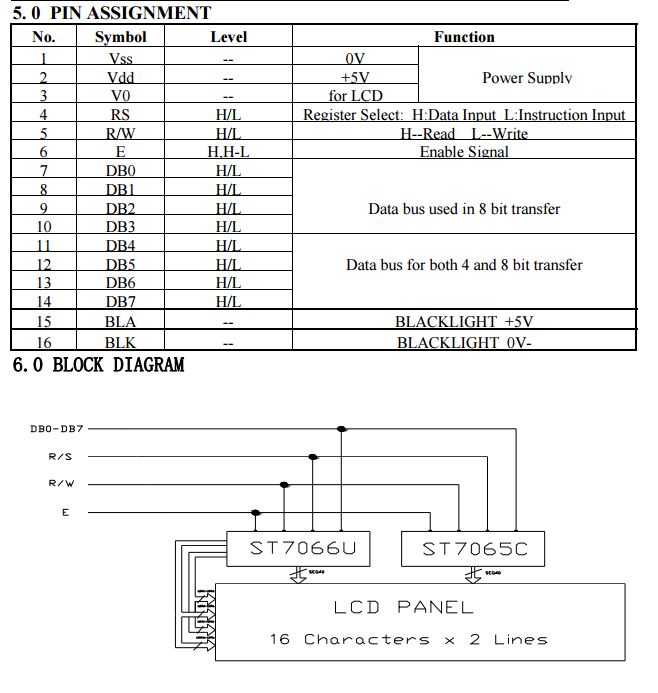
The ATmega328p microcontroller has been selected for this design to utilize the vast collection of libraries written for this chip that will help the software design process much easier to follow. This device will enable all other sensors and actuators to communicate between one another and compute valuable data. The 328p contains 23 I/O pins and 32KB of flash memory, which will be sufficient for this design. A 16Mhz crystal resonator is present on the board.



**DHT22 Digital Temperature and Humidity Sensor**

The DHT22 has been chosen because of its low cost, precision and range of temperature/humidity. The sensor uses a capacitive humidity sensor and a thermistor to measure climate changes. A digital signal is sent to the data pin and no analog inputs are needed. This sensor will collect data every 2 seconds and requires 3.3-6V power.

**RICKS PART**

**Character LCD**

The 1602A Character LCD display has been selected due to its small form factor. This device will display the main outputs of the system by writing temperature readings on the screen. In accordance with two tactile buttons, the LCD will allow the user to change the desired temperature of the environment. The device requires around 5V for sufficient operation.



**Fans**

# The MB50100 5V fan will be used as a model cooling/heating system for this design. One fan will push cool air towards the sensor while the other pulls from it. The fans will power on if the desired temperature does not match the current temperature. Once these two integer values are equal, the fans will stop. The fan requires 5V and consumes around 1.18W.

**LED**

A TLHR640 white LED will be used to model a lighting system for this design. The LED will be powered whenever the PIR sensor detects motion within the environment. The LED will illuminate until no motion is detected. At that point, the LED will be disabled. There will be a delay between this and the PIR sensor to ensure the accuracy of the device. This device can take no more than 3V worth of power.

**RICKS PART**