

Project Proposal

Precipitation Predictor

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Project Abstract

This precipitation predictor is going to be a very, very mini weather station. It will use barometric pressure and relative humidity to predict rain. The user will have the option to display rain prediction (“Rain,” “No rain”), the barometric pressure, or relative humidity on the LED screen of the Zilog Z16 board by using the three buttons also present. When the barometric pressure goes up, an arrow controlled by the step motor turns to indicate ‘up’ or ‘down’.

Strategy

Platform: based on the Zilog Z16 series board with the ZNEO microprocessor.

Capabilities: GPIO, timers, I²C, interrupts, ADC

External: A humidity sensor, barometric pressure sensor, step motor

Evaluations: There are several sensors available but I’ve limited myself to those on breakout boards because I am not experienced in soldering.

For humidity sensors I’ve chosen the Honeywell HIH-4030. The operating conditions require 4-5.8VDC, which the Z16 board can provide and uses analog output. Since the Z16 has an ADC converter, this should be fine.

For barometric pressure sensors I choose the Bosch BMP085. The data sheet is detailed, and the voltage requirements are in the range of the Zilog Z16. The final measurements are 16 to 19 bit variables, but the Z16 is capable of 32 bit calculations. It uses I²C.

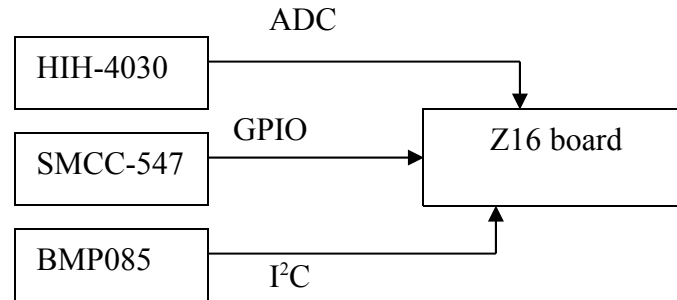
The arrow controlled by step motor is an SMCC-547, supplied by the professor.

Software I need to write:

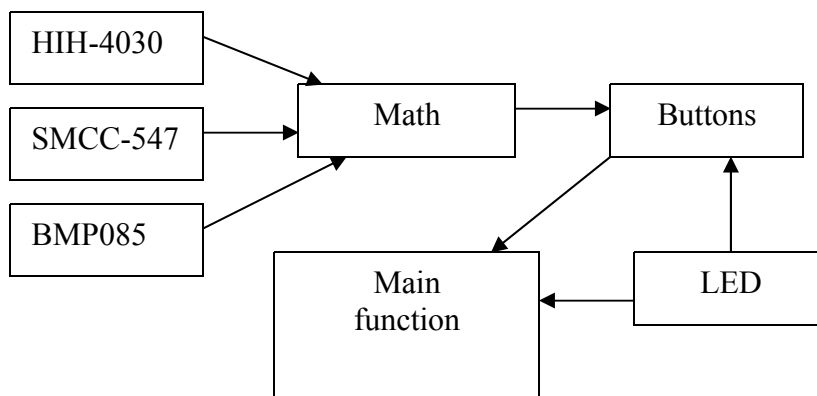
Drivers for the HIH-4030, BMP085, and SMCC-547

Rough calculation functions

Project Proposal



Hardware block diagram



Software block diagram

Unknowns

Math. The math is still unknown, but I'm probably going to go with a table of data, or study tables of record data to come up with a magic 'delta' that indicates enough change to sit up run through calculations for.

Implementation Plan

I will create the drivers first. I have begun work on the step motor and have some movement functions written.

I'll try the humidifier next, followed by the barometer. Both pieces are in so I don't need to wait for delivery. I'll need to calculate any resistor needs.

Finalize hardware design so I know to which ports to connect my button interrupts.

Write the calculations.

Connect it all together.

Resources

- Honeywell HIH-4030 from sparkfun
- Bosch BMP085 from sparkfun
- SMCC-547 supplied by the professor
- Zilog Z16 supplied by the professor
- Resistors from the university