Wireless Solar Temperature/Humidity Sensor

Project Plan Version.2

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Contents

1 Introduction

1.1 Project statement

The purpose of this project is to provide power consumption data in different builds of Wireless solar temperature and humidity sensor circuit. The design and analysis is on how low power consumption we can achieve. My team will try different methods of wireless transmissions and different sensor designs to find the lowest power consumption. We will also check the solar panel in different situations such as indoor and outdoor, or daytime and night.

1.2 Purpose

The temperature and humidity sensors are commonly used in agriculture, pet shops, and weather forecasting. The wireless sensors make it much easier to obtain data anywhere. The wireless temperature and humidity sensor will be powered by solar panel and battery backup so that sensor can work for a long time without direct contact. The solar panel is beneficial in terms of self generating electricity system.

1.3 Goals

The goal of this project is to obtain the lowest system power consumption with useable data transmission. Dan Stieler, the client (Powerfilm Company), wants the team to access many different ways to get the lowest power consumption sensor circuit. First of all, we will compare the power consumption in transmission between BLE (Bluetooth low energy) and Wifi. Secondly, we will compare temperature and humidity sensors of different brand and types. Then, we need to find a good sensor to meet our requirements. Lastly, we also need to check the possible solar energy indoor and outdoor. All the functions of sensor circuit is supposed to be executed with the minimum light energy supply.

2 Deliverables

At the beginning of Design:

- Build a circuit diagram
- Buy the different electrical components, and test the parameters
- Determine the best electrical components for meeting the requirements

At the middle of Design:

- Analyze the data in the system
- Build the interface
- Create the app
- Test the data transmission

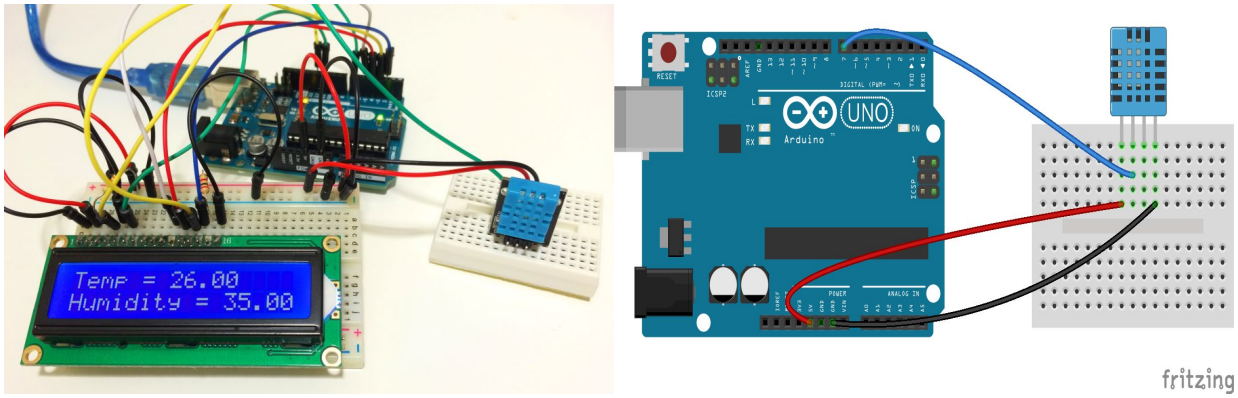
At the end of Design:

- Apply solar panel to the circuit.
- Test and feedback

3 Design

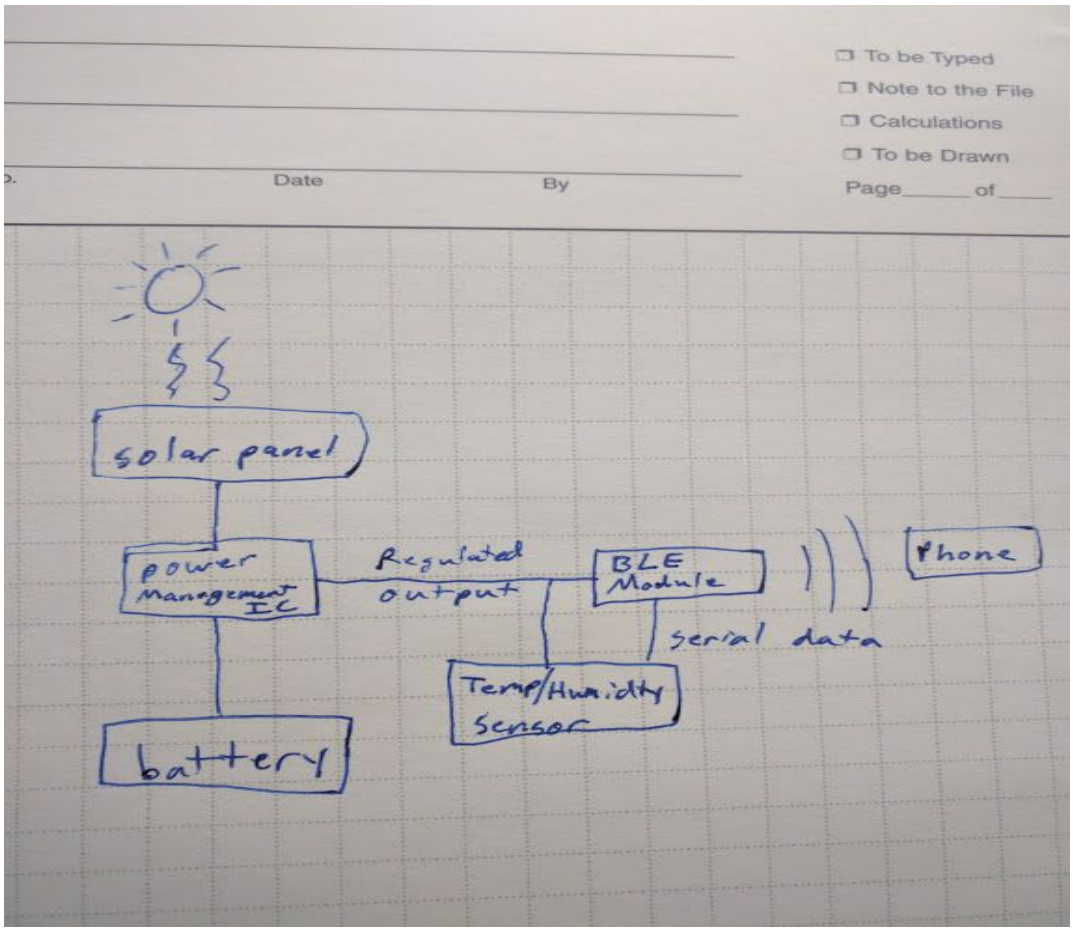
3.1 Previous work/literature

The website, ‘circuitbasics.com’, provides the way to connect temperature and humidity sensor to the arduino board. BLE and Wifi transmission are not mentioned but it shows roughly what stuffs we need to prepare.



The left picture is the actual circuit which uses screen board. The right picture is a circuit diagram which shows the connection between arduino board and dht11 sensor. This previous project shows us one way to make the temperature circuit. We can see how the circuit will display and how the circuit will be work in the pictures.

3.2 Proposed System Block diagram



The block diagram shows how to build the circuit system about our project. First of all, temperature and humidity sensor will be connected to BLE module. Secondly, measuring all possible power consumption and get ideal battery for the circuit. Before connecting to the solar panel, transmission task will be done. We decided to use Android application to get data by the transmission. Lastly, get adaptable solar panel and apply it to the circuit.

3.3 Assessment of Proposed methods

There are many substitution of arduino board. Since arduino board is a great electric platform for easy to apply, we choose arduino board. We can buy a chip to make platform but it consumes a lot of time to do such as soldering or analyze data sheet. We probably need to try different transmissions in order to find out low power consumption components. Arduino shield, Arduino BLE module, Adafruit wifi module or so on can be options.

3.4 Validation

1. Check the input current and voltage to make sure it consumes low energy.
2. Measure the temperature and humid by equipment, then compare it with the value obtained from the sensor we build to make sure they are matching.

4 Project Requirements/Specifications

4.1 functional

List and explain the functional requirements of the project. This would include all the technical requirements you fulfil during your senior design project.

1. make the wireless transmission continuously under 400 lux light level
2. keep the power consumption of the system at a low level
3. precisely record temperature change form sensor

4.2 Non-functional

List and explain the non-functional requirements of the project. This is where you would enlist non-technical requirements. This may still be a fundamental deliverable that your client needs at the end of the semester.

1. Keep the scale of the system small

5 Challenges

In this project, our team(May1717) does not have software engineer. Since we have to make an application to get data transmitted from the circuit sensor, programing is the most challenging part for our team. First prototype is made by Arduino board which is great microcontroller but it consumes a lot of power and size is big. Our second challenge is how much can we make it smaller with low power consumption. The third challenge is to make stable energy delivery system. We are using the solar panel to charge our battery. However, solar panel is affected a lot by the light resource. This inconsistent energy source is another challenge we should focus on.

6 Timeline

6.1 First Semester

circuit	10/16/16	11/10/16	20d
ordering and finding low power consumption sensor	10/16/16	11/01/16	13d
sensor value checking	10/17/16	11/10/16	19d
circuit building	11/02/16	11/10/16	7d
overall checking			
wireless transmission	11/01/16	11/25/16	19d
wireless option finding	11/01/16	11/08/16	6d
programming	11/09/16	11/25/16	13d
connect it to the circuit and overall checking	11/10/16	11/25/16	12d

6.2 Second Semester

Detail what needs to be done in the second semester. You may want to include division of work amongst the team.

battery	01/09/17	02/23/17	34d
solar charging battery selecting	01/09/17	01/16/17	6d
test	01/09/17	01/23/17	11d
phone application	01/23/17	02/23/17	24d
creating an android application	01/23/17	02/23/17	24d
testing	01/23/17	02/23/17	24d
overall testing	02/23/17	05/05/17	52d
summing up all the parts and testing	02/23/17	05/05/17	52d

7 Conclusions

Sum up your project plan. Briefly re-iterate your goals for the project and the plan your team has put in place to achieve these goals.

1. Find the low power consumption sensors.
2. Complete the circuit with sensor to make sure it accurately provide the current temperature and humid
3. Find an effective way of wireless to transfer the information from the circuit to the terminal (probably cell-phone)

8 References

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9 Appendices

A. Timeline

Appendix A

(Timeline)

circuit	10/16/16	11/10/16	20d
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phone application	01/23/17	02/23/17	24d
creating an android application	01/23/17	02/23/17	24d
testing	01/23/17	02/23/17	24d
overall testing	02/23/17	05/05/17	52d
summing up all the parts and testing	02/23/17	05/05/17	52d