**SMART AGRICULTURE MONITORING SYSTEM BASED ON IOT**

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**ABSTRACT**

India's primary industry for earning money is agriculture. It is crucial to the economy of the nation. Agriculture is, however, being affected by people shifting from rural to urban locations. Keeping an eye on environmental factors is not the only approach to increase agricultural productivity. There are no elements that considerably lower productivity. Therefore, Agriculture needs to act to address these issues. make use of automation. Using an autonomous watering system can help farmers save time, money, and energy. Traditional field irrigation techniques involve manual labour. Automation in irrigation equipment can lessen the need for human intervention. Sensors and the Internet of Things (IoT) are combining to enable continuous crop sensing and monitoring.

**Keywords:** Arduino Uno, GSM SIM 808, Sensor

1. **INTRODUCTION**

Agriculture is the crucial sector for humans to continue to exist. It exacerbates a major problem in management across the world. The majority of farmers cultivate their crops using old-fashioned ways. They used to be personally present on their farm to keep an eye on the produce. Technology can help make this work easier and more efficient. And sensors that transmit data via the internet Farmers may monitor their crops remotely from their homes. The Internet of Things (IoT) revolution has swept almost every industry. Agriculture has undergone several changes and has embraced numerous machines in order to increase productivity. critical variables in achieving higher-quality yields. There have been numerous technical improvements in agriculture in recent years, resulting in increased agricultural output and immunity. The agriculture sector consumes over 70% of the world's fresh water, and soil moisture monitors can help sub-optimize the irrigation process and use it more efficiently. The Internet of Things (IoT) [5] is a technology that plays a vital part in this. Traditional agriculture is transitioning into smart agriculture. By remotely monitoring crop health and field settings, IoT networks are reducing human labor requirements. The backbone of the Internet of Things is a wireless sensor network (WSN), control applications, data is collected. The surveillance system comprises end devices that are equipped with a number of sensors to monitor a variety of factors such as temperature, humidity, pH, soil moisture, and other parameters, as well as the ability to communicate. Farmers benefit from IoT by monitoring crop growth stages and estimating yield.

1. **PROBLEM STATEMENTS**
2. **ROLE OF IOT IN SMART AGRICULTURE**

The Internet of Things (IoT) is here to help reduce the amount of physical effort required to acquire these critical data. If manual labor is used, we will send people to various every day to acquire the time-consuming, with no guarantee of data integrity because, as humans, we may potentially lead to incorrect expert conclusions. We can transfer the acquired using IoT. Data integrity is maintained because the data collecting is automated done on computers, specialists can use modern analytical software tools to provide the most accurate predictions.

1. **SMART FARMING OPPORTUNITIES FOR BIG DATA ANALYTICS:**
2. **BIG DATA ANALYTICS**

In layman's terms, "big data analytics" refers to the process of extracting meaningful information from a large volume of raw data. This is done with the use of a lot of processing power and the expertise of experts like data scientists to come up with relevant findings and predictions.

1. **THE DEMAND FOR LARGE-SIZE DATA ANALYTICS**

Data from a single person's agriculture farm may be difficult to get by aid in the growth of that person's farm. However, data from a single place isn't very relevant for a government concerned with the entire nation's agricultural output. They should, ideally, they’re gathering data from as many agricultural farms as they can.

1. **MODIFICATION**

These data can be used by a government that makes meaningful statements and choices about the country's agricultural output, such as how much was produced last year, how much will be produced How individual farmers may boost their productivity next year in light of the current climate condition, and even how much money for its agriculture. agriculture in the coming fiscal year.

1. **BENEFITS**

Using IoT in the agricultural industry has a number of advantages and benefits, some of which are as follows:

* + 1. Cost-cutting: The cost of production will be reduced.
    2. Profitability: It will help farmers make more money.
    3. Longevity: Enhances long-term viability.
    4. Environmental protection: It contributes significantly to environmental protection.

1. **MATERIALS AND METHODS**

This project uses an Arduino as the brain and five sensors to measure six different environmental conditions that affect crop growth and nutrition:

1. Sensors for temperature and humidity.
2. Gas/air quality sensor
3. A light sensor is a device that detects the presence of light.
4. Moisture sensor for the soil.
5. A barometric pressure sensor is a device that measures the pressure in the atmosphere.
6. **BLOCK DIAGRAM**

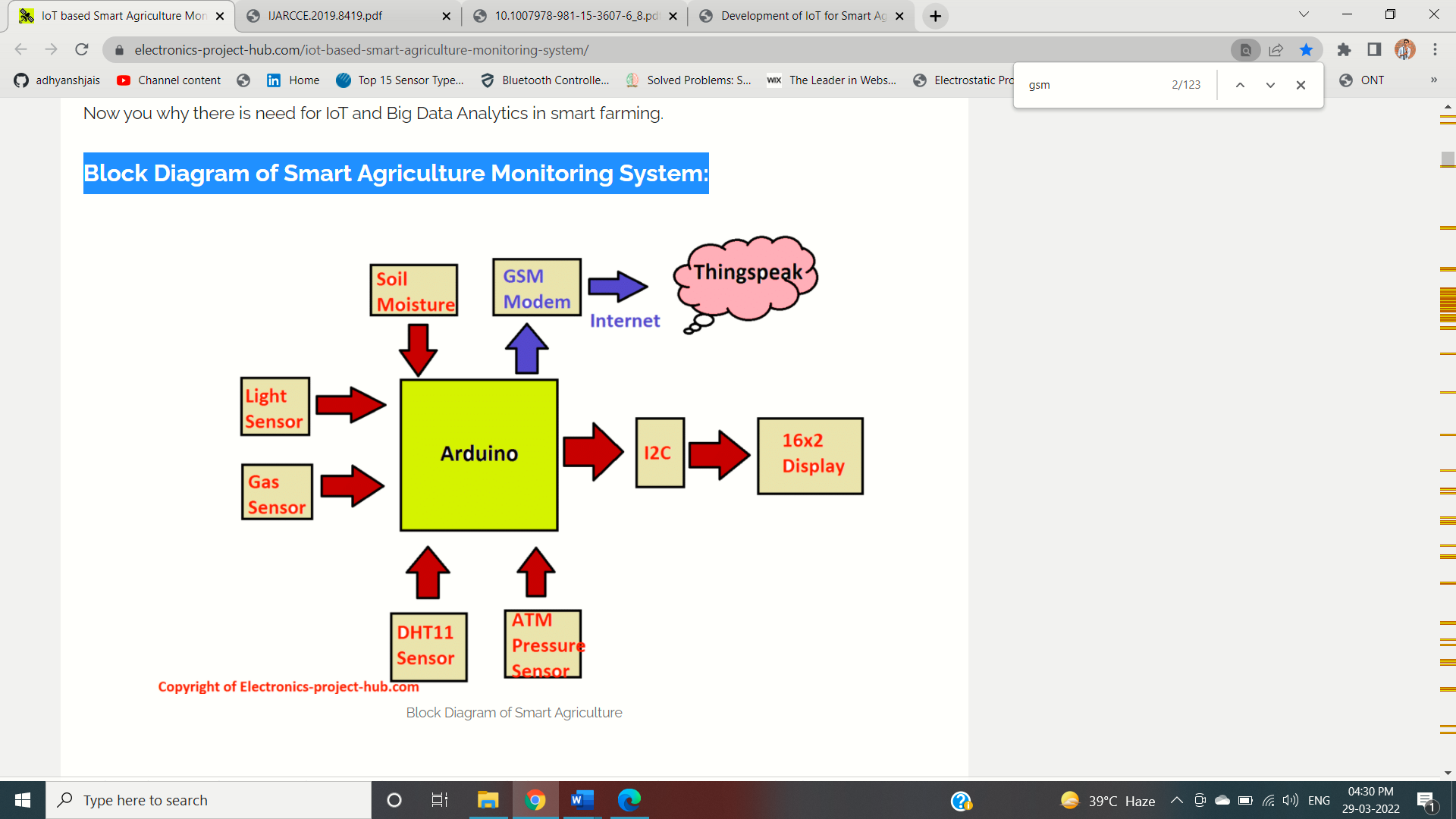


Fig1. Block Diagram Proposed Work [11]

1. **HARDWARE USED**
   * + 1. **Temperature Sensor**

Its output voltage scales linearly with temperature in Celsius, the LM35 sensor is popular. It has a wide range of applications. The highest output voltage is 5 volts. For every one-degree increase in temperature, the output will increase by 10 mV. The temperature ranges from -55 to +150 degrees. VCC, Ground, and the analogue sensor are the three terminals. It uses the least amount of electricity possible. As a result, it saves energy. In horticulture, it is extremely effective. It is simple to operate.

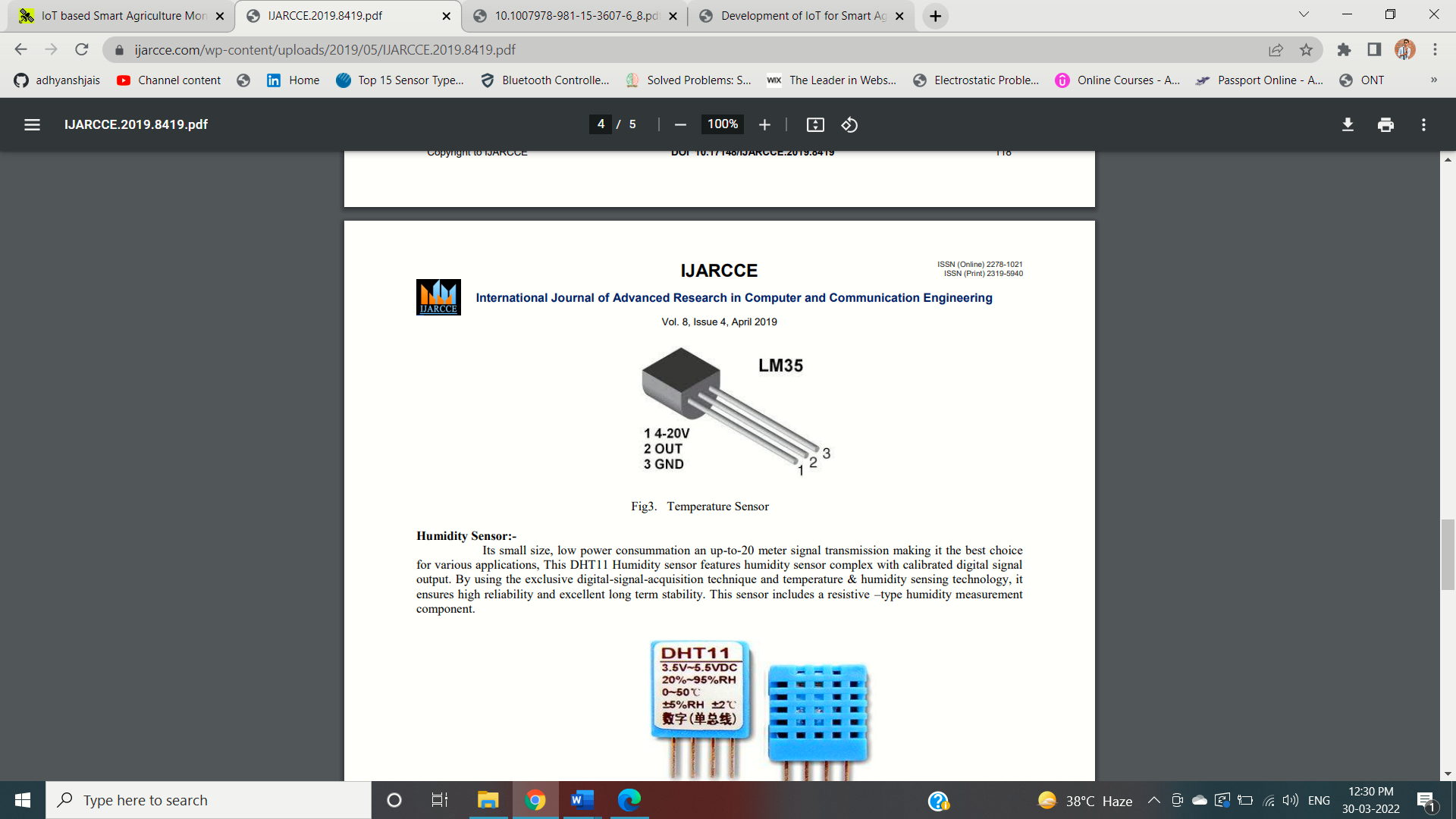


Fig2. Temperature Sensor [12]

* + - 1. **Air Quality Sensor**

Many people are unaware that plants and trees require fresh air to survive and flourish. Plants will become sick as a result of the polluted air, and we may not be able to obtain the highest quality more susceptible to disease and insects. As a result, air quality is a key metric for judging crop development, and we use the MQ 135 air quality sensor to accomplish so.



Fig3. Gas sensor (MQ135) [13]

* + - 1. **Light Sensor**

Plants, of course, require adequate sunlight to make their own food, a process known as photosynthesis. Plants require the right quantity of light, not too little or too much. LDR or photoresistor can be used to measure the quantity.

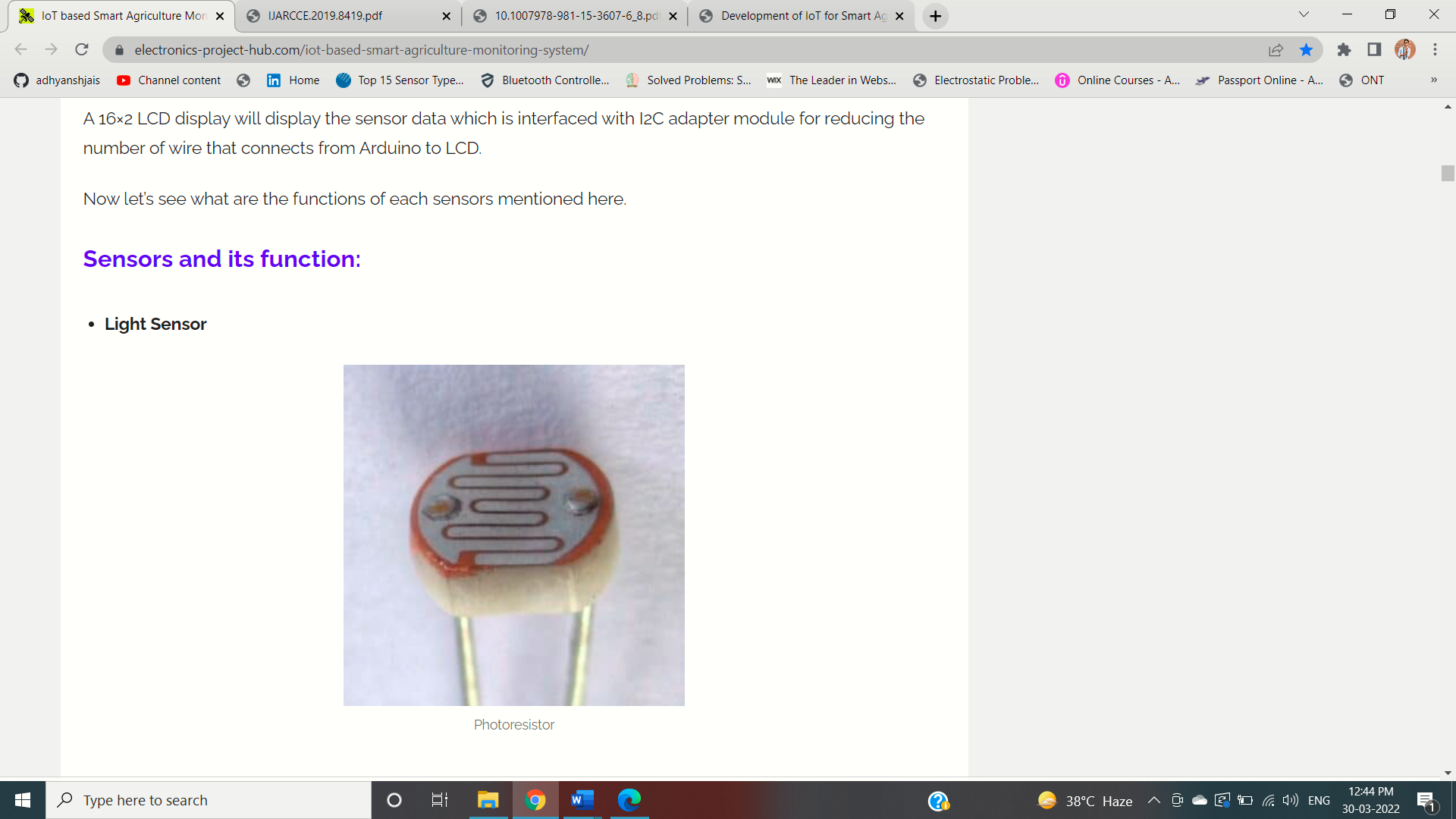


Fig4. Light sensor (MQ135) [14]

* + - 1. **Barometric Pressure Sensor BMP180:**

For detecting atmospheric pressure, a barometric pressure sensor can be used. You can forecast if for the short term and also analyse how plants behave in different atmospheric pressure settings using atmospheric pressure data. The BM180 is a 3.3V digital sensor that can measure ATM pressure, altitude, and temperature. It interfaces to the I2C bus. We'll extract only the ATM pressure data, but you can change the code to add altitude data to examine how crops perform at various elevations. This sensor's temperature data is ignored because we already have a temperature sensor, the DHT11.

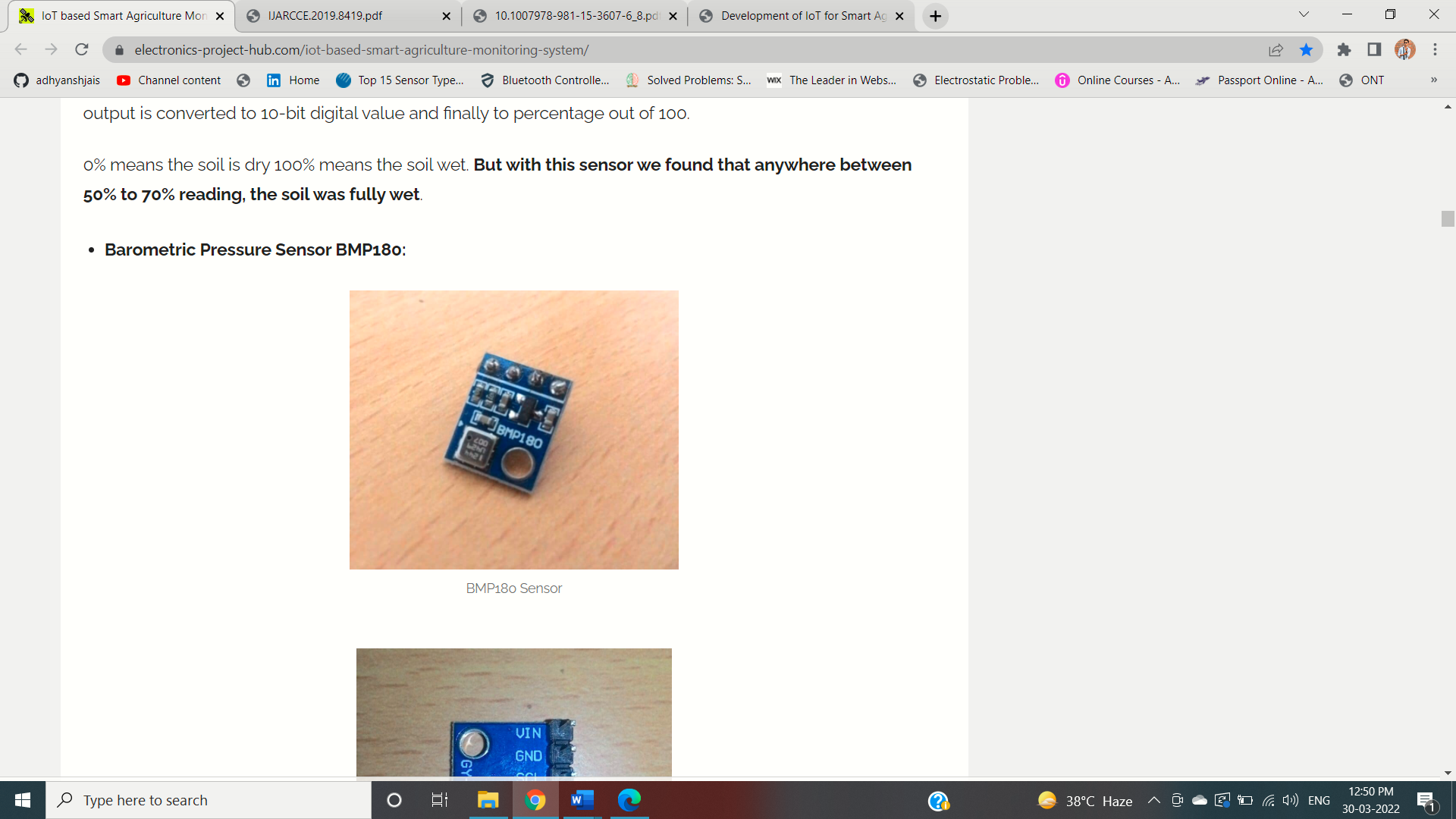


Fig6. BMP180 Sensor [16]

1. **CIRCUIT DIAGRAM**

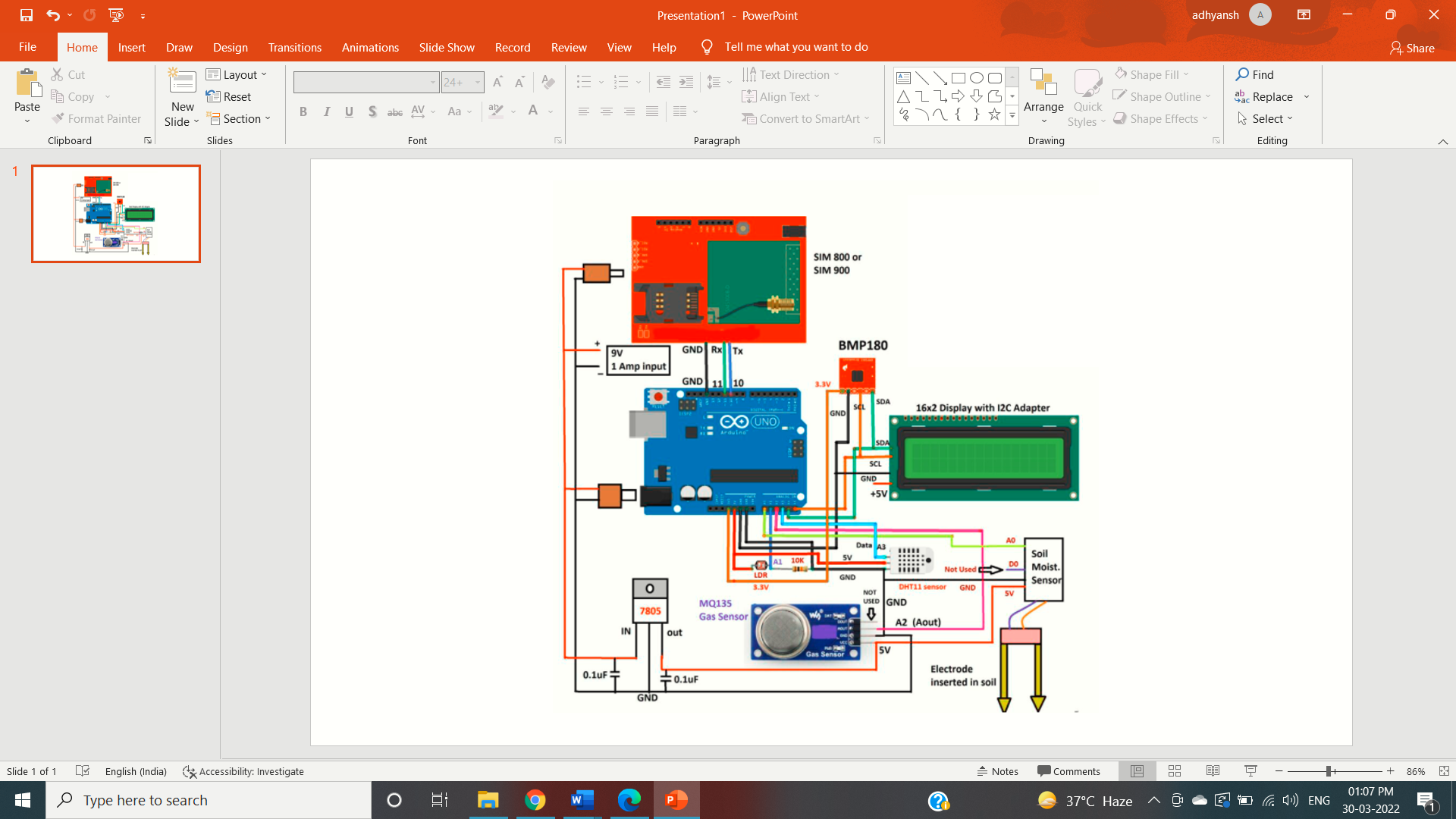
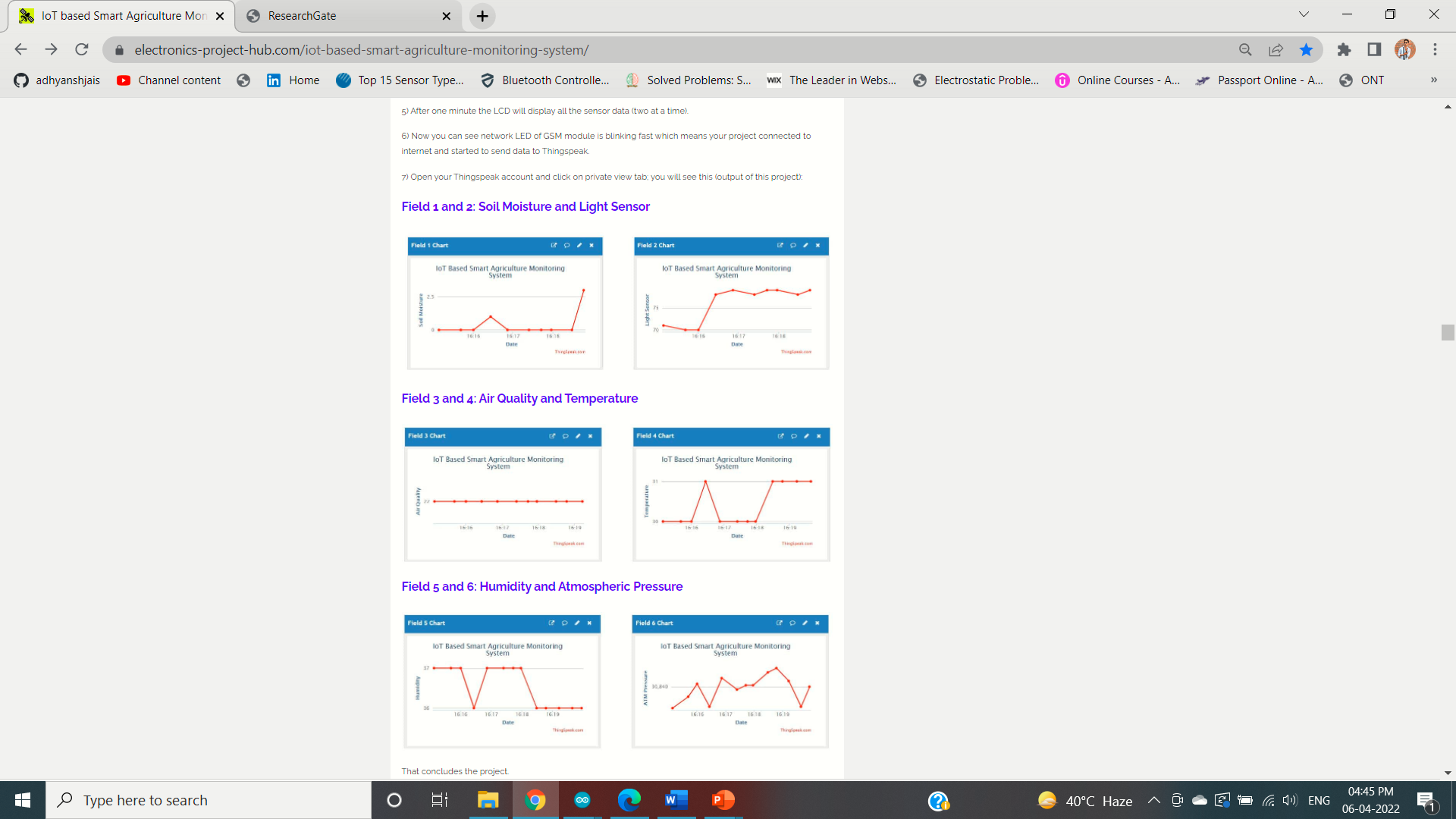


Fig6. Circuit Diagram for a Smart Agriculture Monitoring System [17]

1. **RESULT AND CONCLUSION**



Field 1 and 2 shows the moisture of the soil and the presence of light w.r.t date. Field 3 and 4 shows air quality and temperature w.r.t. date. Field 5 and 6 shows the humidity and air pressure w.r.t. date. The Internet of Things (IoT) and cloud computing work together to create a system that successfully regulates agriculture. All environmental characteristics will be sensed by this system, which will then relay the data to the user via the cloud. The user will utilize an actuator to take controlling action in accordance with that.

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