

# **WELCOME**

The background of the slide features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the right side and bottom of the frame, creating a modern, dynamic feel. The main text 'WELCOME' is positioned in the upper left quadrant, set against a plain white background.

# ALGORITHM

THIS IS REPRESENTED BY-

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## PROBLEM STATEMENT:

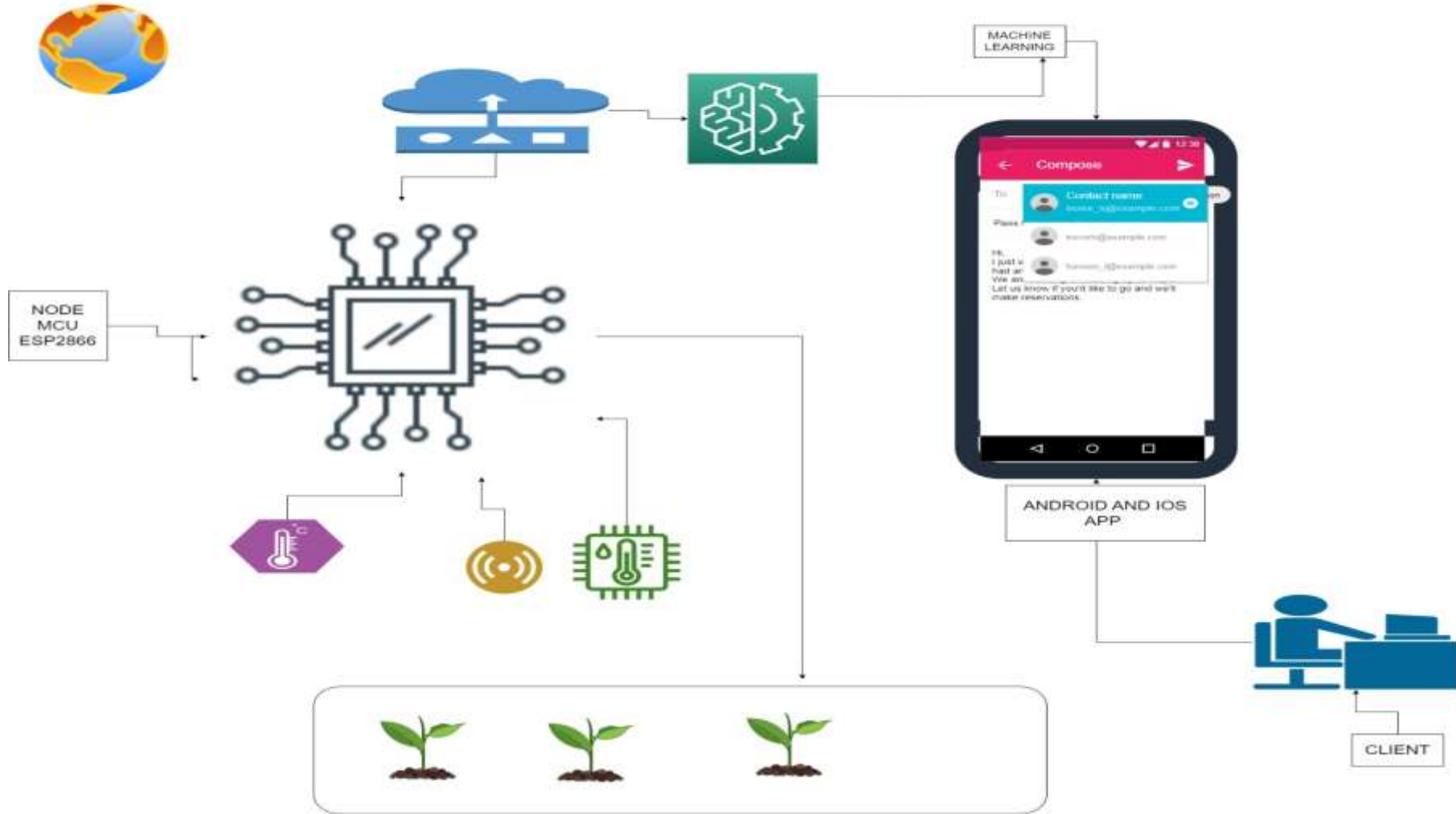
### *SMART PLANT MONITORING AND AUTOMATIC IRRIGATION SYSTEM*

- ▶ Once the system is built, we can place the soil moisture sensor and temperature and humidity sensor in the plant pot. The microcontroller will read the data from the sensors and control the water pump accordingly. This will ensure that the plants are always watered and kept in the ideal temperature and humidity range.

## *Solution:*

- ▶ A smart plant monitoring and irrigation system can be developed using a combination of sensors, microcontrollers, cloud-based software, real-time data monitoring system and building a websites and apps which users can control remotely.

# SMART PLANT MONITORING , AND AUTOMATIC IRRIGATION SYSTEM



# What is Smart Agriculture Monitoring System?

*Smart agriculture monitoring system or simply smart farming is an emerging technology concept where data from several agricultural fields ranging from small to large scale and its surrounding are collected using smart electronic sensors. The collected data are analyzed by experts and local farmers to draw short term and long term conclusion on weather pattern, soil fertility, current quality of crops, amount of water that will be required for next week to a month etc.*

*We can take smart farming a step further by automating several parts of farming, for example smart irrigation and water management. We can apply predictive algorithms on microcontrollers or SoC to calculate the amount of water that will be required today for a particular agriculture field.*

*Say, if there was rain yesterday and the quantity of water required today is going to be less. Similarly if humidity was high the evaporation of water at upper ground level is going to be less, so water required will be less than normal, thus reducing water usage.*

# Role of IoT in smart farming: Why IoT used in smart farming?

- ▶ *IoT is here to reduce the manual labour involved in collecting these crucial agricultural data. If manual labour is involved we have to deploy several thousands of personnel to different agricultural sites to collect the tedious readings every single day and there will be no assurance in the data integrity since we are humans we may get inert and may manipulate the data which could push the expert conclusions in wrong direction.*
- ▶ *Using IoT we can directly send the collected data to a central server in real time. Since we have automated the data collection, the data integrity is assured and since the data processing is done using computers, experts may get advanced analytical software tools to draw most accurate predictions.*

# Plant monitoring and automatic irrigation systems can help working professionals in several ways:

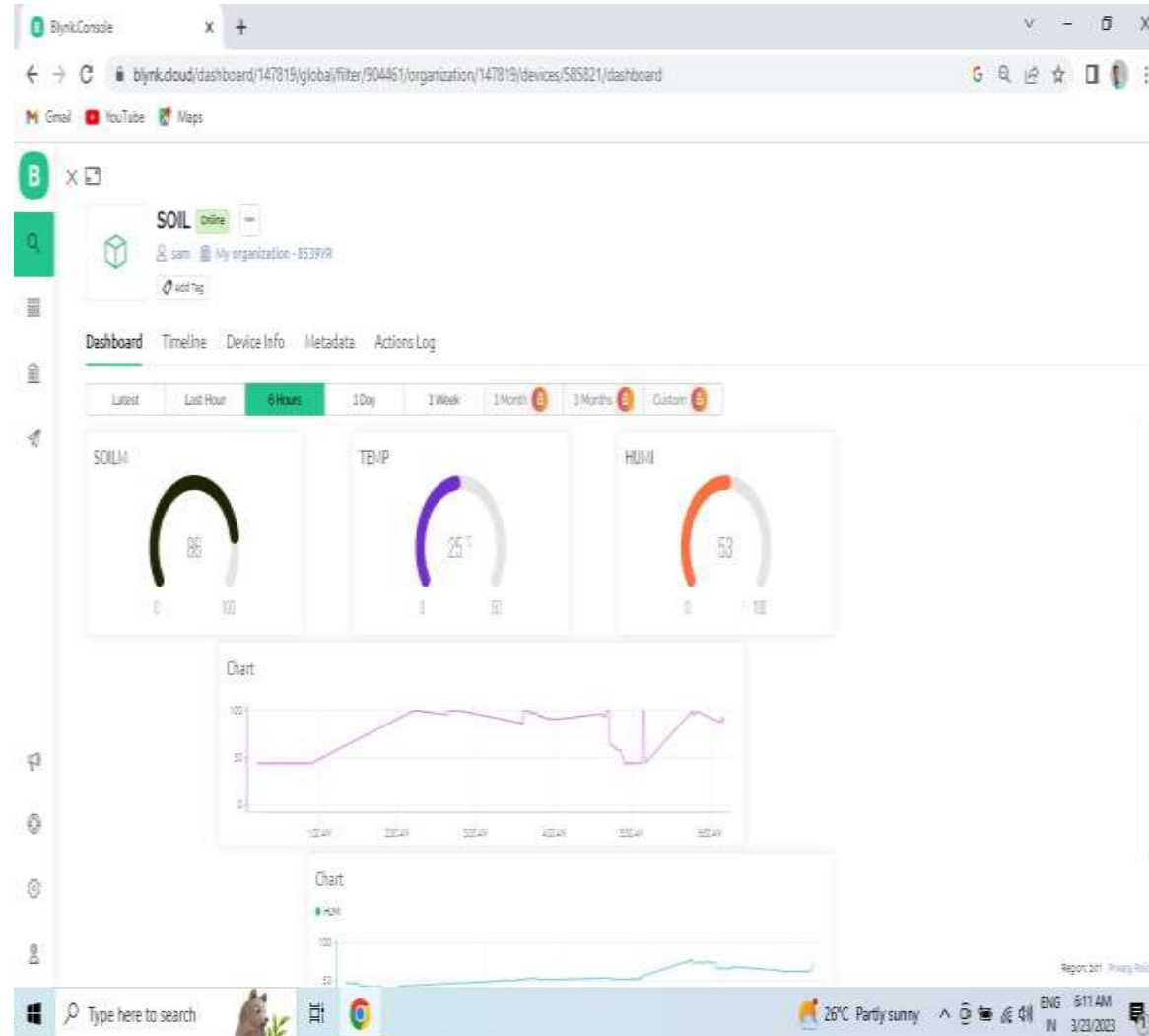
- ▶ 1. **Time-saving**: Working professionals are often busy and may not have the time to water their plants regularly. With an automatic irrigation system, they can set up a schedule for watering and the system will take care of the rest, saving them time and effort.
- ▶ 2. **Efficient use of water**: An automatic irrigation system can ensure that plants receive the right amount of water, reducing wastage and ensuring efficient use of water resources. This can be especially important in areas where water is scarce or where there are restrictions on water usage.
- ▶ 3. **Improved plant health**: Plant monitoring systems can detect issues such as nutrient deficiencies, pests, or diseases early on, allowing working professionals to take action before the problem becomes severe. This can help to improve plant health and yield.
- ▶ 4. **Peace of mind**: Knowing that plants are being well taken care of can provide peace of mind for working professionals who may not have the time or expertise to tend to their plants regularly. They can rest assured that their plants are receiving the care they need, even when they are away from home.



# How machine learning help the plant monitoring through node mcu

- ▶ NodeMCU is an open-source firmware and development kit based on the ESP8266 Wi-Fi module, which is widely used in the Internet of Things (IoT) applications. Machine learning can be integrated with NodeMCU to help in plant monitoring in the following ways:
- ▶ **Real-time data collection:** NodeMCU can be used to collect data from sensors attached to the plants such as temperature, humidity, soil moisture, light, etc. Machine learning algorithms can be trained on this data to detect patterns and trends in the data that may indicate changes in plant growth or health.
- ▶ **Data analysis and prediction:** Machine learning algorithms can be used to analyze the collected data and predict the growth and health of plants. For example, the algorithm can predict the optimal amount of water and nutrients required for a particular plant based on the collected data.

# REAL TIME MONITORING SYSTEM



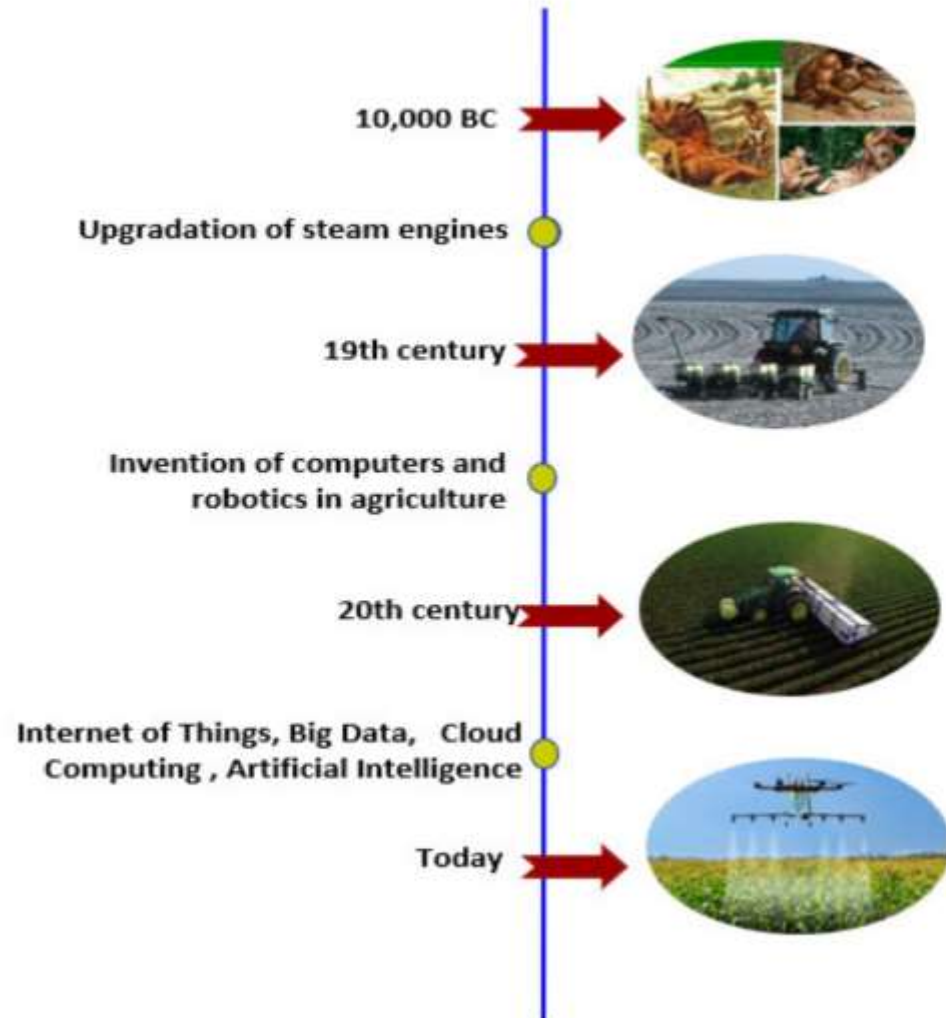
**To introduce a plant monitoring and automatic irrigation system into the real market, you should follow these steps:**

Overall, introducing a plant monitoring and automatic irrigation system into the market requires a strong marketing strategy, effective distribution channels, and a commitment to customer satisfaction. With the right approach, this product has the potential to be a valuable solution for busy working professionals looking to maintain healthy, thriving plants with minimal effort.

# MOBILE APP INTERFACE



## Ancillary aspects



## Strategic features

**Agriculture 1.0**

Usage of simple tools,  
manpower and animal  
forces

**Agriculture 2.0**

Usage of chemicals,  
Agricultural  
machineries

**Agriculture 3.0**

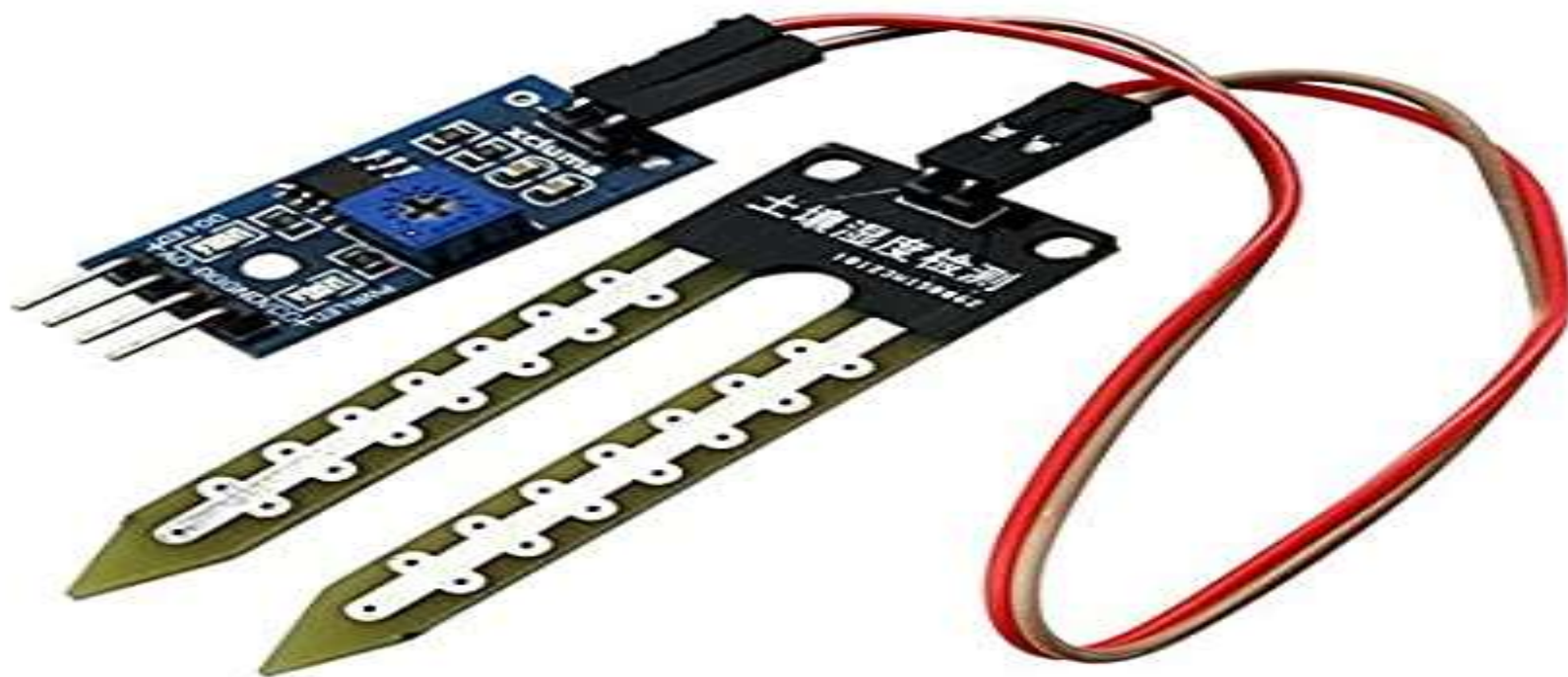
Utilization of robots  
Computer programs

**Agriculture 4.0**

Smart devices  
Smart systems



# SOIL MOTION SENSOR



# SOIL SENSOR

- ▶ *A soil sensor, also known as a soil moisture sensor, is a device that measures the water content or moisture level of soil. It is commonly used in agriculture, horticulture, and environmental monitoring to optimize irrigation and prevent over-watering, which can lead to water waste, nutrient leaching, and soil erosion. Some soil sensors can also measure other parameters such as temperature, pH, and nutrient levels, which are important factors that affect plant growth and health. Soil sensors can be wired or wireless and can provide real-time data to farmers or researchers, allowing them to make informed decisions about irrigation scheduling, fertilization, and other agricultural practices*

# ROLE OF SOIL MOTION SENSOR

*Soil motion sensors can be an important component of an agricultural IoT project because they can provide valuable information about soil erosion, soil compaction, and the movement of soil particles. By monitoring soil motion, farmers can gain insight into the health and fertility of their soil and make informed decisions about crop management.*

*Some of the specific ways that soil motion sensors can be used in agriculture IoT projects include:*

*Monitoring soil erosion: Soil motion sensors can be used to detect changes in the amount of soil that is being eroded from a particular area. This information can be used to determine where erosion is occurring and to take steps to prevent further soil loss.*

*Measuring soil compaction: Soil motion sensors can also be used to measure the degree of soil compaction in a particular area. This can help farmers to identify areas of the field where soil compaction is high and to take steps to alleviate the problem, such as reducing tillage or using cover crops.*

*Tracking soil movement: Soil motion sensors can also be used to track the movement of soil particles over time. This information can be used to monitor the effectiveness of soil conservation practices and to identify areas of the field that may require additional attention.*



# NPK SENSOR



# NPK SENSOR:

An NPK sensor is a device used to measure the levels of three essential macronutrients in plants: nitrogen (N), phosphorus (P), and potassium (K). These macronutrients are critical for plant growth and development, and their availability and balance in the soil are important for achieving optimal plant health and yield.

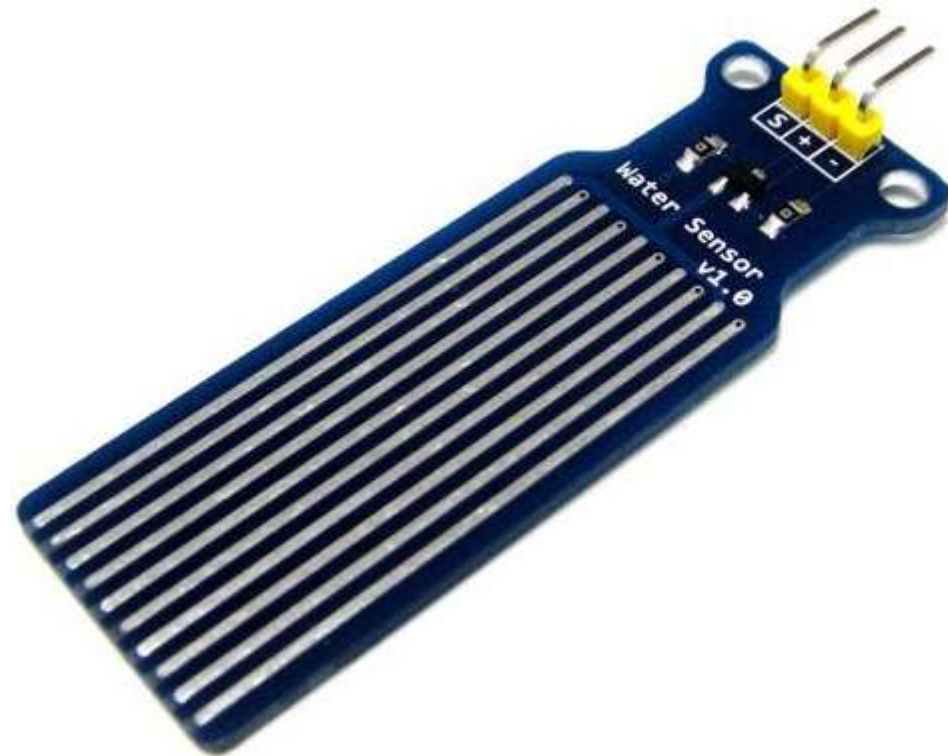
NPK sensors can be either contact or non-contact devices, and they use different technologies to detect and measure nutrient levels in the soil. Contact sensors require insertion into the soil, while non-contact sensors use electromagnetic or spectral imaging to analyze the nutrient levels from a distance.

NPK sensors are useful tools for precision agriculture, as they provide farmers with real-time information about the nutrient status of their crops. This information can be used to optimize fertilization strategies and improve overall crop yield and quality.

# ROLE OF NPK SENSOR:

- ▶ NPK sensor plays a crucial role in agriculture IoT by providing real-time information about the nutrient levels of soil. NPK stands for nitrogen (N), phosphorus (P), and potassium (K), which are the three most important nutrients for plant growth. NPK sensor helps farmers to optimize fertilizer application, leading to higher crop yields, and reduced costs.
- ▶ The NPK sensor can be integrated into an agriculture IoT system, which collects and analyzes data from various sources, such as weather sensors, moisture sensors, and soil sensors. By using the data collected by the NPK sensor, farmers can determine the optimal time to apply fertilizer, the type of fertilizer to use, and the amount of fertilizer to apply, based on the nutrient levels of the soil
- ▶ With the help of NPK sensors, farmers can also identify nutrient deficiencies in the soil, and take corrective measures to improve soil health. This not only leads to better crop yields, but also reduces the environmental impact of farming by minimizing the use of chemical fertilizers.
- ▶ Overall, the NPK sensor is an important tool for precision agriculture, enabling farmers to make data-driven decisions and optimize crop production while reducing the environmental impact of farming.

# WATER DETECTOR SENSOR



# Water Sensor

- ▶ *Connecting a water sensor to an Arduino is a great way to detect a leak, spill, flood, rain, etc. It can be used to detect the presence, the level, the volume and/or the absence of water. While this could be used to remind you to water your plants, there is a better Grove sensor for that. The sensor has an array of exposed traces, which read LOW when water is detected.*

# ROLE OF WATER DETECTOR SENSOR

- ▶ Water detector sensors can play an important role in agriculture by helping farmers to manage irrigation systems more efficiently and effectively. By monitoring soil moisture levels and providing real-time data, water detector sensors can help farmers to optimize water usage, reduce waste, and improve crop yields.
- ▶ In addition to optimizing water usage, water detector sensors can also help farmers to detect and respond to water-related problems such as leaks or flooding. By providing real-time alerts when water is detected where it shouldn't be, water detector sensors can help farmers to quickly identify and resolve issues before they cause serious damage to crops or irrigation systems.
- ▶ Overall, the role of water detector sensors in agriculture is to help farmers to manage water resources more effectively and efficiently, improving crop yields and reducing waste. By providing real-time data on soil moisture levels and water-related problems, water detector sensors can help farmers to make better-informed decisions and take proactive steps to protect their crops and irrigation systems.

# NODE MCU



# Node Mcu:

- ▶ *NodeMCU The NodeMCU (Node MicroController Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.*
- ▶ *However, as a chip, the ESP8266 is also hard to access and use. You must solder wires, with the appropriate analog voltage, to its pins for the simplest tasks such as powering it on or sending a keystroke to the “computer” on the chip. You also have to program it in low-level machine instructions that can be interpreted by the chip hardware. This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics. It is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects.*



# ROLE OF NODE MCU :

- ▶ **Soil Moisture Monitoring:** NodeMCU can be used to build a soil moisture monitoring system that measures the moisture level in the soil and sends the data to a central server or a mobile application. This data can then be used to trigger irrigation systems, optimize crop yield, and reduce water usage.
- ▶ **Environmental Monitoring:** NodeMCU can be used to monitor environmental conditions such as temperature, humidity, and light levels. This data can be used to optimize growing conditions for crops, ensure that livestock are comfortable, and prevent the spread of diseases in livestock.
- ▶ **Automated Irrigation:** NodeMCU can be used to automate irrigation systems based on real-time data such as soil moisture levels, weather conditions, and plant growth rates. This can reduce water usage, ensure that crops are irrigated at the optimal time, and reduce labor costs associated with manual irrigation.
- ▶ **Livestock Monitoring:** NodeMCU can be used to monitor livestock conditions such as feeding habits, water consumption, and temperature. This data can be used to optimize feed schedules, identify health issues early, and prevent animal stress.
- ▶ **Crop Monitoring:** NodeMCU can be used to monitor crop growth and health, including factors such as soil pH, plant height, and leaf color. This data can be used to optimize crop growth, identify nutrient deficiencies or disease, and prevent crop damage.

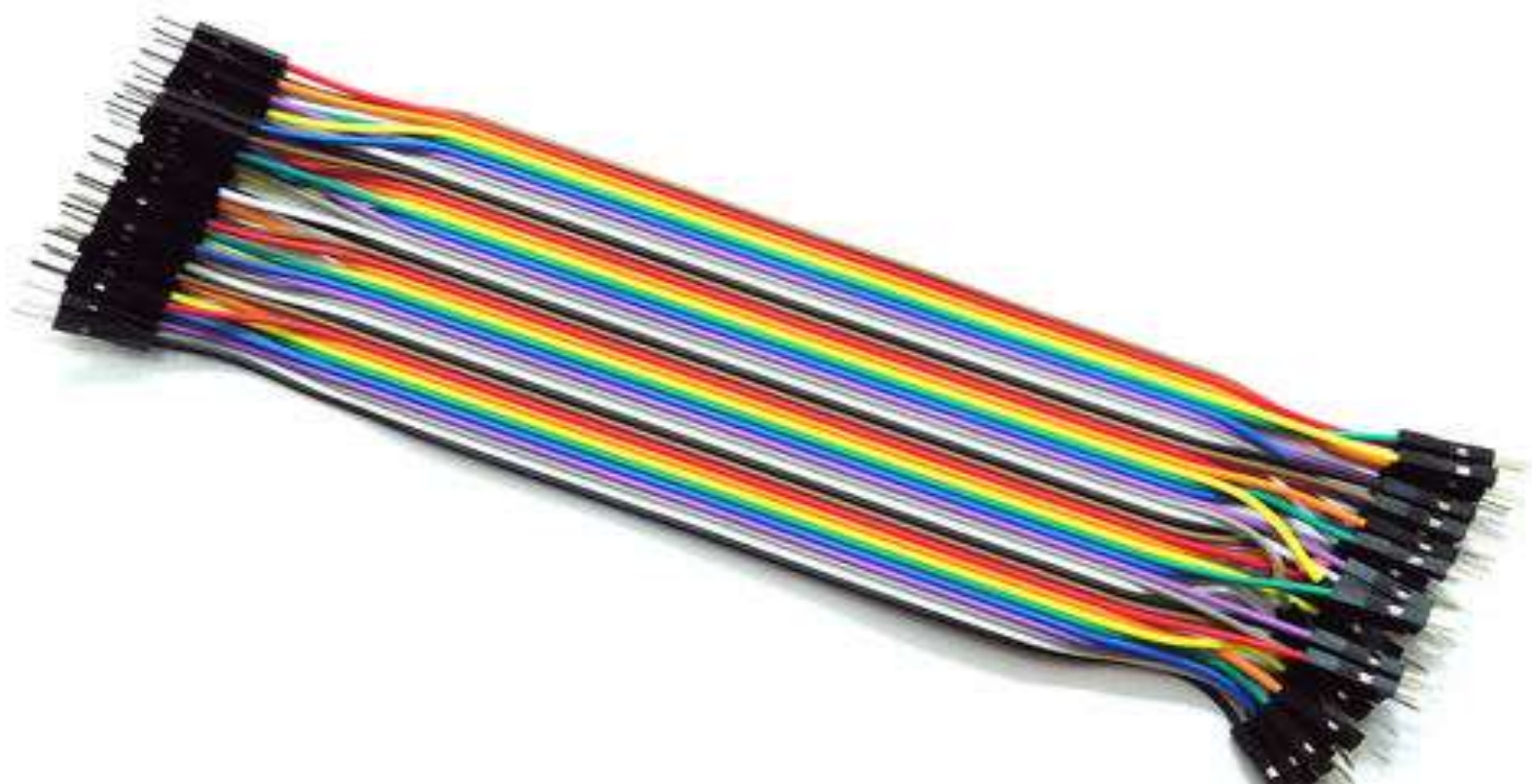
# RELAY



## RELAY

- ▶ The relay is the device that open or closes the contacts to cause the operation of the other electric control. It detects the intolerable or undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area. Thus protects the system from damage.

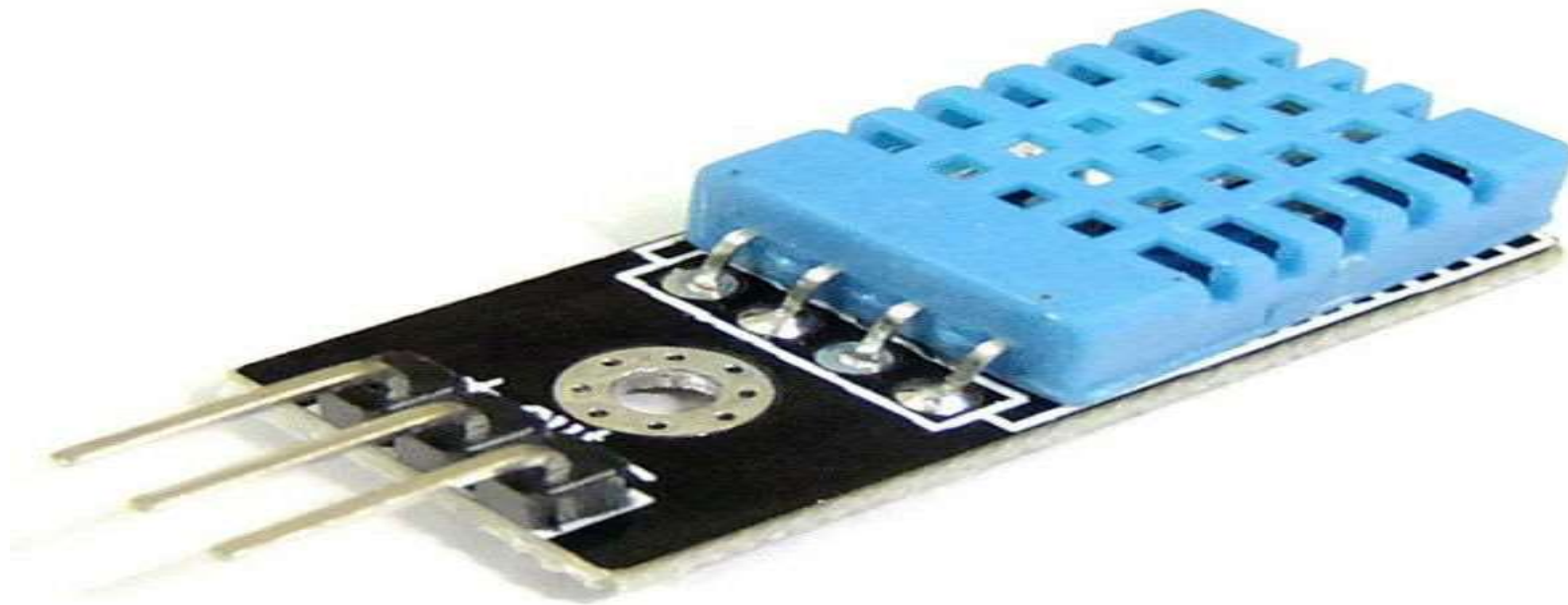
# *JUMPER WIRE*



# JUMPER WIRE:

- ▶ Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires.

# *HUMIDITY AND TEMPERATURE SENSOR*



# HUMIDITY AND TEMPERATURE SENSOR:

- ▶ A humidity sensor is an electronic device that measures the humidity in its environment and converts its findings into a corresponding electrical signal. Humidity sensors vary widely in size and functionality; some humidity sensors can be found in handheld devices (such as smartphones), while others are integrated into larger embedded systems (such as air quality monitoring systems). Humidity sensors are commonly used in the meteorology, medical, automobile, HVAC and manufacturing industries.
- ▶ Temperature sensor that uses an external diode-connected transistor as the sensing element to measure temperatures external to the sensor (for example, on a circuit board or on the die of a CPU). Generally produces a digital output.



# ***WATER PUMP***





# ***WATER PUMP:***

- ▶ A water pump is an electromechanical machine used to increase the pressure of water to move it from one point to another. Modern water pumps are used throughout the world to supply water for municipal, industrial, agricultural, and residential uses.
- ▶ Water pumps also are used to move wastewater in sewage treatment plants. Modern water pumps most often are driven by electricity, but other power sources also are used—for example, diesel or gasoline engines. In some remote areas, such as desert regions, solar panels may be used to supply power to small pumps.

# ***PIR SENSOR***



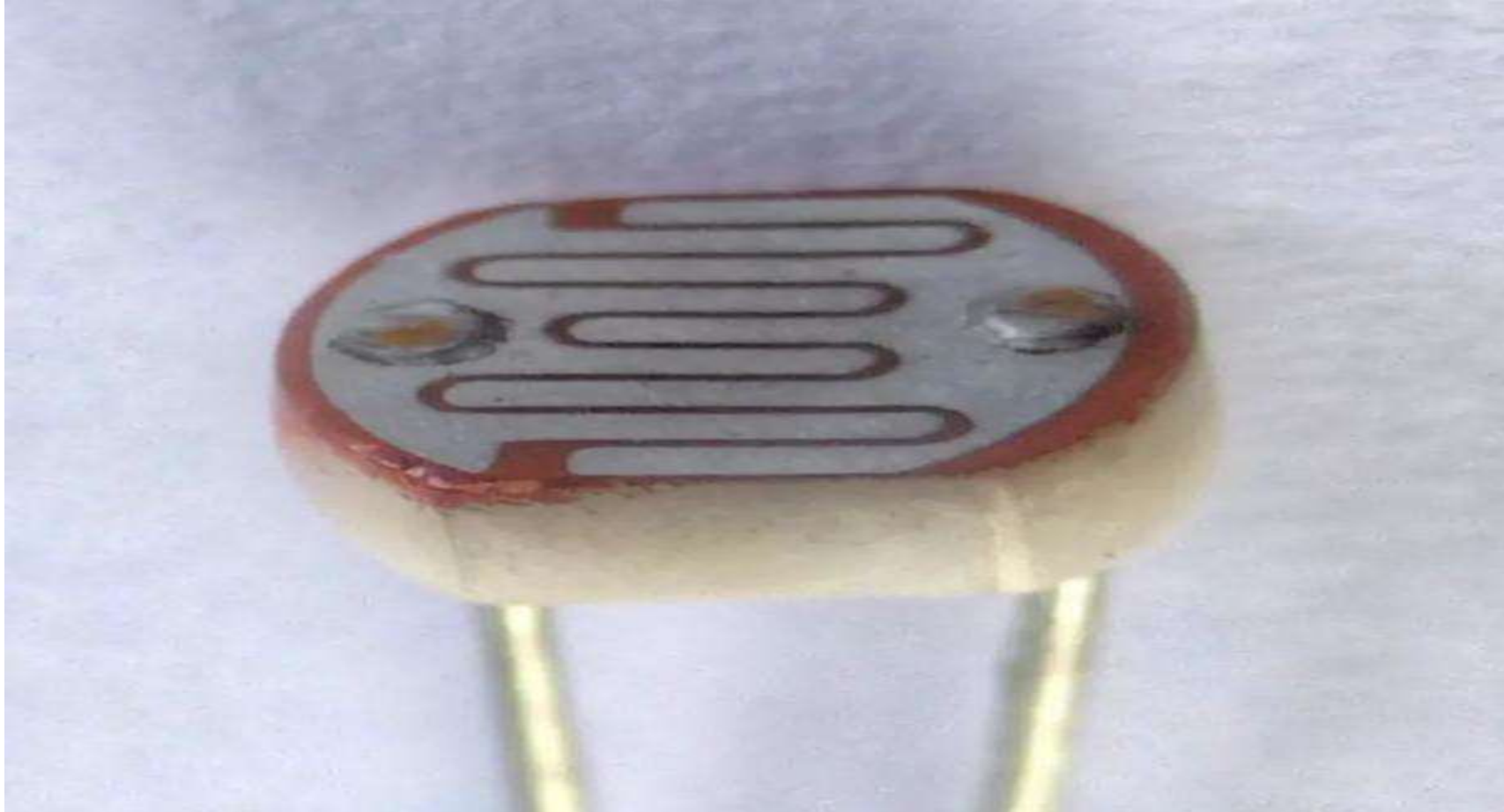
# PIR SENSOR

- ▶ *A PIR (Passive Infrared) sensor is a type of electronic sensor that is designed to detect infrared (IR) radiation emitted by a moving object in its field of view. It works on the principle that all objects, including living beings, emit infrared radiation, which can be detected by the sensor. The PIR sensor is commonly used in motion detection systems, burglar alarms, and automated lighting systems. It is called “passive” because it does not emit any energy of its own, but only detects the energy emitted by other objects*

# ROLE OF PIR SENSOR :

- ▶
- ▶
- ▶ A PIR (Passive Infrared) sensor can play an important role in an agriculture IoT project by detecting the presence of humans, animals, or any other moving objects in a specific area. This can be useful in several ways:
- ▶
- ▶ **Security:** PIR sensors can be used to detect any unauthorized access to the farm or livestock area, helping to prevent theft or vandalism.
- ▶
- ▶ **Pest control:** PIR sensors can detect the presence of pests or rodents in the fields, triggering alarms or notifications to alert farmers to take necessary actions.
- ▶
- ▶ **Energy conservation:** PIR sensors can be used to control the lighting or heating systems in the greenhouse or livestock areas by detecting human presence, reducing energy waste.
- ▶
- ▶ **Irrigation management:** PIR sensors can detect the presence of humans or animals in the fields, helping to avoid unnecessary irrigation, saving water and energy.
- ▶

# ***PHOTO RESISTER***



# PHOTO RESISTOR

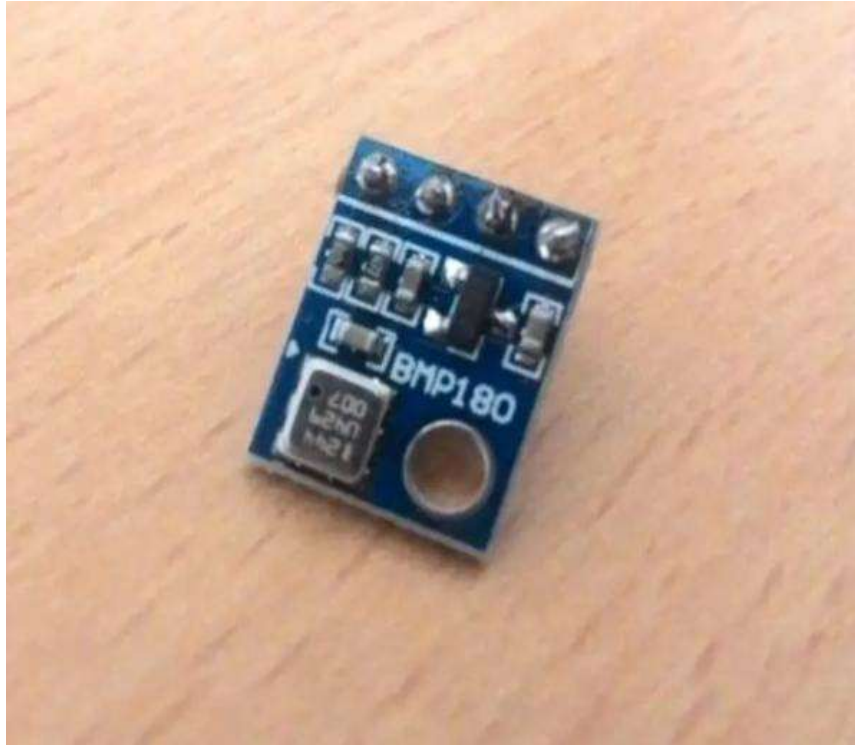
- ▶ *The name photoresistor is the combination of words: photon (light particles) and resistor. A photoresistor is a type of resistor whose resistance decreases when the intensity of light increases. In other words, the flow of electric current through the photoresistor increases when the intensity of light increases.*
- ▶ *Photoresistors are also sometimes referred as LDR (Light Dependent Resistor), semiconductor photoresistor, photoconductor, or photocell. Photoresistor changes its resistance only when it is exposed to light.*

# ROLE OF PHOTO RESISTOR:

- ▶ **Controlling artificial lighting systems:** By using photoresistors to measure the amount of light in a growing environment, farmers can automate lighting systems to turn on and off at specific times or adjust intensity levels to match the needs of different plant species.
- ▶ **Monitoring natural light levels:** Photoresistors can be used to monitor natural light levels in greenhouses or indoor growing environments, providing valuable data for optimizing plant growth and reducing energy consumption.
- ▶ **Detecting shading or obstructions:** By monitoring light levels at different points in a growing environment, photoresistors can detect shading or obstructions that may be blocking light and affecting plant growth.
- ▶ **Overall, the role of photoresistors in agriculture is to help farmers optimize plant growth by monitoring and controlling light levels.** By providing accurate and reliable data on light levels, photoresistors can help farmers make informed decisions about lighting schedules and intensity levels, ultimately improving crop yields and reducing energy costs.



# BAROMETRIC PRESSURE SENSOR





# BAROMETRIC PRESSURE SENSOR

- ▶ A barometric pressure sensor is a device used to measure the atmospheric pressure of the surrounding environment. This type of sensor typically uses a piezoresistive or capacitive mechanism to detect changes in pressure, which are then converted into an electrical signal that can be read by a microcontroller or other electronic device. Barometric pressure sensors are commonly used in weather forecasting, aviation, and other applications where changes in atmospheric pressure can have a significant impact on performance or safety. They can also be used in conjunction with other sensors, such as temperature or humidity sensors, to provide a more complete picture of environmental conditions.

# ROLE OF BAROMETRIC PRESSURE :

- ▶ *Barometric pressure sensors are devices that measure atmospheric pressure, which can be an important factor in agriculture as it can affect plant growth and weather patterns. The role of barometric pressure sensors in agriculture is to provide farmers with information about changes in atmospheric pressure that can help them make informed decisions about crop management.*
- ▶ *In addition to monitoring weather patterns, barometric pressure sensors can also be used to monitor changes in pressure that may affect plant growth. For example, changes in barometric pressure can affect soil moisture levels, which can in turn affect plant growth and nutrient uptake. By monitoring changes in pressure and soil moisture levels, farmers can adjust irrigation schedules and nutrient applications to optimize plant growth.*
- ▶ *Barometric pressure sensors can also be used in precision agriculture, where they can be combined with other sensors and data analytics tools to create a detailed picture of crop health and environmental conditions. By providing real-time data on barometric pressure and other environmental factors, farmers can make informed decisions about crop management and respond quickly to changes in weather or other conditions.*
- ▶ *Overall, the role of barometric pressure sensors in agriculture is to provide farmers with valuable data on changes in atmospheric pressure and other environmental factors that can affect crop growth and weather patterns. By monitoring and analyzing this data, farmers can make informed decisions about crop management and respond quickly to changing conditions, ultimately improving crop yields and reducing risks from weather-related events.*

THANK YOU