# Hydro Sense – Portable Water Contamination Detection System

**Chapter -1**

# Introduction

Hydro Sense Overview:

- A portable device for detecting water contaminants like pH, Turbidity and etc..
- Features real-time monitoring, advanced sensor technology, and mobile app integration.
- Goal: Reliable and efficient IoT-based contamination detection.

Platform Selection:

- Critical to choose a development board/platform that aligns with project requirements.
- Comparison of various board/platform we had in mind.

# Why Platform Matters

Key Requirements for Hydro Sense:

- **Real-Time Data Monitoring:** Efficient sensor data acquisition and transmission.
- **IoT-Ready**: Built-in connectivity for cloud integration.
- **Power Efficiency**: Suitable for portable use.
- **Ease of Development**: Fast prototyping with robust libraries.
- **Cost-Effectiveness**: Affordable without compromising on features.

# Introducing VEGA Aries IoT v2.0

Highlights of VEGA Aries IoT v2.0:

- Made in India: Proudly developed for Indian innovation.
- Built specifically for IoT applications.
- Includes essential connectivity modules: Wi-Fi, BLE, and LoRa.
- Simplified interfaces for sensor integration.
- Supports cloud platforms for real-time monitoring.

# Comparison with Other Platforms

| Platform | Strengths | Weaknesses |
|---|---|---|
| **VEGA Aries IoT v2.0** | IoT-ready, Indian make, built-in connectivity | Limited low-level customization |
| **Raspberry Pi** | High processing power, vast community support | Overkill for IoT; higher power consumption |
| **Arduino** | Beginner-friendly, large community | Limited IoT capabilities, needs extra modules |
| **STM32** | High performance, customizable hardware | Steep learning curve, additional IoT modules |
| **MSB420** | Ultra-low power consumption | Lacks built-in IoT connectivity |

# Why We Chose VEGA Aries IoT v2.0

1. Made in India:
   - Supports indigenous technology.
   - Designed for Indian IoT needs and projects.
2. IoT-Centric Design:
   - Pre-built connectivity modules simplify cloud integration.
   - Ideal for real-time monitoring systems like Hydro Sense.
3. Ease of Use:
   - Developer-friendly with built-in libraries and minimal setup time.
4. Cost-Efficient:
   - Affordable compared to Raspberry Pi or STM32 for similar use cases.
5. Optimized for Portable Use:
   - Power-efficient design, ideal for battery-operated devices.

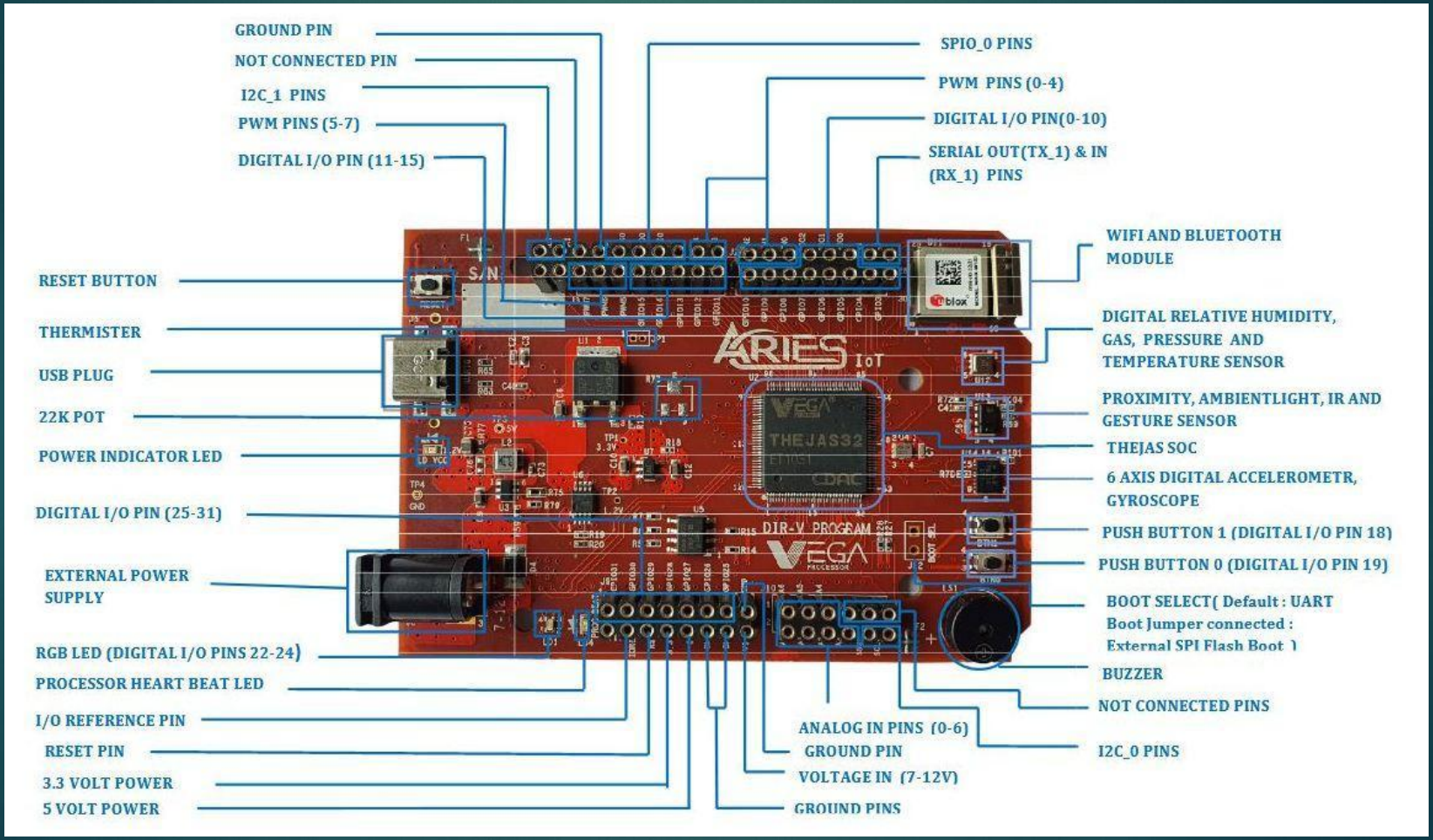
# On Board Features

- Bluetooth v4.2 - WiFi 802.11b/g/n module
- Digital Proximity, Ambient Light, RGB and
- Gesture Sensor
- 6 Axis Digital Accelerometer, Gyroscope Sensor
- Gas, Humidity, Pressure, Temperature Sensor
- Piezoelectric Buzzer
- 2 Push button switches
- 2 LED indicators
- Potentiometer for Analog ADC input
- Thermistor

# Specifications

- **Controller** : VEGA ET1031
- **SRAM** : 256 KB
- **Flash** : 2 Mb
- **PWM Pins** : 8 Nos
- **Analog Input Pins** : 4 Nos
- **SPI** : 3 Nos
- **UART** : 3 Nos
- **I2C** : 2 Nos
- **GPIOs** : 25
- **Input Voltage** : 7-12v
- **DC Current per I/O Pin** : 12 Ma
- **IO Voltage** : 3.3v
- **Clock Speed**: 110 MHz

# Block Diagram



# Detailed Feature Comparison

VEGA Aries IoT v2.0 Features:

- Connectivity: Wi-Fi, BLE, LoRa.
- Interfaces: Built-in GPIOs for sensor modules (e.g., pH, turbidity sensors).
- Power Efficiency: Suitable for portable applications.
- Software Support: Supports Python and C-based SDKs.

Hydro Sense Needs:

- Seamless sensor integration.
- Real-time data transmission to mobile apps.
- Low power consumption for long-term monitoring.

# Conclusion

Why VEGA Aries IoT v2.0?

- Meets Hydro Sense requirements efficiently.
- Proudly Indian-made, supporting indigenous innovation.
- Streamlines IoT development with robust, built-in features.
- Cost-effective and power-efficient for portable applications.

Next Steps:

- Begin integration with pH and turbidity sensors.
- Develop real-time monitoring and alert system.

# Sensors for HydroSense

**Chapter -2**

# pH Sensor

**Name**: Industrial Grade Analog PH Sensor Kit

**SKU**: 1855118

**Features:**

- Model: ELECROW Crowtail- PH Sensor
- Range of measurement: 0-14 pH
- Measuring temperature: 0-60℃
- Response time: less than 2min
- Working voltage: 5v

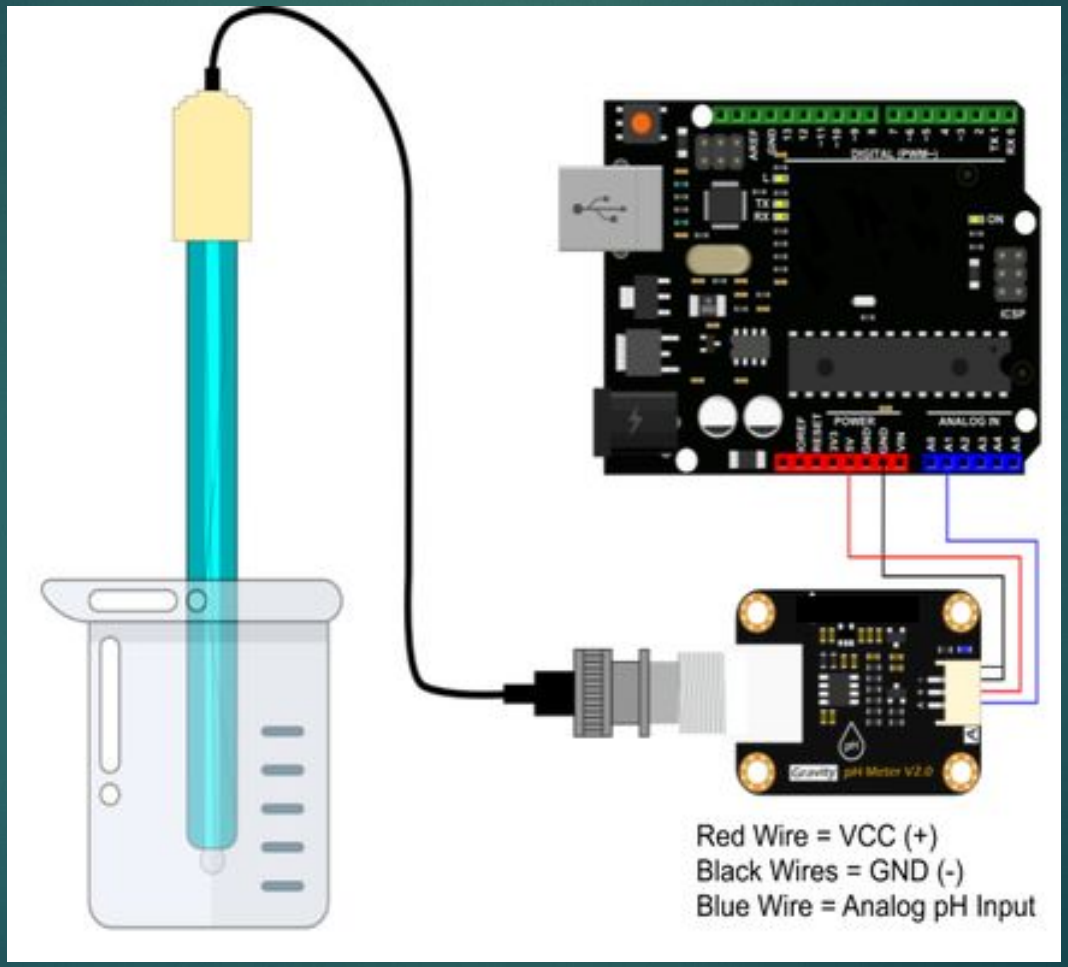
**Cost:** ₹ 1,099.00 (Incl. GST)

# Description

- The module is a PH sensor, which can be used to test the PH value of the aqueous solution.
- The electrode of the Crowtail PH sensor is a composite electrode composed of a glass electrode and a reference electrode.
- It is widely used in environmental monitoring, chemical industry, pharmaceutical industry, dyestuff industry, universities, and research institutions in the situation of detection of the pH of an aqueous solution.

- The plastic barrier protection of the fragile part of the electrode can't be broken and can not be used as a string rod when measuring.
- The electrode is a full-screen type to prevent interference of external electric field when measuring.
- Choose the analog pin of Arduino as the LED control mode.

# Circuit Diagram



# Specifications

| | |
|---|---|
| **Model Type** | pH Sensor |
| **Operating Voltage (VDC)** | 5 |
| **Model** | ELECROW Crowtail- PH Sensor |
| **Measurement range** | 0-14 pH |
| **Measuring Temperature (° C)** | 0-60℃ |
| **Response Time(s)** | 120 |
| **Dimensions (L x W x H) mm** | 58.8 x 20.0 x 27.0 |
| **Shipping Weight** | 0.104 kg |
| **Shipping Dimensions** | 22 × 10 × 5 cm |

# Turbidity Sensor

**Name**: Turbidity Sensor with Module

**SKU**: 62828

**Features:**

- Operating Voltage: 5VDC.
- Current: 30mA (MAX).
- Operating temperature: -30 ° C to 80 ° C.
- Compatible with Arduino, Raspberry Pi, AVR, PIC, etc.
- Measuring Range: 0 ~ 1000 NTU.

Cost: ₹ 518.00 (Incl. GST)

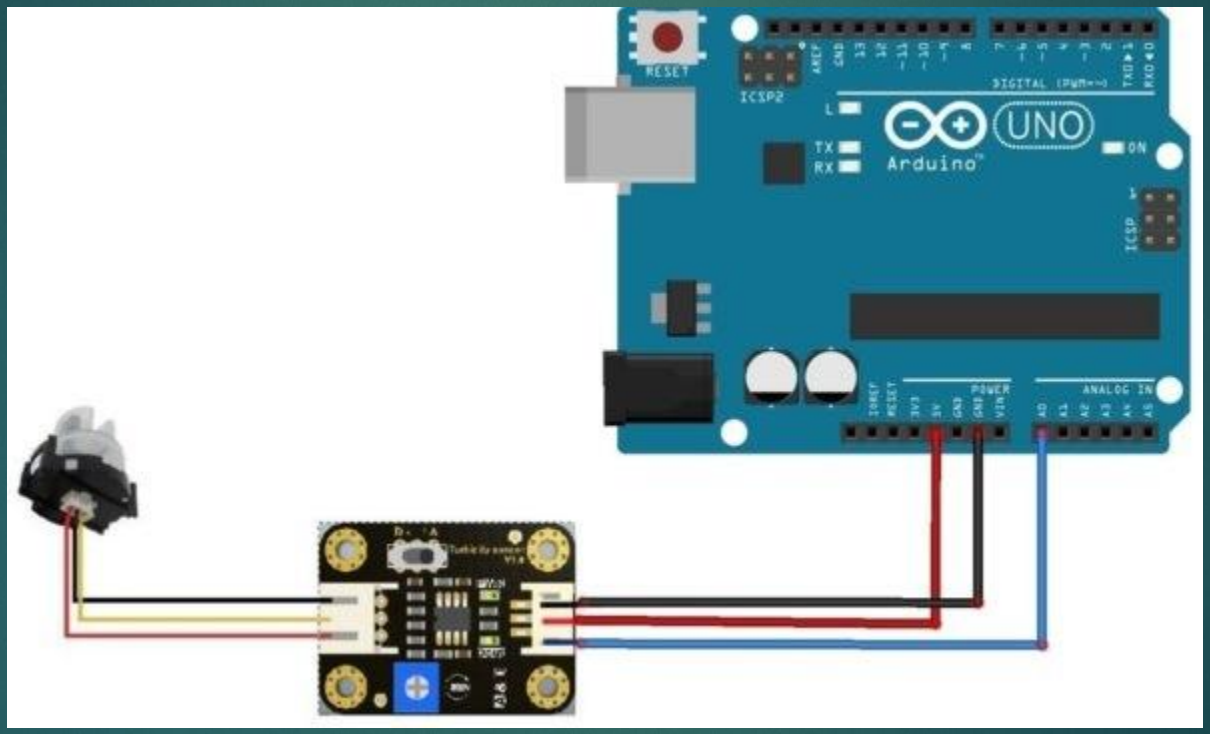
# Description

- The Turbidity Sensor emits at its end an infrared light, imperceptible to human vision, capable of detecting particles that are suspended in water, measuring the light transmittance and the dispersion rate, which changes according to the Amount of TSS (Total Suspended Solids), increasing the turbidity of the liquid whenever levels increase.

- In general, the Arduino Turbidity Sensor is applied in projects involving the monitoring of water turbidity in rivers, streams, lakes, water bodies, catchment and research sites, laboratories, tanks with liquids, and so on.

- This Turbidity Sensor has an end specially prepared for direct contact, having an electronic module to amplify and send the received data to the microcontroller of the project

# Circuit Diagram



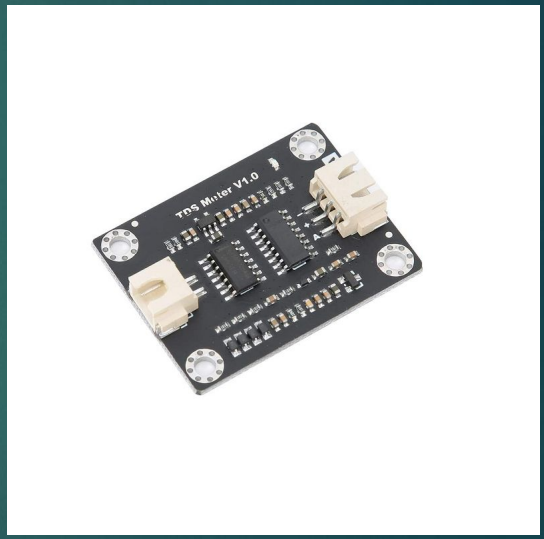
# Specifications

| | |
|---|---|
| **Model Type** | Turbidity Sensor |
| **Operating Voltage (VDC)** | 5 |
| **Working Current (mA)** | 30mA [MAX] |
| **Response time(mS)** | <500 msec |
| **Insulation Resistance (MOhm)** | 100MΩ [Min] |
| **Operating Temperature (°C)** | -30 ~ +80 |
| **Length (mm):** | 33 |
| **Width (mm):** | 20 |
| **Weight (g):** | 55 |
| **Shipping Weight** | 0.059 kg |
| **Shipping Dimensions** | 8 × 5 × 5 cm |

# TDS Sensor

**Name**: Analog TDS Sensor Module Normal Quality

**SKU**: 890181




**Features:**

- Wide voltage operation: 3.3~5.5V
- 0~2.3V analog signal output, compatible with 5V, 3.3V two control systems
- The excitation source is an AC signal, effectively preventing probe polarization
- Waterproof probe for long-term immersion in water

Cost: ₹ 491.00 (Incl. GST)

# Description

- The commonly used TDS testing equipment is a TDS pen. Although it is inexpensive and easy to use, it cannot transmit data to the control system, do long-term online monitoring, and analyze the water quality. Using a special instrument, although the data can be transmitted, the accuracy is high, but the price is very expensive. To this end, we have specially introduced this Arduino-compatible TDS sensor, which can be used to measure the TDS value of water after connecting to the Arduino controller.

- Designed for Arduino, this product is plug and play and easy to use. The wide voltage supply of 3.3~5.5V and the analog signal output of 0~2.3V make this product compatible with the 5V, 3.3V control system, which can be easily used in the ready-made control system. The excitation source used for measurement uses an AC signal, which can effectively prevent probe polarization, extend probe life, and increase the stability of the output signal. The TDS probe is a waterproof probe that can be immersed in water for long periods of time.

# Specifications

| | |
|---|---|
| **Model Type:** | TDS Sensor |
| **Operating Voltage (VDC):** | 3.3 to 5.5 |
| **Operating Current (A):** | 0.003 |
| **Output Voltage (V):** | 0 to 2.3 |
| **Measurement Range:** | 0~1000ppm (TDS) |
| **Measurement Accuracy** | ±10% F.S (TDS ) |
| **Length (mm):** | 42 |
| **Width (mm):** | 32 |
| **Height (mm):** | 15 |
| **Weight (g):** | 60 |
| **Shipping Weight** | 0.064 kg |
| **Shipping Dimensions** | 7 × 4 × 2 cm |

# Temperature Sensor

**Name**: DS18B20 Water Proof Temperature Probe – Black (1m)

**SKU**: 11500

**Features:**

- A probe by new original installation import DS18B20 temperature sensor chip.
- Chip each pin use heat shrinkable tube to prevent short circuit, internal sealing glue, waterproof, moisture proof.
- Stainless steel tube encapsulation waterproof moisture proof prevent rust.
- Stainless steel shell (6 * 45 mm), lead length 100 cm (shielding wire) use stability.
- Without the external components, the unique single bus;

Cost: ₹ 49.00 (Incl. GST)

# Image

# Specifications

| | |
|---|---|
| **Item Type:** | Probe |
| **Model Type:** | WaterProof Temperature Probe |
| **Rated Voltage (V):** | 3 to 5.5 |
| **Temp. Measuring Range (°C):** | -55 ~ +125 Â°C |
| **Probe Diameter** | 6mm |
| **Probe Length (mm):** | 50mm |
| **Resolution:** | 9 ~ 12 bit |
| **Query time** | 750 msec |
| **Cable Length (m):** | 1 |
| **Shipping Weight** | 0.08 kg |
| **Shipping Dimensions** | 7 × 5 × 3 cm |

# Pressure Sensor

**Name**: DFRobot Gravity Analog Water Pressure Sensor

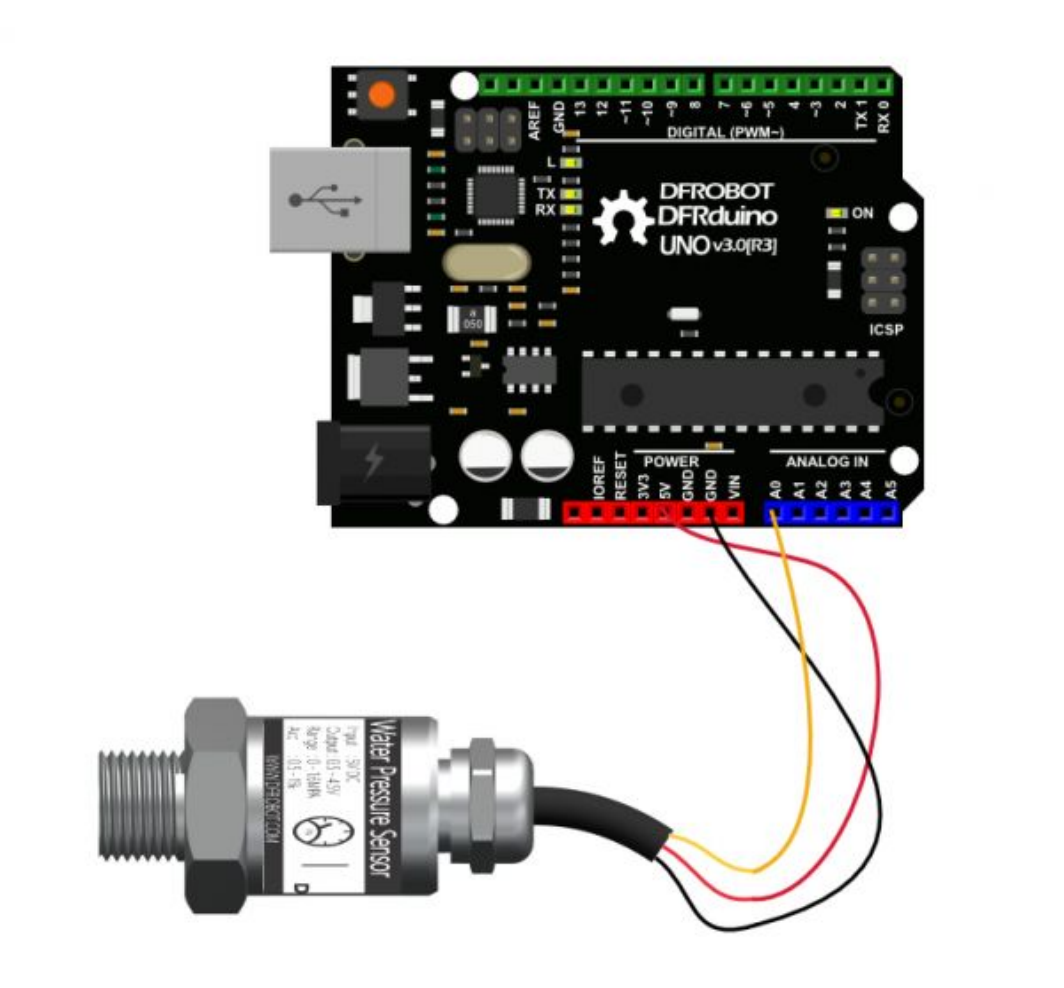
**SKU**: 1073424

**Features:**

- Medium: liquid/gas without corrosion
- Wiring: Gravity-3Pin (Signal-VCC-GND)
- Pressure Measurement Range: 0~1.6 Mpa
- Input Voltage: +5 VDC
- Output Voltage: 0.5~4.5 V

Cost: ₹ 1,758.00 (Incl. GST)

# Circuit Diagram



# Specifications

| | |
|---|---|
| **Model Type:** | Pressure Sensor |
| **Working water pressure(MPa)** | ≤2.0 |
| **Output Voltage (V):** | 0.5~4.5 |
| **Waterproof Level** | IP68 |
| **Response Time (mS)** | <2.0 |
| **Quiescent Current (mA)** | 2.8 |
| **Operating Temperature (°C):** | -20 to 85 |
| **Shipping Weight** | 0.1 kg |
| **Shipping Dimensions** | 10 × 5 × 2 cm |

# SD Card for Storage

**Name**: Micro SD Card Reader Module

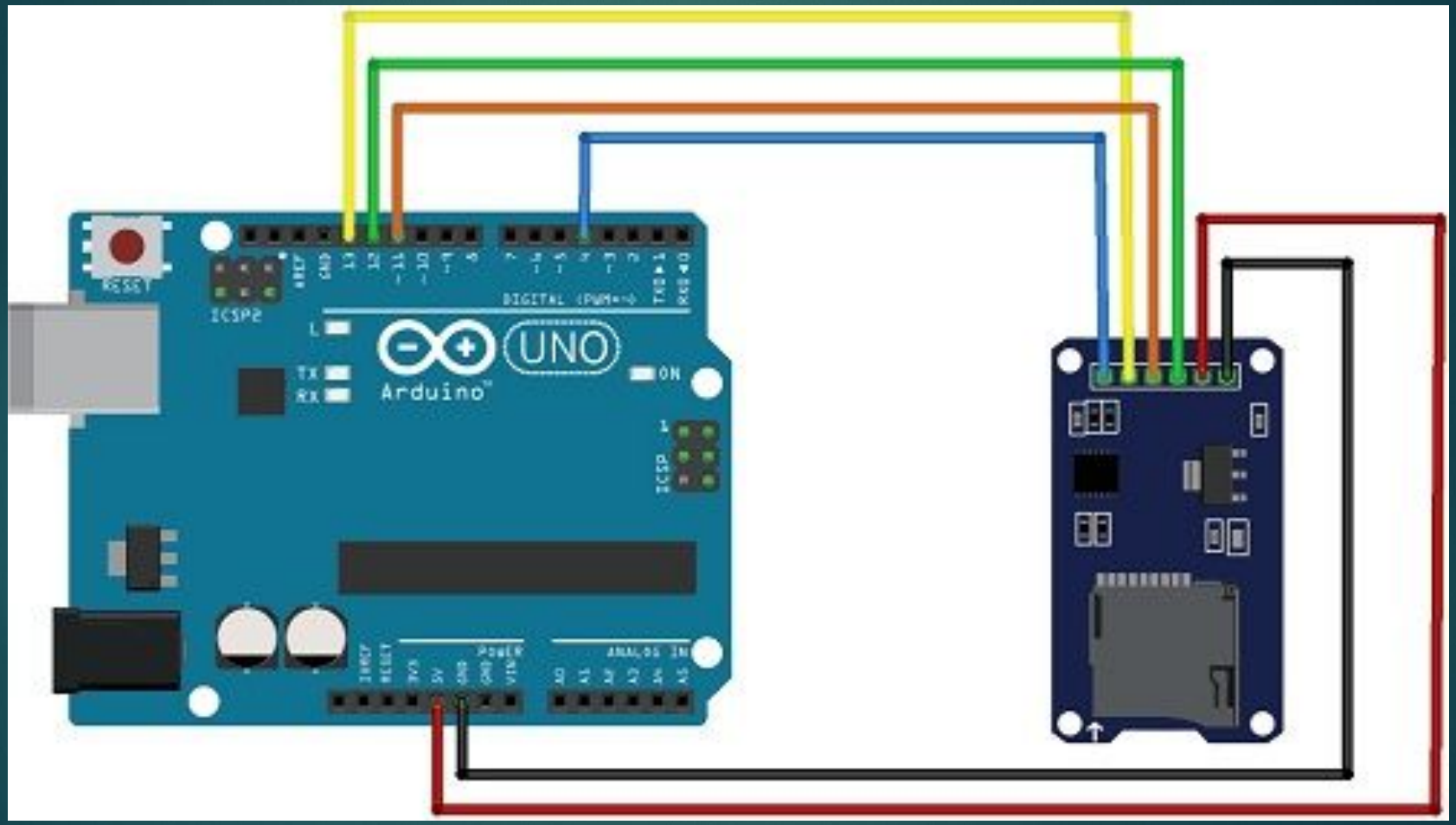
**SKU**: 11566

**Features:**

- Power supply: 4.5V – 5.5V, 3.3V voltage regulator circuit board
- Positioning holes: 4 M2 screws positioning hole diameter of 2.2mm
- Control Interface: GND, VCC, MISO, MOSI, SCK, CS
- Size: 45 x 28mm
- Net weight: 6g

Cost: ₹ 40.00 (Incl. GST)

# Circuit Diagram



# Specifications

| | |
|---|---|
| **Input Supply Voltage (VDC)** | 4.5 ~ 5.5 |
| **Control Interface** | GND, VCC, MISO, MOSI, SCK, CS |
| **Voltage Regulator** | 3.3V |
| **PCB Size ( L x W ) mm** | 40 x 24 |
| **Mounting Hole size** | M2 |
| **Weight (g):** | 4 |
| **Shipping Weight** | 0.005 kg |
| **Shipping Dimensions** | 9 × 5 × 2 cm |

Thank you!

https://hydrosense-app.vercel.app/