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.

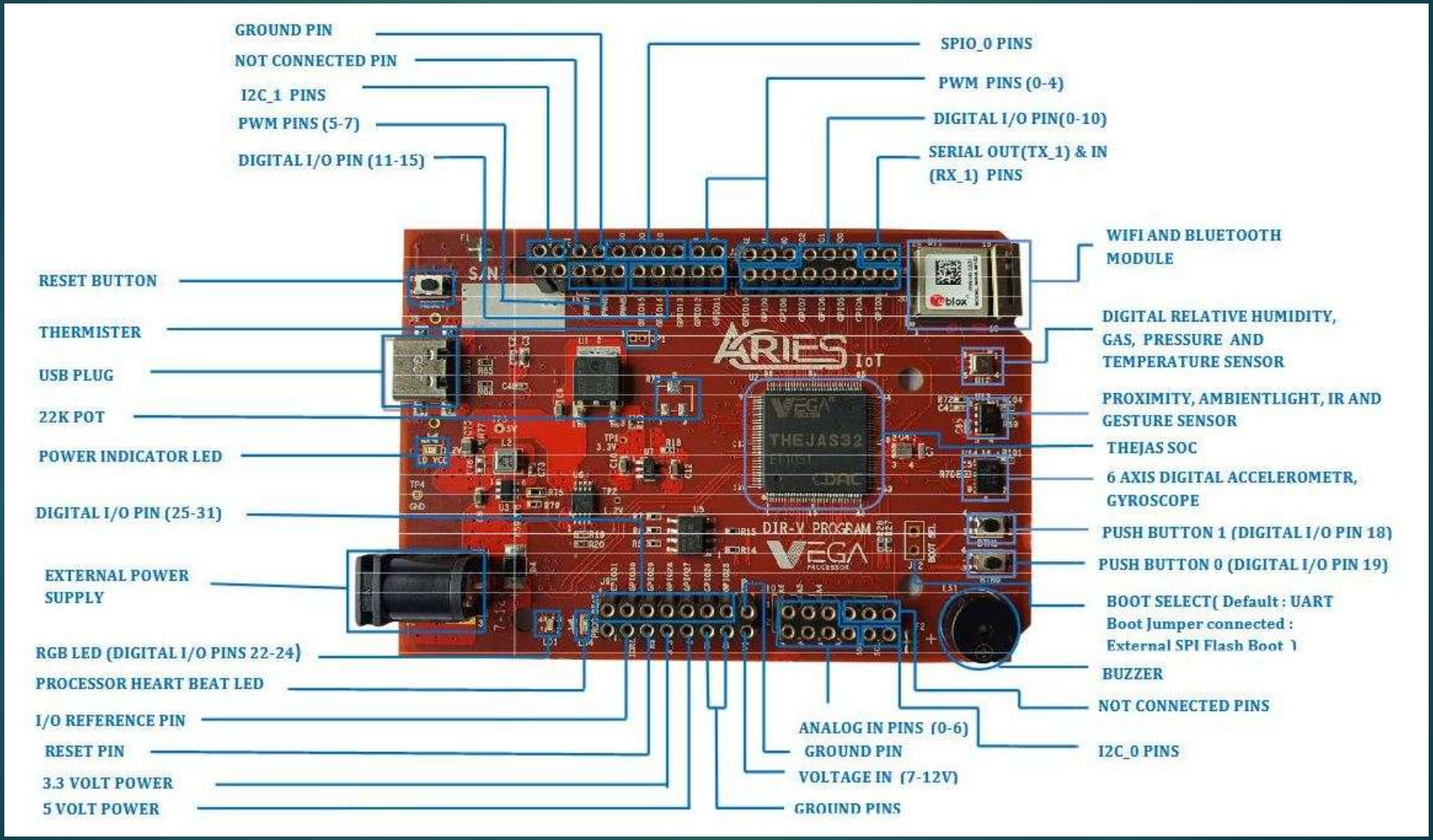
On Board Features

- 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

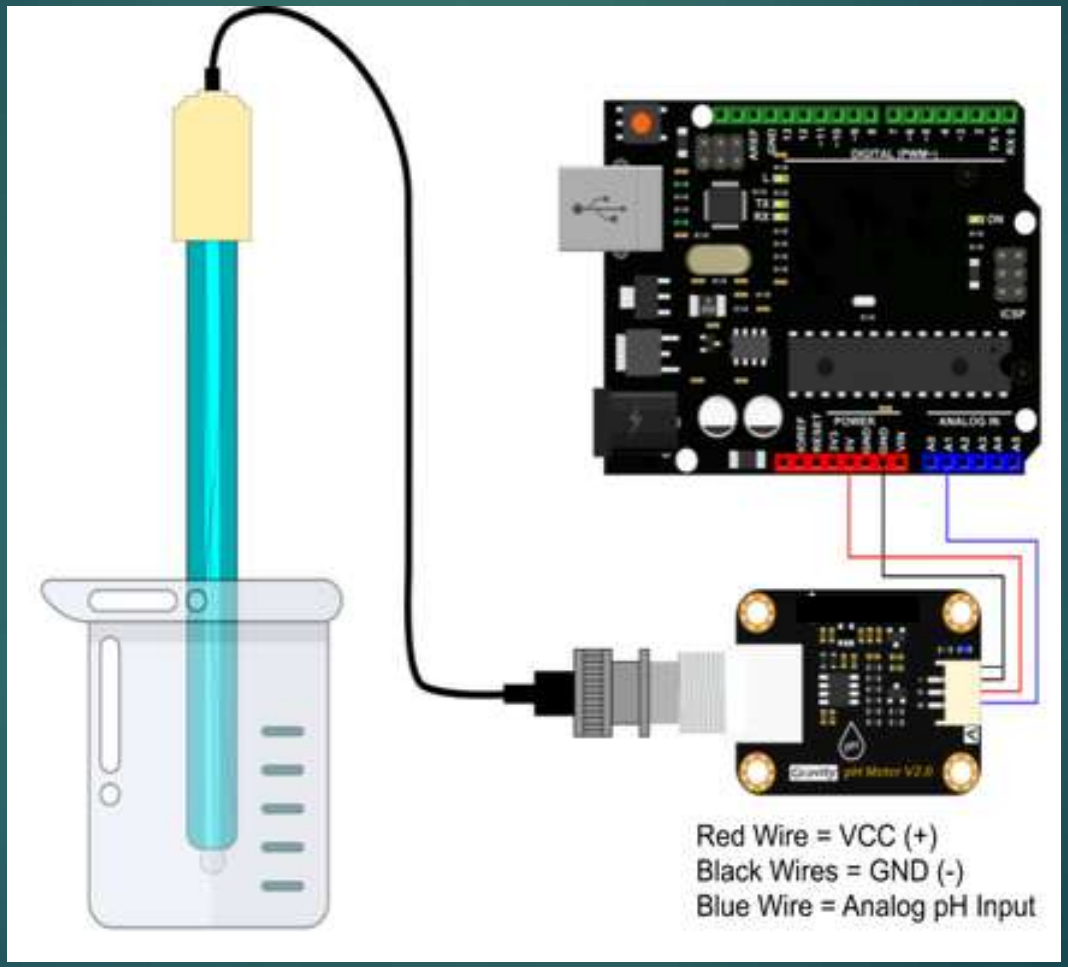
Cost: ₹ 1,099.00 (Incl. GST)

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

Turbudity 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)

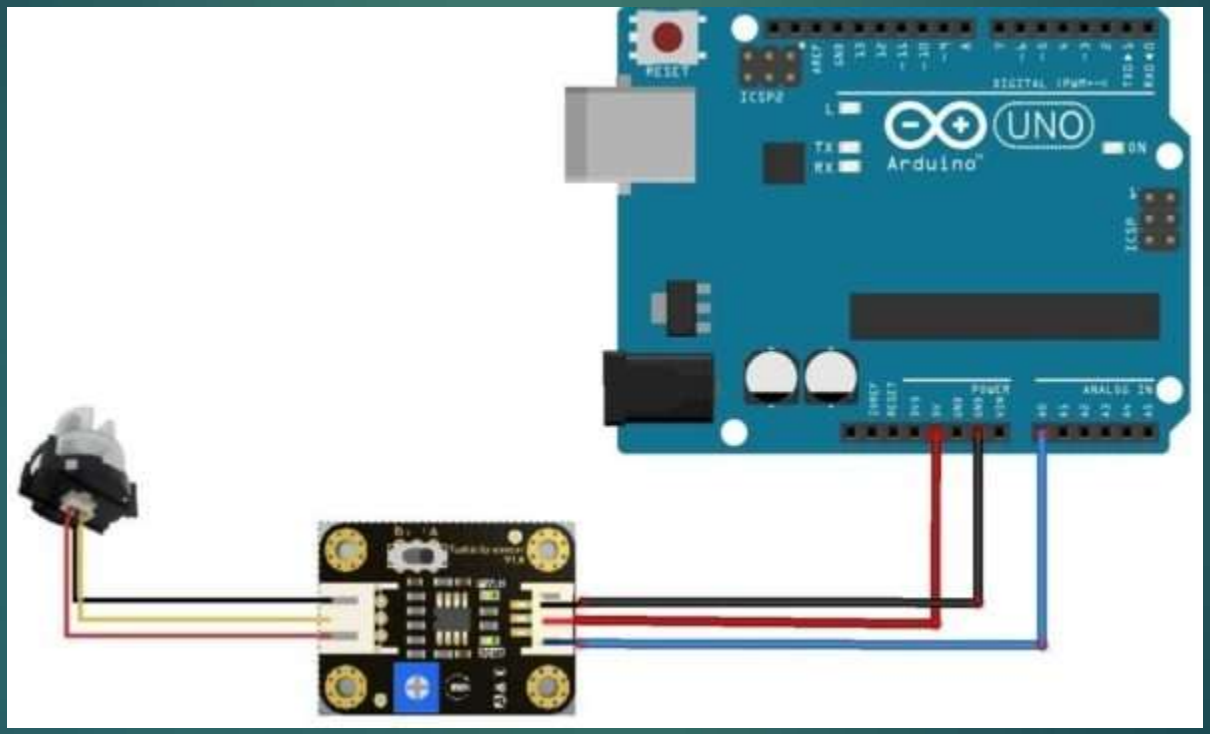
Description

- 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

Thank you!

https://hydrosense.pythonanywhere.com