

Reference

Checkout the embedded simplified from ERC

Source Code References

If you made it till here, you a true G. Also, this was rather useful, check this out... [ERC Embedded Simplified Official](#)

Main Application

File	Purpose
<code>src/sensor_board/main.c</code>	Main entry point and sensor loop

Sensor Drivers

Sensor	Header	Source
GPS	<code>components/sensor_board/gps/gps_sensor.h</code>	<code>gps_sensor.c</code>
IMU	<code>components/sensor_board/imu/imu_sensor.h</code>	<code>imu_sensor.c</code>
pH	<code>components/sensor_board/ph/ph_sensor.h</code>	<code>ph_sensor.c</code>
Load Cell	<code>components/sensor_board/load_cell/load_cell_sensor.h</code>	<code>load_cell_sensor.c</code>
Pressure	<code>components/sensor_board/pressure/pressure_sensor.h</code>	<code>pressure_sensor.c</code>
Utilities	<code>components/sensor_board/sensor_basics/sensor_basics.h</code>	<code>sensor_basics.c</code>

Protobuf Definitions

For detailed protobuf message format documentation, see: [Sensor Board Protobuf](#)

```
ERC-Protobufs/components/sensor_board/
```

```
├─ diagnostics.proto      - Board-level diagnostics and health status
```

└─ sensor.proto	- Aggregated sensor state message
└─ gps_sensor.proto	- GNSS positioning data
└─ imu_sensor.proto	- Inertial measurement (acceleration, gyro, mag)
└─ ph_sensor.proto	- Water quality pH measurement
└─ load_cell.proto	- Force measurement (gripper control)
└─ pressure_sensor.proto	- Pressure measurement (gripper control)

Build Configuration

File	Purpose
platformio.ini	Build configuration for all boards
.mxproject	STM32 CubeMX configuration
firmware.ioc	CubeMX IOC file (device config)

Test References

Test Suites

```
test/sensor_board/  
└─ test_gps_sensor/  
└─ test_imu_sensor/  
└─ test_load_sensor/  
└─ test_ph_sensor/  
└─ test_pressure_sensor/  
└─ test_sensor_basics/
```

Running Tests

```
// Build all tests  
pio test -e sensor_board  
  
// Run with verbose output  
pio test -e sensor_board -v  
  
// Build only (no run)
```

```
pio test -e sensor_board --no-run
```

Hardware References

Microcontroller

- **STM32H753ZI** - ARM Cortex-M7, 480 MHz, 1 MB Flash
- **Datasheet:** ST Microelectronics STM32H7 reference

Ethernet

- **LAN8742** - Ethernet PHY
- **Interface:** RMI (Reduced Media Independent Interface)
- **Link Speed:** 10/100 Mbps auto-negotiation

Sensors

Sensor	Model	Protocol	Note
GPS	GY-NEO6MV2 (NEO-6M)	UART 9600	Default NMEA config
IMU	Reference design TBD	I2C/SPI	Dual IMU planned
pH	DFRobot SEN0161	ADC Analog	40-sample averaging
Load Cell	Application specific	ADC	Dual cells (×2)
Pressure	Application specific	ADC/I2C	Dual sensors (×2)

Development Workflow

Building Firmware

```
// Build for sensor_board
pio run -e sensor_board

// Upload to board
pio run -e sensor_board --target upload

// Monitor serial output
```

```
pio device monitor -b 115200 -p COM4
```

Development Cycle

```
// 1. Edit source code
// 2. Build
pio run -e sensor_board

// 3. Upload
pio run -e sensor_board --target upload

// 4. Monitor
pio device monitor

// 5. Run tests
pio test -e sensor_board
```

Useful Commands

PlatformIO CLI

```
// List available boards
pio boards

// Show board info
pio boards nucleo_h753zi

// Clean build
pio run -e sensor_board --target clean

// Full rebuild
pio run -e sensor_board --target clean --target upload
```

Troubleshooting Guide

Serial Monitor No Output

1. Check USB connection
2. Verify COM port in platformio.ini
3. Check baud rate (115200)
4. Verify UART initialization succeeded

Sensor Shows IDLE

1. Check physical connection (UART/I2C/SPI)
2. Verify baud rate (for UART sensors)
3. Check pull-up resistors (for I2C)
4. Verify device address (for I2C/SPI)

Network Packets Not Received

1. Check IP address configuration
2. Verify MAC address filtering
3. Check firewall settings
4. Verify UDP port 7 not blocked

Low Heap Warning

1. Check for memory leaks in sensor drivers
2. Reduce buffer sizes
3. Verify UDP queue sizes
4. Check for recursive allocations

Quick Reference Checklist

Before Deployment

- All sensors connected and responding
- Network IP/MAC configured correctly
- Calibration parameters set for pH/load cells
- Serial monitor showing sensor data
- Heap usage monitored (>8KB free)
- UDP packets reaching destination

Protobuf encoding verified

Monitoring in Production

- Check sensor status codes
 - Monitor heap usage trend
 - Verify data ranges match expectations
 - Track error rates per sensor
 - Review network packet statistics
-

Hope you had fun☺

END OF DOCUMENTATION FOR SESOR BOARD☺

Last Updated: April 14, 2026

Revision #4

Created 2026-04-14 16:08:14 UTC by Shishir Nambiar

Updated 2026-04-21 07:13:27 UTC by Shishir Nambiar