

SMART LOGISTICS

Optimizing Supply Chain Operations

Introduction

Problem Statement

• Inadequate and unoptimized traditional methods lead to inefficient supply chain and increased carrier costs.
• Lack of data integration and information flow across supply chain results in higher maintenance costs and delays.
• Implementing smart supply chain operations is essential to improve efficiency, safety, and sustainability in transportation operations.

Solution

• Real-time sensor data provided.
• Fleet sensor used to monitor door status, door closed monitoring.
• Temperature monitored using smart sensor.
• Temperature of transport packages tracked via IoT sensors.

Target Audience

• Logistics Companies Fleet
• Transporters, Forwarder or cargo owners
• Third-Party Logistics (3PL)
• Providers, Government regulatory services
• Technology Providers and Solution Integrators, Smart Logistics Development

CONCLUSION

About MQTT

Reference (MQTT):
MQTT (Message Queue Telemetry Transport) is a lightweight, open, and royalty-free messaging protocol designed for use in constrained environments and over unreliable networks.
MQTT Architecture (Publish/Subscribe):
MQTT is a publish/subscribe messaging protocol. It consists of three main components: a Client, a Broker, and a Server. The Client publishes messages to the Broker, which then distributes them to the Server. The Server then distributes the messages to the Client.
Advantages (MQTT):
MQTT is a lightweight, open, and royalty-free messaging protocol. It is designed for use in constrained environments and over unreliable networks. It is a publish/subscribe messaging protocol. It consists of three main components: a Client, a Broker, and a Server. The Client publishes messages to the Broker, which then distributes them to the Server. The Server then distributes the messages to the Client.

MQTT Broker

The MQTT Broker is the central component of the MQTT architecture. It receives messages from the Client and distributes them to the Server. It also manages the subscriptions of the Client and the Server.

QoS Levels

MQTT supports three Quality of Service (QoS) levels: QoS 0 (At most once), QoS 1 (At least once), and QoS 2 (Exactly once).

Uses

MQTT is used in a wide range of applications, including: Industrial Automation, Smart Home, Smart City, Smart Agriculture, Smart Healthcare, Smart Transportation, Smart Energy, Smart Manufacturing, Smart Logistics, Smart Retail, Smart Healthcare, Smart Agriculture, Smart Healthcare, Smart Transportation, Smart Energy, Smart Manufacturing, Smart Logistics, Smart Retail.

Real Time Examples

MQTT is used in a wide range of applications, including: Industrial Automation, Smart Home, Smart City, Smart Agriculture, Smart Healthcare, Smart Transportation, Smart Energy, Smart Manufacturing, Smart Logistics, Smart Retail, Smart Healthcare, Smart Agriculture, Smart Healthcare, Smart Transportation, Smart Energy, Smart Manufacturing, Smart Logistics, Smart Retail.

Sensors

MQTT is used in a wide range of applications, including: Industrial Automation, Smart Home, Smart City, Smart Agriculture, Smart Healthcare, Smart Transportation, Smart Energy, Smart Manufacturing, Smart Logistics, Smart Retail, Smart Healthcare, Smart Agriculture, Smart Healthcare, Smart Transportation, Smart Energy, Smart Manufacturing, Smart Logistics, Smart Retail.

USP of our Project



Business Opportunities

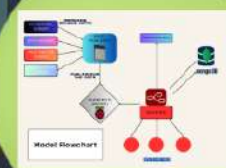
• IoT based development
• Data Analytics
• Predictive Maintenance
• Real Time Monitoring
• Location Tracking
• Temperature Monitoring
• Door Status Monitoring

Future Endeavors

• Predictive Maintenance
• Cargo Damage Monitoring
• Security Monitoring
• Environmental Monitoring
• Energy Harvesting

Node Red

Node-RED is a visual programming tool for the Internet of Things (IoT). It allows you to create workflows by connecting different components, such as sensors, actuators, and data stores. It is a powerful tool for creating IoT applications.



PRESENTING THE MODEL

Our Team

- 1) Viswesh (IIITDMK)
- 2) Gargaya (IIITDMK)
- 3) Jayavanth (IIITDMK)
- 4) Dhanush (IIITDMK)
- 5) Eswar (GPREC)
- 6) Sujana (IIITDMK)
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Introduction

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Problem Statement

- In transportation and logistics, traditional methods lead to inefficiencies, safety issues, and environmental impact.
- Lack of real-time monitoring and optimization tools causes suboptimal routes, higher maintenance costs, and cargo risks.
- Implementing smart truck technologies is essential to improve efficiency, safety, and sustainability in transportation operations.

Solution

- Real-time consignment data provided.
- Reed sensor used for container door status (open/closed) monitoring.
- Engine health monitored using sound sensor.
- Temperature of transported package checked with DHT11 sensor.

About MQTT

Publisher (ESP32):

ESP32: Generates and sends messages to the MQTT broker based on predefined conditions or events.

Broker and Gateway (Raspberry Pi):

Raspberry Pi: Acts as an intermediary server and gateway, facilitating communication between publishers and subscribers while managing external network connections.

Subscriber (Organizations):

Organizations: Subscribe to specific topics, receiving pertinent messages to monitor relevant information for their operations.

MQTT Broker

The broker gets messages from publishers and sends them to subscribers who are interested in specific topics. It makes sure messages are delivered correctly, following the chosen quality level.

QoS Levels

Level-0: At most once

Level-1: At least once

Level-2: Exactly once

Uses

- Internet of Things
- Home automation
- Industrial automation
- Telemetry and remote

Real-Time Examples

- Smart home systems
- Industrial IoT
- Weather monitoring
- Fleet management





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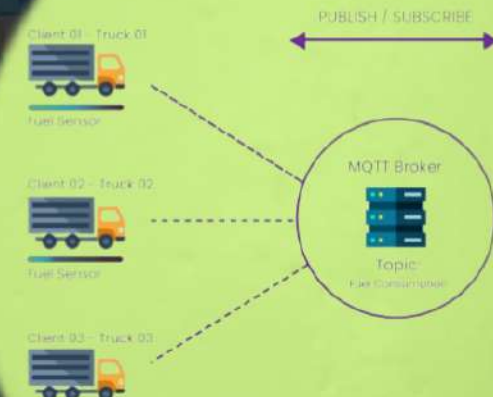
Level-2: Exactly once

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Real-Time Examples

- Smart home systems
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systems

monitoring
element





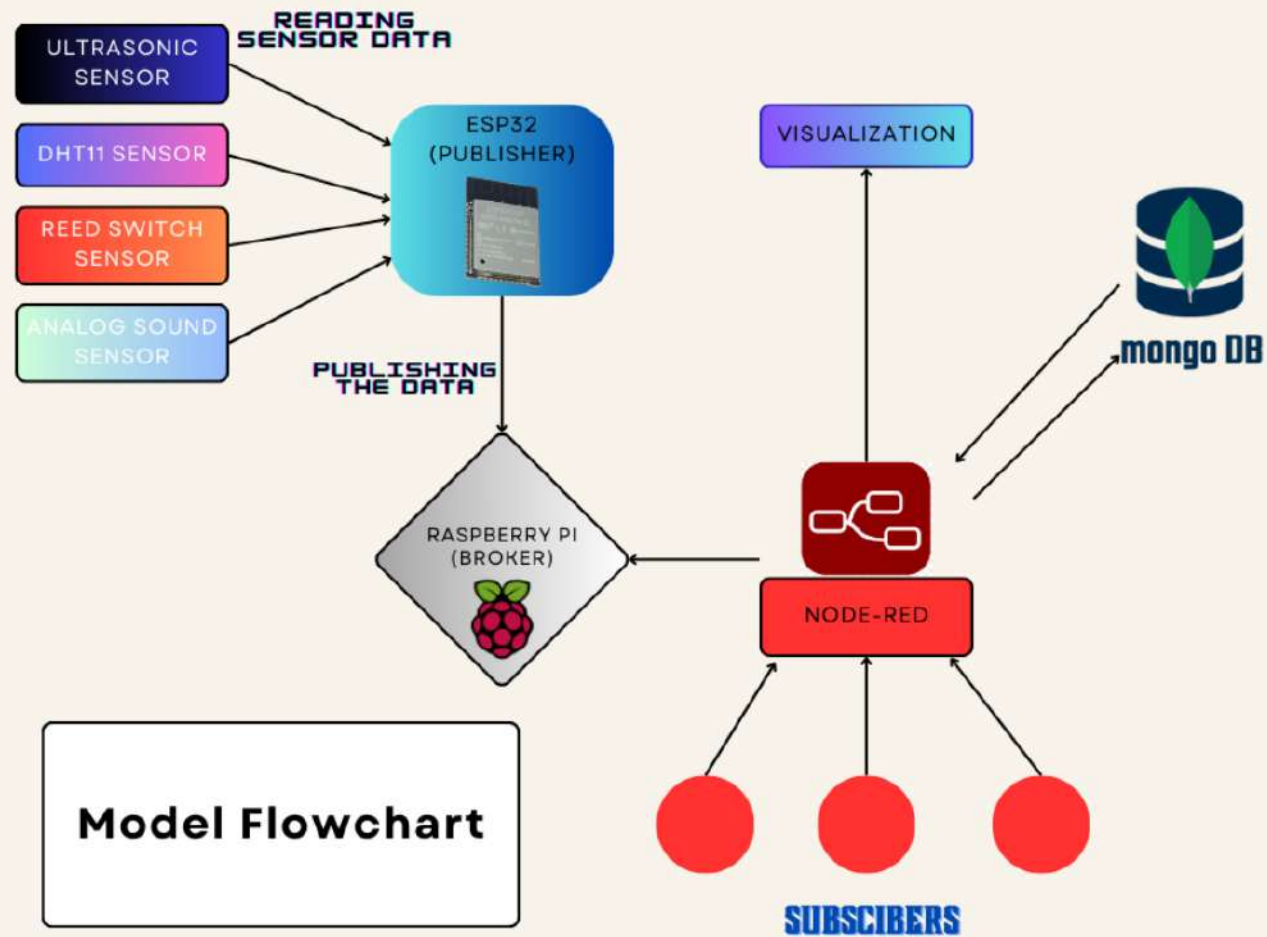
Sensors

- Ultrasonic Sensor: Measures distance by emitting ultrasonic waves and detecting their reflection.
- DHT11 Sensor: Measures temperature and humidity in the environment.
- Analog Sound Sensor: Detects sound intensity and converts it into electrical signals.
- Reed Switch Sensor: Detects the opening and closing of a magnetic field, commonly used for door or window sensing.

Raspberry Pi: Acts as an interface, facilitating communication between subscribers while managing the system.

Subscriber (Organization)

Organizations: Subscribe to receive pertinent messages to monitor and manage their operations.



Node-Red



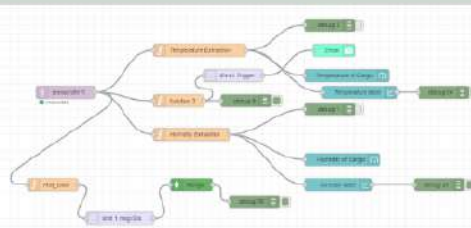
Node-RED:

- Node-RED is a user-friendly, open-source tool for visual programming.
- Developed by IBM Emerging Technology and the open-source community.
- Features a browser-based editor for creating complex flows by connecting different nodes.
- Ideal for IoT projects due to its versatility and extensive range of nodes.
- Simplifies development with a visual programming approach, enabling quick prototyping and testing.

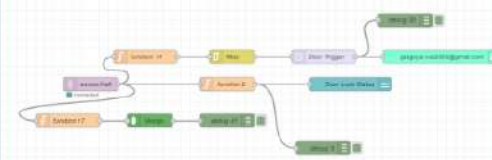
Node-RED as a Dashboard:

- Node-RED serves as a powerful dashboard for IoT projects.
- Enables visualization of real-time data from connected devices and sensors.
- Facilitates monitoring of system status and control of devices remotely.
- Offers a user-friendly interface for easy interaction and management of IoT systems.

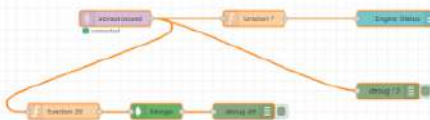
NODE-RED FLOW FOR DHT11 SENSOR



NODE-RED FLOW FOR REED SWITCH SENSOR



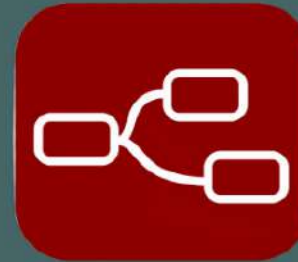
NODE-RED FLOW FOR ANALOG SOUND SENSOR



NODE-RED FLOW FOR ULTRASONIC SENSOR



Node-Red



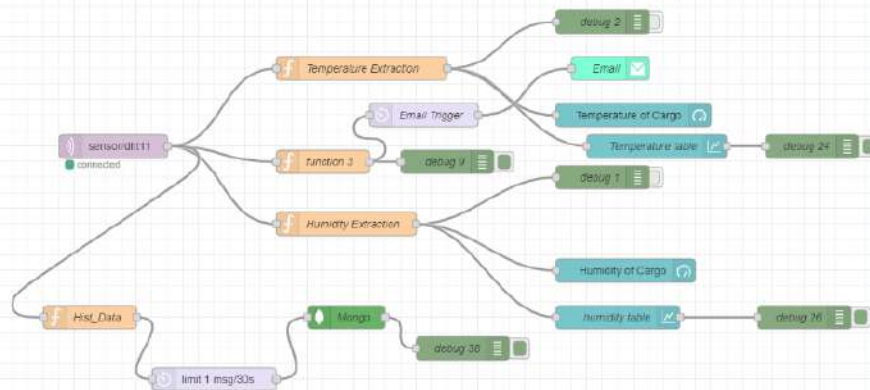
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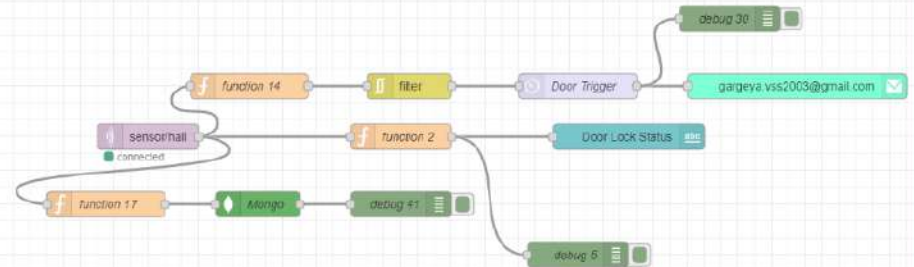
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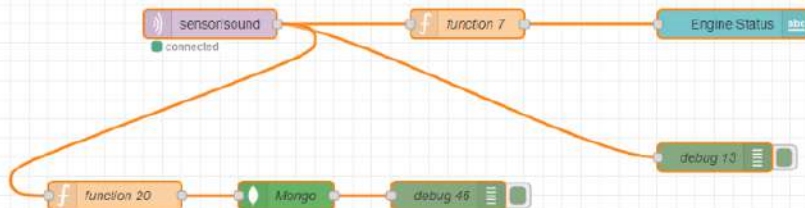
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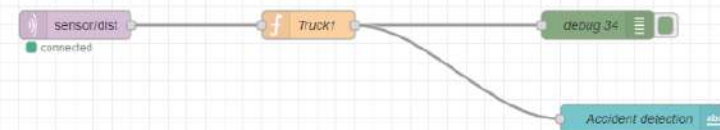
NODE-RED FLOW FOR REED SWITCH SENSOR



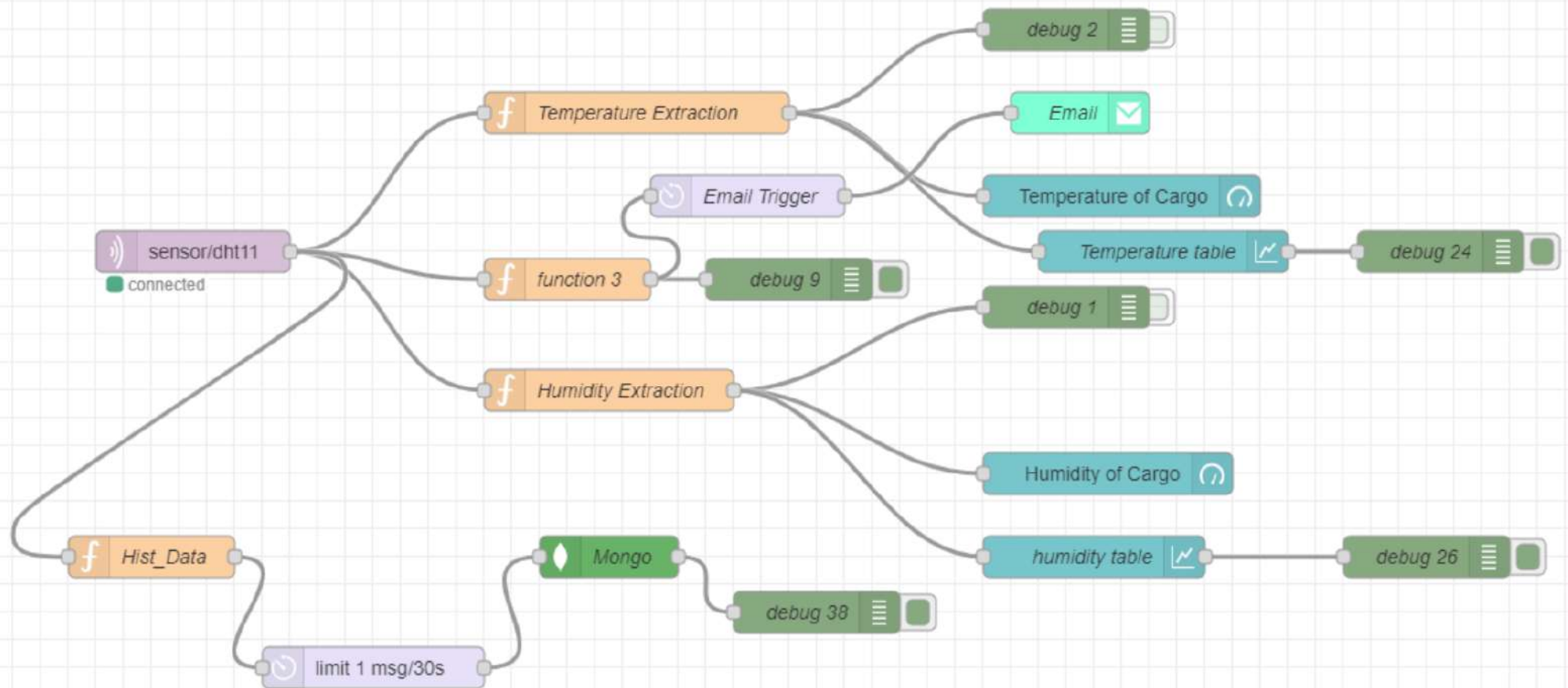
NODE-RED FLOW FOR ANALOG SOUND SENSOR



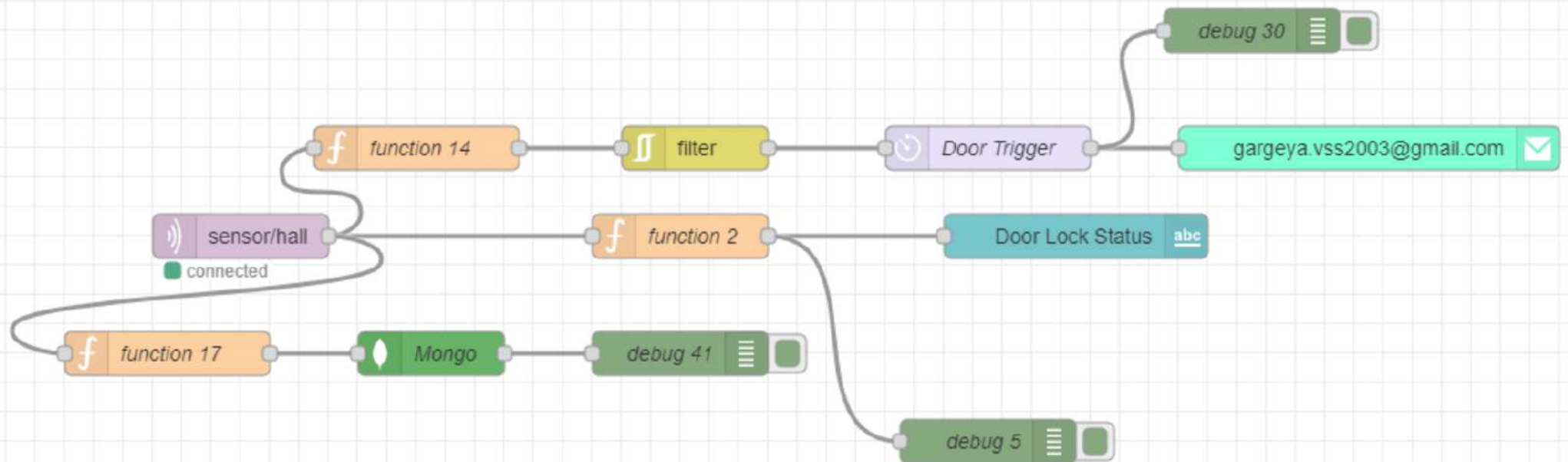
NODE-RED FLOW FOR ULTRASONIC SENSOR



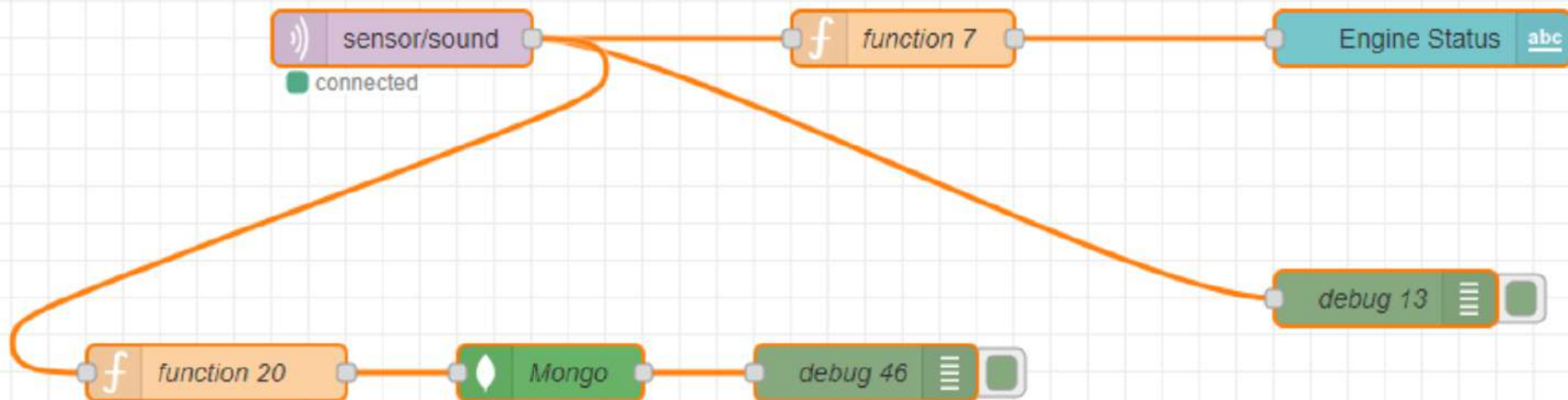
NODE-RED FLOW FOR DHT11 SENSOR



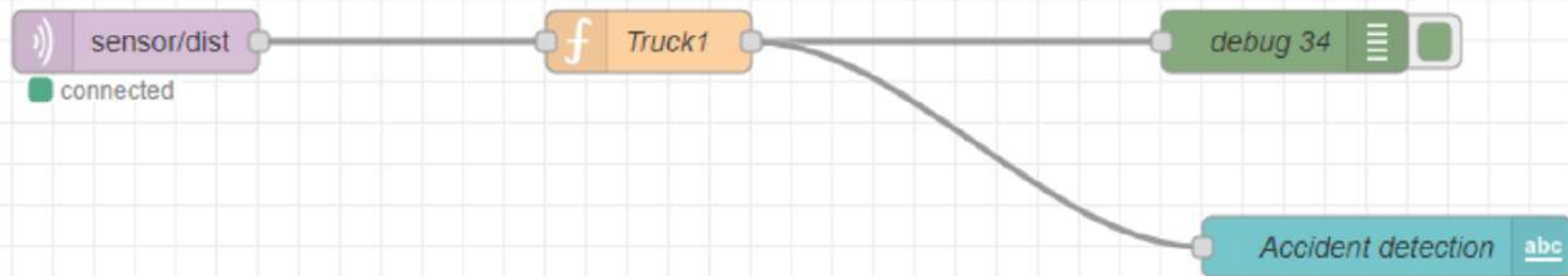
NODE-RED FLOW FOR REED SWITCH SENSOR



NODE-RED FLOW FOR ANALOG SOUND SENSOR



NODE-RED FLOW FOR ULTRASONIC SENSOR



An aerial photograph of a large container port. The image shows numerous rows of stacked shipping containers in various colors (red, blue, green, yellow, white) organized into neat stacks. Several large gantry cranes are visible, used for loading and unloading containers from ships. In the foreground, there are several semi-trucks parked or moving, some with containers labeled 'MAERSK' and 'EVERGREEN'. The overall scene depicts a busy logistics hub.

PRESENTING THE MODEL

Target Audience

- **Logistics Companies:** Food transporters, Environmental cargo carriers
- **Third-Party Logistics (3PL) Providers:** Outsourced logistics services
- **Technology Providers and Solution Integrators:** Smart logistics developers



USP of our Project

Real-time
Environmental
monitoring

Predictive
Maintenance
Capabilities

Enhanced
Security Features

Providing efficiency,
safety, and
transportation
operations

Business Opportunities

- IoT Device Development
- Data Analytics and Predictive Analytics and also Data selling
- Last-Mile Delivery Solutions

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S P A R K

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- Implementing smart truck technologies is essential to improve efficiency, safety, and sustainability in transportation operations.

Solution

- Real-time congestion data provided
- Fleet sensor used for container door status (open/closed) monitoring
- Engine health monitored using sound sensor
- Temperature of transportation package checked with DHT22 sensor

Target Audience

- Logistics Companies: Road transporters, Environmental cargo carriers
- Third-Party Logistics (3PL) Providers: Outsourced logistics services
- Technology Providers and Solution Integrators: Smart logistics developers

About MQTT

Definition (MQTT)

MQTT is a lightweight, open, and standard protocol for the MQTT broker based on a publish-subscribe model.

Broker and Gateway (Raspberry Pi)

Raspberry Pi Acts as an intermediary server and gateway facilitating communication between publishers and subscribers while managing external network connections.

Subscriber Organizations

Organizations subscribe to specific topics, receiving pertinent messages to monitor freight movements for their operations.

Sensors

- Ultrasonic Sensor: Measures distance by emitting ultrasonic waves and detecting their reflection.
- DHT22 Sensor: Measures temperature and humidity in the environment.
- Acoustic Sensor: Detects engine noise and vibration in the vehicle's engine.
- Photo Eye Sensor: Detects the opening and closing of a magnetic field, commonly used for door or window sensing.

MQTT Broker

The Broker gets messages from publishers and sends them to subscribers who are interested in specific topics. It makes sure messages are delivered in order, following the chosen quality of service.

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Level 0: At most once
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- Internet of Things
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- Industrial automation
- Telemetry and remote monitoring

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- Smart home systems
- Industrial IoT
- Weather monitoring
- Fleet management

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Node-Red



Node-Red is a visual programming tool for the Internet of Things (IoT). It allows you to create workflows and integrate various devices and services without writing code. It is a low-code/no-code platform that makes it easy to build and deploy IoT applications.

