**Controller Area Network (CAN) Protocol**

The Controller Area Network (CAN) protocol is used for robust communication between

the STM32F407VGt6 microcontroller and external devices, such as sensors and other CAN

nodes. CAN communication offers a reliable and efficient method for data exchange in

automotive and industrial applications, ensuring high data integrity and error detection.

• The STM32F407VGt6 microcontroller features built-in CAN peripherals for

seamless integration with CAN networks.

• CAN interfaces are configured with specific baud rates and communication

settings to ensure compatibility and reliable data transfer between devices.

• CAN communication operates in a multi-master, multi-slave configuration,

allowing multiple nodes to communicate over the same bus with built-in error

detection and handling mechanisms.

• Data transmission occurs synchronously, with the microcontroller and CAN nodes

exchanging messages framed with identifiers, data bytes, and control information.

• The microcontroller transmits and receives data packets via the CAN TX and RX

pins, with the CAN transceiver handling the physical layer of communication.

• CAN communication employs a standardized message format, including

identifiers, data length codes, and data payloads, to ensure accurate data exchange

between nodes.

• The baud rate determines the speed of data transmission on the CAN bus and must

be set identically on all nodes to ensure proper communication.

• Baud rate selection depends on the network requirements and the maximum speed

supported by the CAN peripherals and transceivers.

**In the project, CAN1 and CAN2 are utilized on the STM32F407VGt6 microcontroller for different communication purposes:**

**CAN1 Configuration (Sensor Data):**

**•** CAN1 is configured with a baud rate of 500 kbps for communication with various

sensors integrated into the system.

• The microcontroller sends sensor data packets via CAN1, with data formatted

according to the CAN protocol specifications.

• The CAN transceiver converts the data into CAN-compatible signals, allowing it

to be transmitted over the CAN bus to other devices.

**CAN2 Configuration (External Devices):**

• CAN2 is configured with a baud rate of 1 Mbps for high-speed communication

with external devices or other CAN nodes.

• The microcontroller transmits control and status information through CAN2,

interfacing with devices that support CAN communication.

• The data sent via CAN2 is processed by external CAN nodes or devices connected

to the same bus, ensuring timely and reliable data exchange.

**Integration with ESP32 and CAN:**

The STM32F407VGt6 microcontroller uses CAN communication to interface with the

ESP32 module for further processing or wireless transmission:

• The CAN interface on the STM32 is configured to transmit sensor data packets to

the ESP32 module.

• The CAN RX pin of the STM32 is connected to the CAN TX pin of the ESP32

module, establishing a serial communication link.

• Upon receiving data, the ESP32 processes the CAN messages for further analysis,

storage, or transmission via its wireless capabilities.