

MEMO: Sensors and Protocols

Date: 2/15/15

WHO: Sam Cesario

Sensors and Protocols already on the system and what we plan to use

The VSCADA team has decided on protocol's to communicate with the rest of the team. VSCADA communication to the DYNO team's motor controller and to the sensors from the GLV team will be communicated through the CAN bus protocol. The VSCADA team will communicate with the TSV teams packman systems via the ethernet protocol.

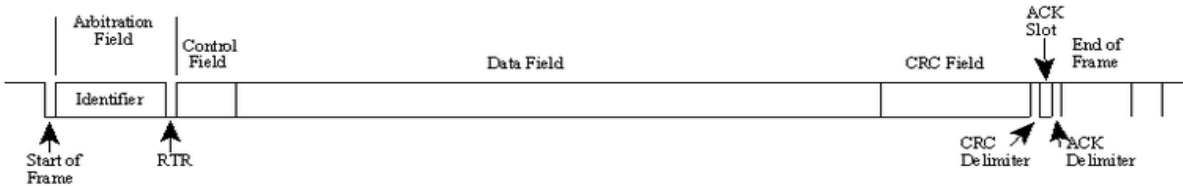
Introduction the the CAN bus protocol

<http://www.kvaser.com/about-can/the-can-protocol/>

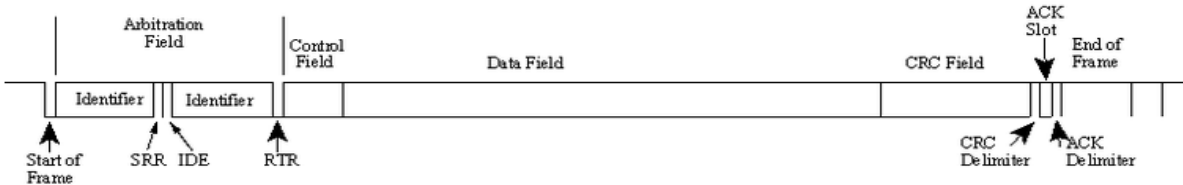
The CAN bus protocol is defined by the 11898-1 standard. It is a physical layer transmitted by a differential on a twisted pair of wire. The messages are at most eight data bytes and implement a checksum. The address of the message only define it's priority on the bus. The protocol also implements an elaborate error handling scheme that results in retransmissions, and there are ways to isolate faults. The CAN bus is a broadcast bus, all nodes can hear transmission.

Types of CAN bus messages

1. Data Frame
 - a. Contents
 - i. Arbitration field - determines the priority of the message when two or more nodes are contending for the bus
 - ii. Data field - Contains zero to eight bytes of data
 - iii. CRC field - 15 bit checksum
 - iv. ACK Slot - if a CAN controller has been able to receiver the message sends an ACK at the end of the message back to the transmitter. Transmitter check for the ACK and retransmission if no ACK was detected.



A CAN 2.0A ("standard CAN") Data Frame.



A CAN 2.0B ("extended CAN") Data Frame.

2. Remote Frame
 - a. Like Data BUT RTR in Arbitration Field is recessive, and NO data
 - b. Summary: "Hello everyone, can somebody please produce the data labeled X?"
 - c. Resquest-response traffic management
 - d. *Not used alot in practice
3. Error Frame
 - a. Violated framming rules of a CAN message.
 - b. Is transmitted when a node detects a fault then will try to retransmit
4. Overload Frame
 - a. Not use very often

Message Priority

The CAN protocol implements a system called arbitration which is define as an agreement on what sensor's packet should occupy the bus. When the bus is idle a sensor can start transmitting. When two or more sensors begin to send packets at the same time, the sensor with the higher priority will transmit and the lower priority sensor's packet will be stopped until the bus is idle again.

Products

<http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en010405#documentation>

Higher Layer

The VSCADA team will implement a higher layer as a way to manage CAN communication by establishing flow control and transportation of data larger than can fit in the 8 byte message.

ex. CanKingdom