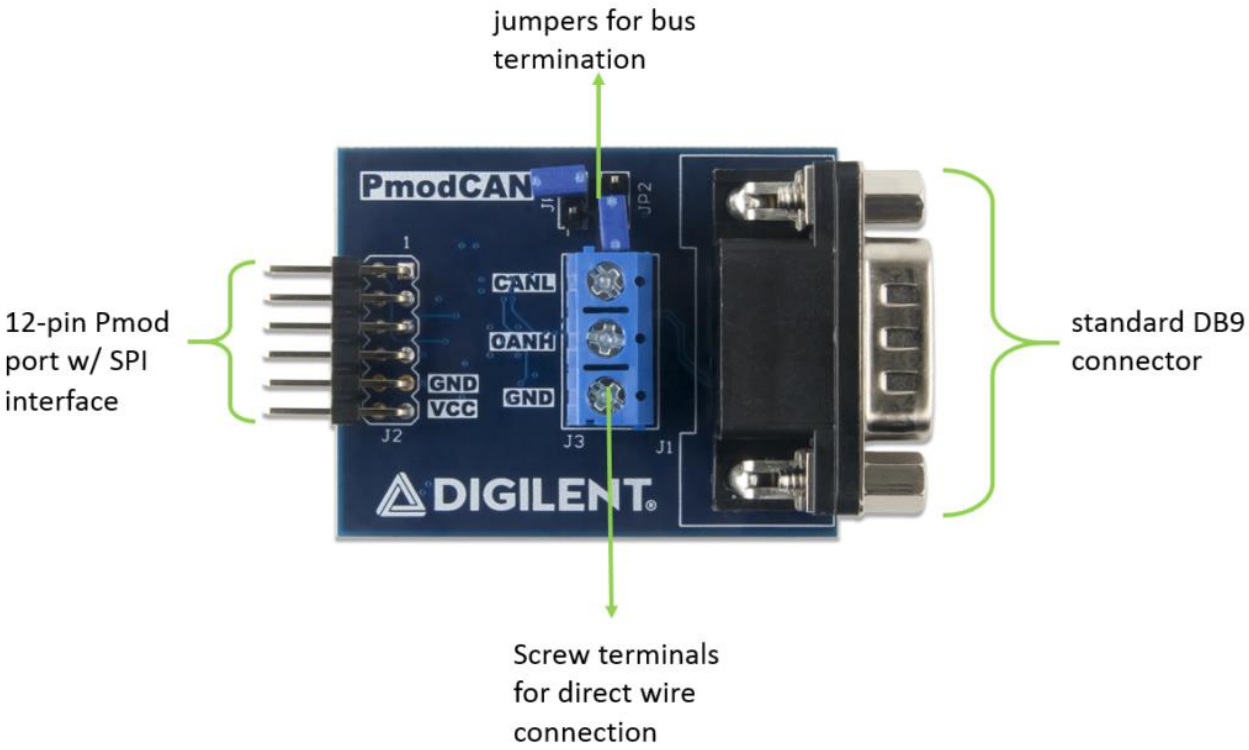
The Digilent Pmod CAN is a CAN 2.0B controller with an integrated transceiver. The embedded Microchip MCP25625 chip connects directly to the physical CAN bus and meets automotive requirements for high-speed (1 Mb/s), low quiescent current, electromagnetic compatibility, and electrostatic discharge. The Pmod CAN enables CAN communication between a variety of external devices and microcontroller and field programmable gate array (FPGA) development boards.

How does it work?

CAN is a peer-to-peer networking protocol. This means there is no single master controlling the flow of data between nodes on the network, such as there is with something like the SPI protocol. Instead, any node can write a frame to the network anytime the bus is free. All nodes on the network will receive the transmitted frame and decide whether to accept it based on what is called an arbitration ID. If multiple nodes try to transmit frames simultaneously, the node with the highest priority (lowest arbitration ID) will get bus access.



As stated above, the Pmod CAN communicates with the host board via the SPI protocol. By driving and keeping the Chip Select line at a logic level low, users may communicate back and forth with the Pmod, depending on whether or not both sets of data lines are enabled. The embedded chip on the Pmod operates in SPI Mode 0 or 3, with data captured on the rising edge of the clock, data transferred on the falling edge of the clock, and a minimum clock cycle time of 100 nanoseconds.

Nine SPI instructions are available to read the status of the receiver, load a transmit buffer, modify bits in a register and more.

Applications

As mentioned in the intro of this post, CAN is most well-known for its use in the automotive industry, specifically for in-vehicle communication. However, it has also been adopted by other industries due to its benefits as a low-cost, lightweight, dependable and durable wired networking standard. This includes use in railway applications, aircraft, aerospace, medical, as well as elevator and escalator applications to name a handful.

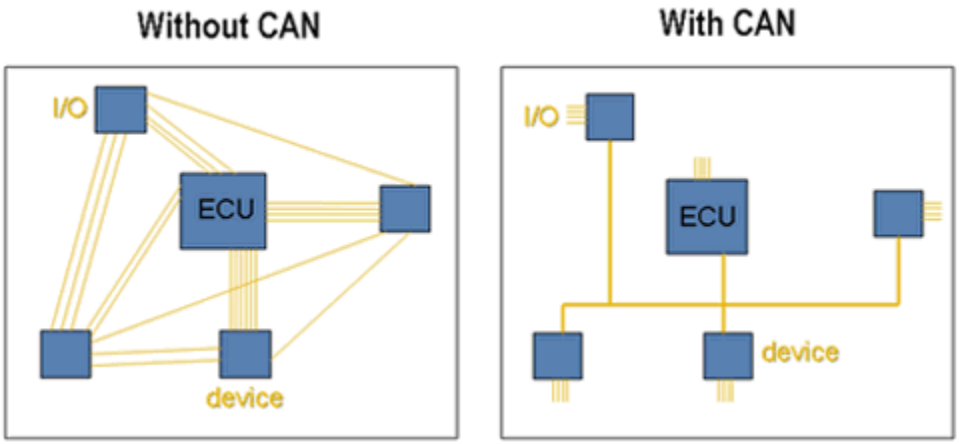


Image from a National Instruments whitepaper on the CAN protocol, showing how a typical CAN network is set up and illustrating one of the benefits – fewer wires, resulting in a cheaper and more lightweight wired networking system.

Getting Started

With libraries and example codes, users can easily interface Pmod CAN with Digilent Basys Mx3, PIC 32 microcontroller board and a range of Digilent FPGA boards featuring Xilinx 7 series FPGA device as well as Arduino boards

If you are an MCU user, we've written some libraries and example code to illustrate how to start communicating using the CAN protocol. The example code was written in the Arduino IDE and should work smoothly with the Digilent core for Arduino. For download instructions, see our tutorial on how to get started with the Digilent core.

If using the Pmod CAN with a Digilent FPGA board, see our wiki page titled Using Pmod IPs for instructions on how to use our drag and drop Pmod CAN IP Core with MicroBlaze designs.