Electronics
Single wire communication

Terry Sturtevant

Wilfrid Laurier University

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Single wire communication

Parallel communication uses 4 or 8 bits plus control signals. SPI communication uses 3 bits plus chip select signals for each device. RS-232 (UART) communication requires 2 signals, and is normally only between two devices. I2C communication requires two signals and can involve several devices.

Why does the number of signals matter?

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Single wire communication

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Single wire communication

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Why does the number of signals matter?
- Single wire means all communication is *asynchronous*
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• Bidirectional communication on a single line means low data rates
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- Bidirectional communication on a single line means low data rates
- Bidirectional communication on a single line requires a pull-up resistor, like $I^2C$
SD-12

Data is transferred in 1200 baud, RS-232 format, 7 bit, even parity.

Master-slave configuration:
One master can communicate with up to 62 slaves.

Data, ground, and 12V lines used for environmental monitoring.

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- Data, ground, and 12V lines
- Used for environmental monitoring
From: SD-12 support group

**Single wire communication**

**SD-12**

DHT11, 22

Dallas 1-wire

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**DATA RECORDER**

- break (at least 12 milliseconds)

**SENSOR**

- command
- response

- marking at least 8.33 milliseconds

- marking 8.33 milliseconds

**SDI-12 Data Line**

- sensor must respond within 15 milliseconds
- *maximum time

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*The maximum time for a response to a DB command, to get a high volume binary data packet, is 10.1 seconds.*

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<table>
<thead>
<tr>
<th>Time (ms)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>380</td>
<td>most commands</td>
</tr>
<tr>
<td>780</td>
<td>for a D command after a concurrent measurement</td>
</tr>
<tr>
<td>810</td>
<td>for a D command after a concurrent measurement, with CRC</td>
</tr>
</tbody>
</table>
From: Sentek

SD-12
DHT11,22

Proprietary format
Communication between one microprocessor and one device
Data, ground, and VDD (3.5 - 5.5V) lines
User for temperature and humidity sensors
40 bit data; 5 bytes: humidity H,L, temperature H,L, CRC
Minimum interval of 2 seconds between readings
DHT11,22

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DHT11,22

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From Aosong datasheet

- **DHT11**
From Aosong datasheet

- AM2302
Dallas 1-wire
Dallas 1-wire

- Master-slave configuration
Dallas 1-wire

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  - Each device has a 64 bit serial number
Dallas 1-wire

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Dallas 1-wire

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Dallas 1-wire

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- Data and ground lines *only*
  - Each device has a 800pF capacitor and gets power from the data line
Dallas 1-wire

- Master-slave configuration
  Each device has a 64 bit serial number
  Devices are enumerated
- Data and ground lines *only*
  Each device has a 800pF capacitor and gets power from the data line
- Lots of devices
From Wikipedia

1 Wire reset, write and read example with DS2432

1-wire

- Reset procedure
- Send byte x'11' (b"00110011")
- Read reset (first byte: family code x'33')