

Other DAQ system

Alpha Omega System Server
etc.

CNEL DAQ system

Vhand 3.0

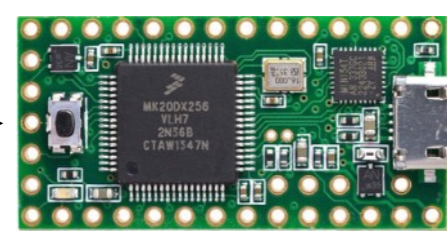


Webcam



Video file

Teensy



Accelerometer
Dynamometer
etc.

Depth etc.
Sockets (TCP/UDP)

Finger positions
Video frame #
10 A/D
USB (COM)

Screen capture etc.

CNEL
Client

CNEL
Server

100 Hz

CNEL
Memory
Buffer

Real-time data
process & monitor

Behavioral data

Sockets (TCP/UDP)

Simulink command

Neural data

Simulink
client

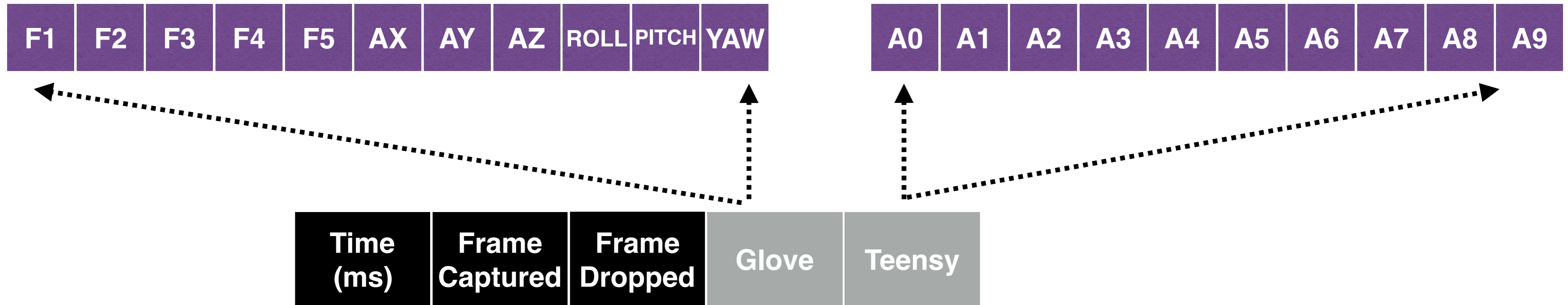
Simulink
realtime
process

Data
storage

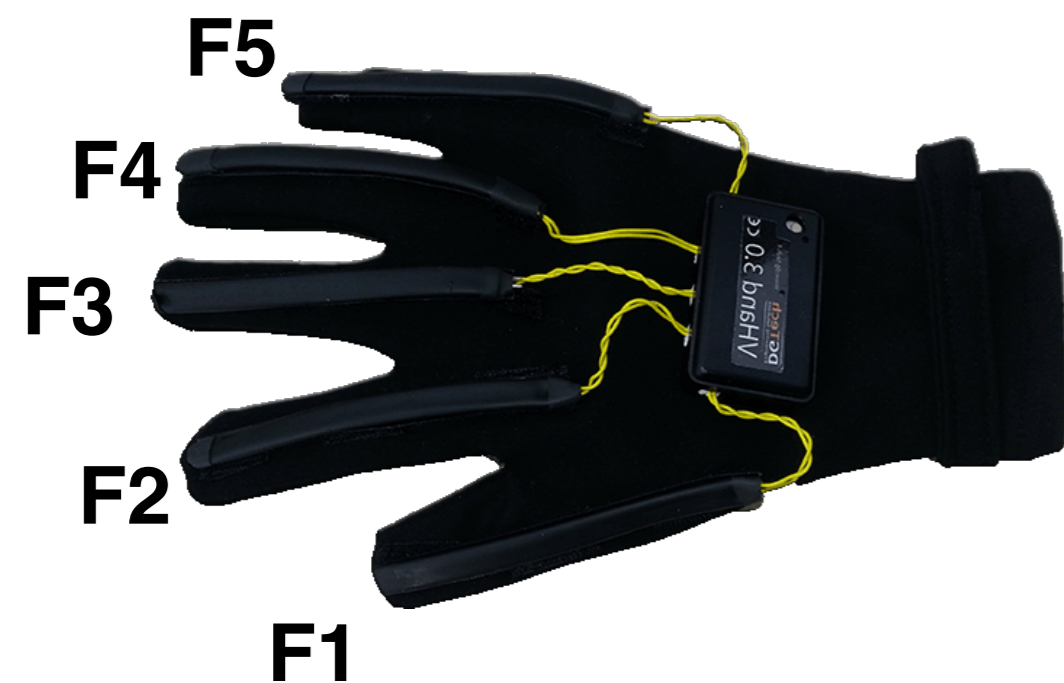
UDP Package Protocol

Length: min 3, max 24

On demand **Reserved**



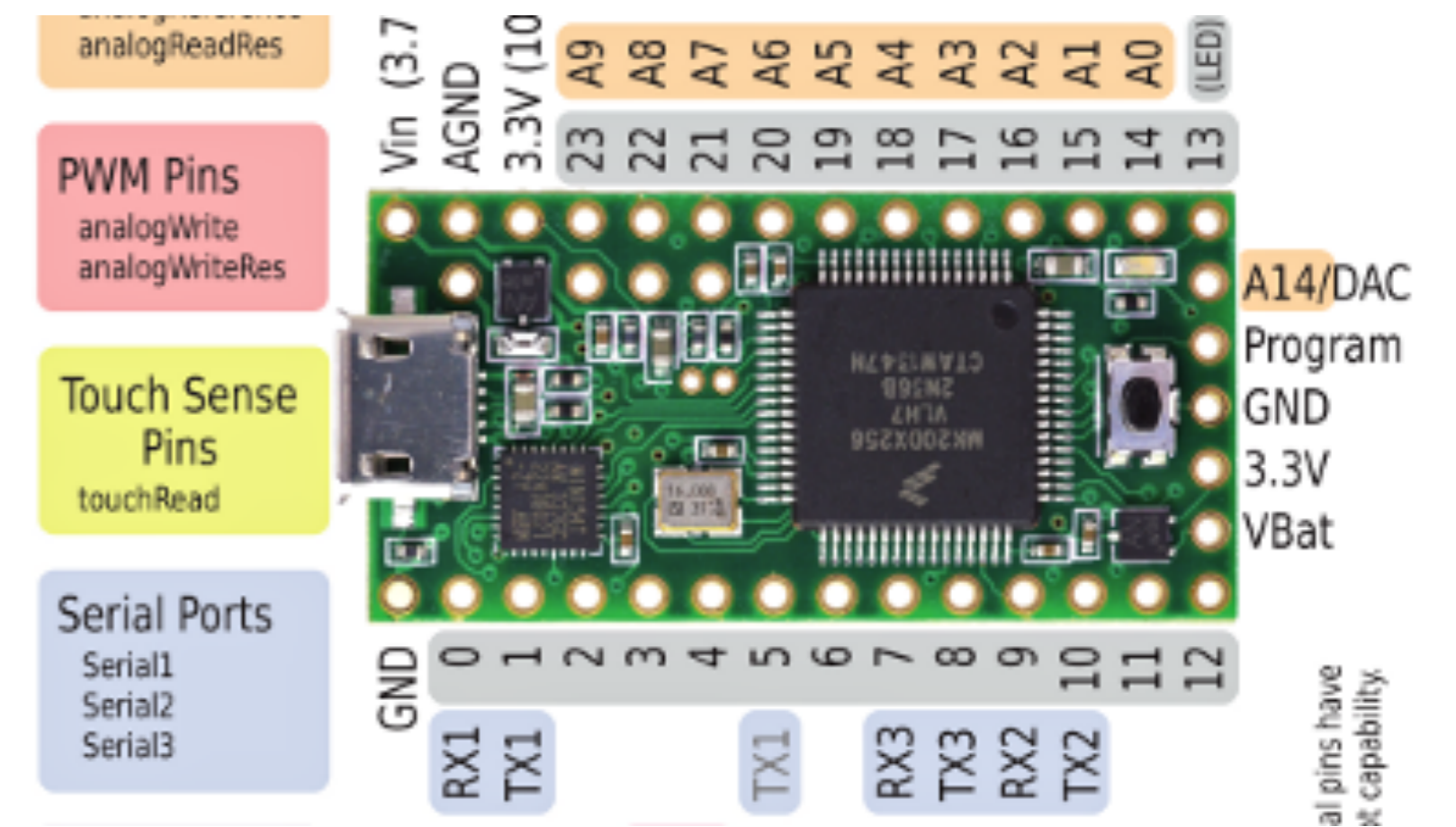
Vhand 2.0/3.0



Webcam



Teensy 3.2



Teensy COM Data Transmission Protocol

A0 , **A1** , **A2** , **A3** , **A5** , **A4** , **A3** , **A2** , **A1** , **A0** !

10 floating numbers separated by comma and terminated by exclamation

- **Explicitly supply 10 numbers in Teensy**
- **Fill with zero or any other number if does not apply**
- **Each number has to be in 4 characters including period. Arduino default keeps 2 decimals when prints the floating point:**
 - **Valid: 1000, 8.32, 9.90, 9999**
 - **Invalid: 10000, 10.00, 100.31**

Default Parameters

Overwrite the [annie] and [cnel] in “C:\Windows\win.ini” with provided win.ini for first-time installation

C:\Windows\win.ini	Description	Default
COM_VHAND_30_LEFT	COM port number for Vhand 3.0 left glove	N/A
COM_VHAND_30_RIGHT	COM port number for Vhand 3.0 right glove	N/A
COM_TEENSY_USB	COM port number for teensy usb connection	N/A
COM_TEENSY_BLUETOOTH	COM port number for teensy bluetooth connection	N/A
HOST_IP_REMOTE	IP address of remote socket receiver (simulink)	127.0.0.1
HOST_PORT_REMOTE	port number of remote socket receiver	27002
HOST_PORT_LOCAL	port number of local server for remote control	27100

Default Parameters

Overwrite the [annie] and [cnel] in “C:\Windows\win.ini” with provided win.ini for first-time installation

C:\Windows\win.ini	Description	Default
COM_BUFFER_PACKETS	Buffer size in packets for bluetooth device	1 (no buffer)
SOCKET_STATUS	status of socket <ul style="list-style-type: none">• 100: Disconnect• 101: UDP• 102: TCP/IP	100 (Disconnect)
TIMER_PERIOD_MS	timer resolution (ms) of socket's sendto()	10
OUTPUT_TO_TEXT	output sensor data to text file ?	0
OUTPUT_FILE_NAME	output filename if OUTPUT_TO_TEXT is 1	test.txt

Dependent dll on target machine

Two custom dlls are needed for the behavioral program to run **VHand30_SDK.dll** and **VHandManager.dll**. They are included in the package of your download. Additionally, install **VS 2015 runtime libraries** (link available on the website also).

To add dll to system path in Windows 7:

1. From the desktop, right-click **My Computer** and click **Properties**.
2. Click into **Advanced system settings**
3. In the **System Properties window**, click on the **Advanced** tab
4. In the Advanced section, click the **Environment Variables** button.
5. Finally, in the Environment Variables window (as shown below), find the **Path** variable in the Systems Variable section and click the **Edit** button. Add [path-to-dll] at the end.

Each different directory is separated with a **semicolon** as shown below.

C:\Program Files; YOUR-PATH-TO-THE-DLLs

Remote Control using UDP (Matlab)

```
%Initialization
sender = udp('127.0.0.1', 27100); % 27100 is the default HOST_PORT_LOCAL
fopen(sender);
%%
%Update
fwrite(sender, 'Screenshot: FileName=C:/Users/Public/OR_depth'); % capture screenshot
% from desktop, filename will be appended by datetime.bmp
% fwrite(sender, 'Teensy: 1,100,4,3,100,4,3,4,0,0,0,0'); % teensy command
% fwrite(sender, 'Video: Open Window'); % open video capturing window
% fwrite(sender, 'Video: Close Window'); % close video capturing window
% fwrite(sender, 'Video: FileName=C:/or.avi'); % set capture file name
% fwrite(sender, 'Video: Start Capture'); % start capturing the video
% fwrite(sender, 'Video: Stop Capture'); % stop capturing the video
% fwrite(sender, 'Video: Preview'); % preview the video
%%
%Close
fclose(sender);
```

Remote Control using UDP (pnet)

```
%% using pnet (faster!)
%Initialization
sender=pnet('udpsocket', 27100);

%%
%Update
pnet(sender, 'write', 'Video: Start Capture', 'native'); % or other commands like before
pnet(sender, 'writepacket', '127.0.0.1', 27100);

%%
%Close
pnet(sender, 'close');
```