Development of a communications protocol between X-Plane and external microcontrollers.

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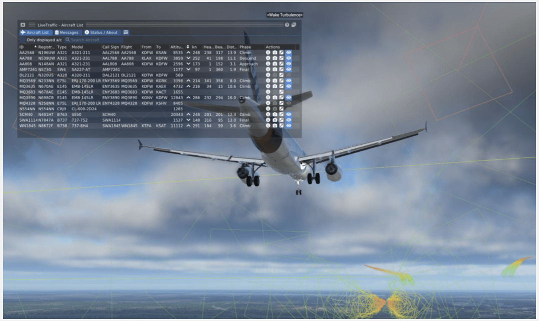
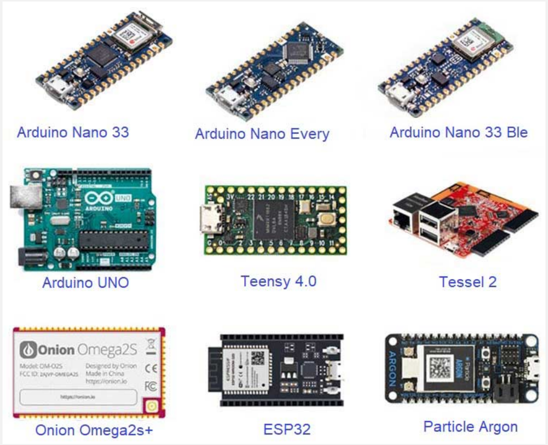
X-Plane



ID	Registr...	Type	Model	Call Sign	Flight	From	To	Altitu...		kn	Hea...	Bea...	Dist...	Phase	Actions
AA2568	N196UW	A321	A321-211	AAL2568	AA2568	KDFW	KSAN	8535	^	248	238	317	13.9	Climb	
AA788	N539UW	A321	A321-231	AAL788	AA788	KLAX	KDFW	3859	v	252	41	198	11.1	Descend	
AA808	N148AN	A321	A321-231	AAL808	AA808	KDFW	KDFW	2596	v	173	1	152	3.1	Approach	
AMF7261	N573G	SW4	SA227-AT	AMF7261				1177	v	97	1	360	1.9	Final	
DL2121	N320US	A320	A320-211	DAL2121	DL2121	KDTW	KDFW	569							
MQ3569	N233NN	E75L	ERJ 170-200 LR	ENY3569	MQ3569	KDFW	KGRK	3398	^	214	341	358	8.0	Climb	
MQ3635	N670AE	E145	EMB-145LR	ENY3635	MQ3635	KDFW	KAEX	4732	^	216	34	15	10.6	Climb	
MQ3683	N678AE	E145	EMB-145LR	ENY3683	MQ3683	KDFW	KACT	1655							
MQ3890	N698CB	E145	EMB-145LR	ENY3890	MQ3890	KGNV	KDFW	12843	^	286	232	294	16.0	Climb	
MQ4328	N258NN	E75L	ERJ 170-200 LR	ENY4328	MQ4328	KDFW	KSHV	8405							
N554NN	N554NN	CRJ9	CL-600-2D24					1265							
SCM40	N401HT	B763	S550	SCM40				20343	^	248	201	201	12.3	Climb	
SWA1114	N7847A	B737	737-752	SWA1114				1537	v	148	316	95	13.0	Final	
WN1845	N8672F	B738	737-8H4	SWA1845	WN1845	KTPA	KSAT	11112	^	291	184	99	3.6	Climb	

Microcontrollers



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Examples

- Implement control systems
- Develop portable software

Main objective

Establish a communications protocol between X-Plane and microcontrollers

Design decisions

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- Easy to use for non-programmers
- Compatible with most simulation software and microcontrollers
- Simple yet powerful

Current solutions

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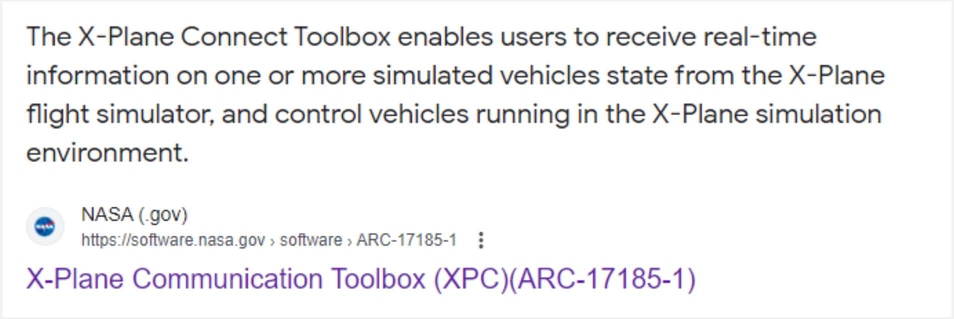
- NASA's X-Plane Communications Toolbox
- X-Plane built in UDP messaging
- Peter Dowson's Flight Simulator Universal Inter-Process Communication (FSUIPC)

1. X-Plane Communications Toolbox


The X-Plane Connect Toolbox enables users to receive real-time information on one or more simulated vehicles state from the X-Plane flight simulator, and control vehicles running in the X-Plane simulation environment.

NASA (.gov)
https://software.nasa.gov › software › ARC-17185-1

X-Plane Communication Toolbox (XPC)(ARC-17185-1)

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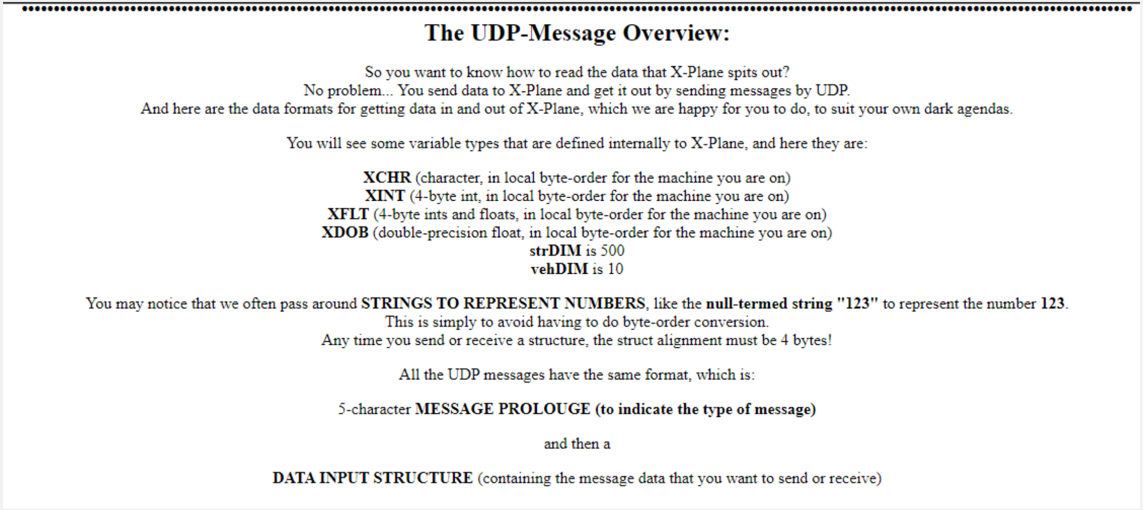
- Abandoned and buggy

2. X-Plane's built in UDP messaging



The UDP-Message Overview:

So you want to know how to read the data that X-Plane spits out?
No problem... You send data to X-Plane and get it out by sending messages by UDP.
And here are the data formats for getting data in and out of X-Plane, which we are happy for you to do, to suit your own dark agendas.

You will see some variable types that are defined internally to X-Plane, and here they are:

XCHR (character, in local byte-order for the machine you are on)
XINT (4-byte int, in local byte-order for the machine you are on)
XFLT (4-byte ints and floats, in local byte-order for the machine you are on)
XDOB (double-precision float, in local byte-order for the machine you are on)
strDIM is 500
vehDIM is 10

You may notice that we often pass around **STRINGS TO REPRESENT NUMBERS**, like the **null-termed string "123"** to represent the number **123**.
This is simply to avoid having to do byte-order conversion.
Any time you send or receive a structure, the struct alignment must be 4 bytes!

All the UDP messages have the same format, which is:

5-character **MESSAGE PROLOUGE (to indicate the type of message)**

and then a

DATA INPUT STRUCTURE (containing the message data that you want to send or receive)

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- Not designed for microcontrollers
- Allows full access to X-Plane data i/o
- Official feature of the simulator

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- Works with on any simulator
- Not designed for microcontrollers
- Allows access to most simulator variables
- Under active development with customer support