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Active Vision Group

LOG FILE FORMAT
UNIVERSITY OF KOBLENZ-LANDAU

1 Introduction

This document describes the file format of the log files acquired during test runs with the Velodyne HDL64E-S2 mounted on a car.

1.1 Logged Datasets

Recorded data includes:

- Velodyne raw data (about 3000 per second)
- GPS data (circa 1 Hz),
- OBD vehicle data (circa 1 Hz)
- Inertial Measurement Unit (IMU) with 100 Hz
- Images of 3 cameras with 640×480 pixel and 30 Hz

1.2 Data Type

The following table presents an overview of the used data types and their respective characteristics.

Type	Size in Bytes
unsigned char	1
unsigned short	2
int	4
unsigned int	4
long long	8
bool	4
float	4
double	8

All data types are stored in *little-endian* (default by x86 systems) and the data types „float“ and „double“ are stored in the usual IEEE 754 format.

2 File Format

2.1 Setup

The log file consists of three parts in the denoted order:

- header with magic number
- index
- serialized messages

The mentioned parts are described in the following sections.

2.2 Header

Name/Value	Type	Size in Bytes
{0xA4,„V“,„E“,„L“}	unsigned char[4]	4
Major Version (current 0x0001)	unsigned short	2
Minor Version (current 0x0001)	unsigned short	2

2.3 Index

Valid start positions for the deserialization of the messages are specified in the header. The positions are absolute e. g. relative to the beginning of the data file. Every entry represents one second of the log file. The first entry points to the beginning of the first second, the second entry points to the second second and so on.

Name	Type	Size in Bytes
Index Size: n	unsigned int	4
Index 0	long long	8
$\vdots$	$\vdots$	$\vdots$
Index $n-1$	long long	8

2.4 Messages

The header described in this section prepends to all described messages in this chapter:

Name/Value	Type	Size in Bytes
Message size in bytes *(Size of the message incl. header*	unsigned int	4
„1“ (Hex: 0x49) *(„1“ indicates a valid message)*	unsigned char	1
Message type *(see below)*	int	4
Message version *(see below)*	int	4
Message timestamp (*in ms, since program startup*)	double	8
Message data	komplex, see below	„Message size“ -17 *(„Message size„ minus header)*

Different messages can be identified using „Message type“. The structure of „Message data“ for particular messages is described in the following sections.

OBDDataM

Message type: 0x00014043
Described version: 100

Name	Type	Size in Bytes
Speed (*in km/h*)	int	4
Engine RPM	int	4
unused	float	4
unused	int	4
unused	int	4
Throttle Position	float	4
unused	int	4

GPSDataM

Message type: 0x00014A32
Described version: 100

Name	Type	Size in Bytes
Time-Hour (UTC)	int	4
Time-Minute (UTC)	int	4
Time-Second (UTC)	int	4
Warning (0 or 1)	int	4
Latitude	double	8
Longitude	double	8
Speed (*in km/h*)	float	4
Course	float	4
Date-Day	int	4
Date-Month	int	4
Date-Year	int	4
Quality	int	4
0=invalid, 1=gps, 2=dgps, 6=estimated		
Number of satellites	int	4
Accuracy HDOP	float	4
Height	float	4
Geoid height	float	4
Accuracy VDOP	float	4
Accuracy PDOP	float	4

ImageM

Message type: 0x000109C9
Described Version: 100

Name	Type	Size in Bytes
Source Id	int	4
IsCompressed (*currently always true*)	bool	4
Width	int	4
Height	int	4
Size of image data	unsigned int	4
Data	unsigned char	Size of image data × 1

The image data are all JPEG compressed and can be decompressed by common libraries (e. g. libjpeg).

RobotPoseM

Message type: 0x0001E342
Described Version: 100

Name	Type	Size in Bytes
Orientation Quaternion	float[4]	16
Acceleration Vector	float[3]	12

VelodyneRawDataM

Message Type: 0x0003112B
Described Version: 100

Name	Type	Size in Bytes
Number of Velodyne packets	unsigned int	4
Velodyne packets	VelodynePacket[]	Number × 1206

The Velodyne packets are exactly those packets received from the Velodyne scanner.

3 End of file recognition

The end of file is reached, when either of the following conditions is true:

- The file pointer is at the end of file.
- The message size was read as 0xFFFFFFFF.
- The available amount of data in the file is not smaller than the specified message size.