- **Search**

- **Follow Us**

- **Archives**

  - July 2014 (7)
  - April 2014 (8)
  - January 2014 (7)
  - view more
  - October 2013 (6)
  - July 2013 (10)
  - April 2013 (12)
  - January 2013 (11)
  - October 2012 (8)
  - July 2012 (7)
  - April 2012 (12)
  - January 2012 (9)
  - October 2011 (9)
  - view all

- **Topics**

  - All (137)
  - Scientific Visualization (34)
  - Computer vision (9)
  - Medical Imaging (23)
  - Scientific Data Management (6)
  - Informatics (6)
  - Software Process (10)
  - Open Source (63)
  - Recent Releases

Jul 24 2014

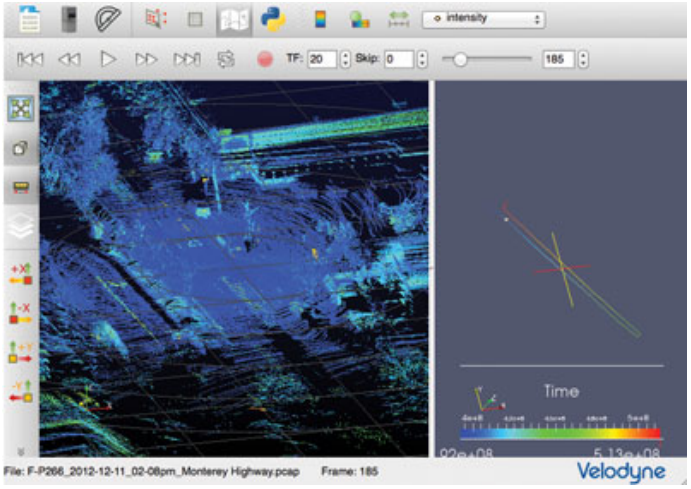
Velodyne: A Case Study in Open-Source Solutions

Posted in Open Source, Computer vision. Viewed 115 times.
Authored by: Brad Davis, Casey Goodlett, Wolfgang Juchmann

In 2013, Velodyne's Director of Sales & Marketing, Wolfgang Juchmann, approached Kitware for help designing and developing a custom visualization and analysis application. Velodyne manufactures real-time, 3D LiDAR sensors that produce data streams on the order of a million data points per second from a multi-channel family of laser sensors (HDL-32E and HDL-64E). The sensors capture a full 360° 3D scan up to 20 times per second.

What Velodyne needed was software capable of showing the vast amount of data in a 3D environment, as well as the ability to live stream data from a sensor to the application. The custom software needed to be straightforward so that a novice user could experience and understand the 3D sensor data quickly without going through the training required for a complicated software package.

As a leader in visualization and open-source technology, Kitware was a natural partner for this effort. By leveraging the open-source toolkits ParaView and VTK, Kitware was able to very rapidly deploy an initial version of the application, VeloView. Kitware followed an agile development philosophy that incrementally improved the initial version with constant dialogue between the two companies, ensuring that customer needs and priorities were continuously incorporated in the development process.



In the left panel VeloView overlays several consecutive 360° scans to visualize the 3D space around the vehicle. The right panel shows the position and GPS path of the car.

As a sensor hardware manufacturer, Velodyne further recognized the benefit provided by open-source access to VeloView's source code, as it enables application developers to minimize time to market iterations.

"We use VeloView as a sales tool, providing current and potential customers with ready-to-use software," Juchmann said. "The live-streaming feature provides us with the opportunity to offer real-time demonstrations of the sensor's capabilities during customer visits and at conferences and tradeshows, which are guaranteed to generate excited audiences."

Features

VeloView 2.0 was released in April. Key features of VeloView 2.0 include:

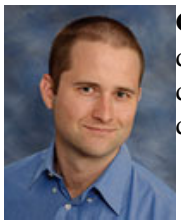
- Input from live sensor stream or pre-recorded data
- Visualization of LiDAR returns in 3D and time including 3D position and attribute data such as timestamp, azimuth, laser ID, etc.
- A spreadsheet inspector for LiDAR attributes

(21)
- Kitware News (24)
- VTK (30)
- ITK (30)
- IGSTK (5)
- CMake (16)
- ParaView (21)
- MIDAS (7)
- VolView (3)
- CDash (5)
- Open Chemistry (9)

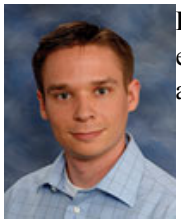
- **Authors**

- Luis Ibanez (11)
- Aashish Chaudhary (10)
- Marcus Hanwell (9)
- Julien Jomier (4)
- Chris Harris (4)
- Dave DeMarle (4)
- Bill Hoffman (4)
- Xiaoxiao Liu (3)
- Brad King (3)
- Matt McCormick (3)
- view all
- Philippe Pebay (3)
- Zach Mullen (3)
- Steve Jordan (3)
- Bill Sherman (2)
- David Lonie (2)
- Andy Bauer (2)
- David Doria (2)
- David Cole (2)
- Ben Burnett (2)
- Charles Marion (2)
- Stephen Aylward (2)
- Brad Davis (2)
- Jean-Christophe Fillion-Robin (2)
- Pat Marion (2)
- Casey Goodlett (2)
- Eran Swears (1)
- Rusty Blue (1)
- Jeremiah Wilke (1)
- Bob O Bara (1)
- Russell Taylor (1)
- Charles Law (1)
- Kyle Lutz (1)

- The ability to record data from live sensor stream and export it in multiple formats
- A distance measurement ruler tool
- Visualization of GPS data in spreadsheet and map format
- The ability to show multiple frames (one 360° rotation) of data simultaneously
- The ability to show or hide a subset of laser channels



Casey Goodlett is a Technical Leader at Kitware, Inc., with expertise in business development, medical computing, and computer vision. Casey is currently focused on developing technology in point cloud processing including visualization, registration, object detection, and software development.



Brad Davis works closely with customers and the Kitware team to discover, define, and execute successful software R&D projects. His focus areas include medical image analysis, statistics of shape, pointcloud processing, and 3D interactive visualization.

Wolfgang Juchmann is Director of Sales and Marketing at Velodyne LiDAR (www.velodynelidar.com). He is responsible for the business development of Velodyne's HDL line of real-time 3D LiDAR sensors with applications in autonomous driving, mobile mapping, and security/defense. For more information, contact lidar@velodyne.com.

- Get the pdf version

Do you like this post? I really do!
To leave a comment please log in

+1 Tweet Share

- Eric Whiting (1)
- Gilbert Hendry (1)
- Jacob Becker (1)
- George Zagaris (1)
- Nikhil Shetty (1)
- Giles Richardson (1)
- Janine Bennett (1)
- Yumin Yuan (1)
- Christian Boucheny (1)
- Julien Finet (1)
- Hamid Ghadyani (1)
- Wolfgang Juchmann (1)
- Alejandro Ribes (1)
- Carlos Barrales (1)
- Rajeev Jain (1)
- Matthew Turk (1)
- Javier Velasco (1)
- Simon Rit (1)
- Diego Morate (1)
- Marc Vila Oliva (1)
- Alvaro Bertelsen (1)
- Andrea Galeazzi (1)
- Michael Jermyn (1)
- Richard Beare (1)
- Yuanxin Liu (1)
- Hamid Dehghani (1)
- Wendel Bezerra Silva (1)
- Jonathan Woodring (1)
- Nicholas Tustison (1)
- Ozgur Guler (1)
- Michael A. Mastanduno (1)
- Matthias Baitsch (1)
- Ghassan Hamarneh (1)
- John Durkin (1)
- Ziv Yaniv (1)
- Scott C. Davis (1)
- Duy Thanh Truong (1)
- Zhi Feng Huang

(1)
- Diego Borro (1)
- Brian Pogue (1)
- Luis Torres (1)
- Tara Lindsley (1)
- Thomas Maxwell (1)
- Daniel Kohler Osmari (1)
- Danielle Pace (1)
- Jothybasu Selvaraj (1)
- Boonthanome Nouanesengsy (1)
- Gabe Hart (1)
- Luc Soler (1)
- Ben Payne (1)
- John Patchett (1)
- David Thompson (1)
- Berk Geveci (1)
- Johan Moreau (1)
- Matthew Woehlke (1)
- Yung Ryn (Elisha) Choe (1)
- Patrick O Leary (1)
- Cory Quammen (1)
- view less

This work is licensed under a Creative Commons Attribution-NoDerivs 3.0 Unported License. Additional information on this license can be found here.