UAVIATORS
HUMANITARIAN UAV NETWORK

Software for Humanitarian UAVs/Drones
人道救援 UAVs/Drones之軟體

This document lists numerous open-source, free to use, and proprietary software that can be used with UAVs/Drones in humanitarian contexts. Each entry contains the name of the software, a link to its source, and a brief description of its features. Kindly help us fill any missing gaps by adding to this document directly and feel free to suggest additional tags as well. Thank you!

To submit an addition/edit, please fill out this form. We will update the document as soon as possible.

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UAV Control

Airware

http://airware.com/

In 2011, we identified a significant gap in the market. Military autopilots were too inflexible and expensive and hobbyist projects weren't safe or reliable enough for commercial use. We knew that for the growing number of diverse commercial applications, the industry needed more than an autopilot.

Tags: UAV Control

APM:Copter

http://copter.ardupilot.com/

APM:Copter is capable of the full range of flight requirements from fast paced FPV racing to smooth aerial photography to fully autonomous complex missions which can be programmed through one of 4 elegant and well-developed software ground stations.

Tags: UAV Control, Opensource

APM:Plane

http://plane.ardupilot.com/

The free APM:Plane (formerly ArduPlane) firmware running on the APM autopilot gives any fixed-wing aircraft full autonomous capability. APM:Plane provides advanced functions such as support for hundreds of three-dimensional waypoints, automatic takeoff and landing as well as sophisticated mission planning and camera controls.

Tags: UAV Control, Opensource

LibrePilot

https://www.librepilot.org/

The LibrePilot open source project was founded in July 2015. It focuses on research and development of software and hardware to be used in a variety of applications including vehicle control and stabilization, unmanned autonomous vehicles and robotics. One of the project's primary goals is to provide an open and collaborative environment making it the ideal home for development of innovative ideas.

Tags: UAV Control, Opensource

Paparazzi

http://wiki.paparazziuav.org/wiki/Main_Page

Paparazzi is a free and open-source hardware and software project encompassing an exceptionally powerful and versatile autopilot system for fixed wing aircrafts as well as multicopters. Being open enables you to add more features and improve the system. Using and improving Paparazzi is wholeheartedly encouraged by the community. Because of lots of enthusiasts like you , Paparazzi is swiftly evolving into an even more powerful system.

Tags: UAV Control, Opensource

Ground Station

Mission Planner

http://planner.ardupilot.com/

The Mission Planner, created by Michael Oborne, does a lot more than its name. Here are some of the features:

- Point-and-click waypoint entry, using Google Maps.
- Select mission commands from drop-down menus
- Download mission log files and analyze them
- Configure APM settings for your airframe
- Interface with a PC flight simulator to create a full hardware-in-the-loop UAV simulator.
- See the output from APM's serial terminal

Tags: UAV Control, Opensource

Image Processing

Airphoto SE

http://www.uni-koeln.de/~al001/airdown.html
http://www.uni-koeln.de/~al001/airphotose.html
AirPhotoSE offers essential features needed for rectification of oblique aerial imagery with geo-referenced output. It is capable of working with very large images, and it offers multithreading, using up to four processors operating on four parts of a large image simultaneously. Automatic correction for radial lens distortion, atmospheric diffraction and hilly terrain is included. It is designed for use by beginners or experienced users who need an efficient programme for combining aerial images with maps, orthophotos, or satellite pictures.
Tags: Orthorectification

Fiji

http://fiji.sc/Fiji
Fiji is an image processing package. It can be described as a distribution of ImageJ (and ImageJ2) together with Java, Java3D and a lot of plugins organized into a coherent menu structure. Fiji compares to ImageJ as Ubuntu compares to Linux.
Tags: Image Processing, Opensource, Computer Vision

ImageJ

http://imagej.nih.gov/ij/index.html
ImageJ is a public domain Java image processing program inspired by NIH Image for the Macintosh. It can display, edit, analyze, process, save and print 8-bit, 16-bit and 32-bit images. It can calculate area and pixel value statistics of user-defined selections.
Tags: Image Processing, Opensource

Kolor Autopano Giga

http://www.kolor.com/image-stitching-software-autopano-giga.html
Autopano Giga is the most advanced image-stitching application of Kolor. It includes all features of Autopano Pro panorama software and offers many extra features that make the creation of panoramas simpler, more efficient and so pleasant to use.
Tags: Image Stitching

MapKnitter

http://mapknitter.org/

MapKnitter is a free and open source tool for combining and positioning images (often from MapMill.org) in geographic space into a composite image map. Known as “orthorectification” or “georectification” to geographers, this step covers the process of figuring out where images can be placed on an existing map, and how they can be combined, or “stitched” together.

Tags: Orthorectification, Opensource

Microsoft ICE

http://research.microsoft.com/en-us/um/redmond/groups/ivm/ICE/

Microsoft Image Composite Editor is an advanced panoramic image stitcher. Given a set of overlapping photographs of a scene shot from a single camera location, the application creates a high-resolution panorama that seamlessly combines the original images.

Tags: Image Stitching

Image Processing -- Photogrammetric

Correlator3D

http://www.simactive.com/en/software-description

SimActive’s Correlator3D™ software is a patented end-to-end photogrammetry solution for the generation of high-quality geospatial data from satellite and aerial imagery, including UAVs. Correlator3D™ performs aerial triangulation (AT) and produces dense digital surface models (DSM), digital terrain models (DTM), orthomosaics and vectorized 3D features.

Tags: Photogrammetry, Orthorectification,

IMAGINE Photogrammetry

http://www.hexagongeospatial.com/products/photogrammetry/imagine-photogrammetry-(formerly-lps)

Our integrated software platform means robust photogrammetry, GIS, image processing, AND point cloud tools are all made available in one powerful product. Delineate boundaries with the utmost precision, resulting in even more dense and highly-accurate correlated point clouds. Distribute processing over multiple cores or workstations, effectively maximizing available resources and production output.
Tags: Photogrammetry

Inpho UASMaster

http://www.trimble.com/Geospatial/Inpho-UASMaster.aspx
Create powerful deliverables from images collected with UAS (Unmanned Aircraft Systems) j

aerial mapping and surveying systems. UASMaster combines ease of use with the full power of a photogrammetric workstation. Create digital orthophotos, create colorized dense point clouds, surface models and bare earth terrain models, georeferencing refinement and analysis, and more.
Tags: Photogrammetry, Orthorectification

MenciSoftware APS

http://www.menci.com/uav-drone-mapping/aps-3d-maps-software-remote-sensing/aps-3d-maps-software
APS is the powerful and widely tested photogrammetry software suite for massive and accurate UAV data processing. APS handles ground-facing images coming from several kinds of drone, but they must include GPS data (optionally IMU data too). Images must be acquired in strips, with a standard overlap of 70-80% (lateral and longitudinal).
Tags: Photogrammetry, Image Processing

MenciSoftware OPK Suite

http://www.menci.com/aerial-mapping/opk-suite-gis-data-orthophoto
OPK suite is a photogrammetric software for processing large format images from **aerial cameras** and **satellite**. OPK is a software suite with high performance for the big production of aerial photogrammetric products starting from large format digital images acquired by aerial cameras, such as UltraCam, DMC, DIMAC or satellite data like GeoEye, Ikonos, QuickBird.
Tags: Photogrammetry, Image Processing

MenciSoftware - Cloud View

http://www.menci.com/3d-modeling-software/remote-sensing-cloud-view
Cloud View UAV photogrammetry software reads aerial images collected with Unmanned Aerial Systems and processes them into **seamless orthorectified mosaics**, which come with map coordinates and are thus GIS-ready and viewable immediately e.g in Google Earth.

Tags: Photogrammetry, Orthorectification

Photomod

http://photomod.galantis.com/

The PHOTOMOD software family comprises a wide range of products for the remote sensing data photogrammetric processing. This state-of-the-art software allows the extraction of geometrically accurate spatial information from almost all commercially available types of imagery, whether obtained by film or digital cameras, high resolution satellite scanners or synthetic aperture radars.

Tags: Photogrammetry

Image Processing -- Structure from Motion / Multi-Stereo View

Agisoft Photoscan

http://www.agisoft.ru/products/photoscan

Agisoft PhotoScan is a stand-alone software product that performs photogrammetric processing of digital images and generates 3D spatial data. Features include Photogrammetric triangulation, Dense point cloud: editing and classification, Digital elevation model: DSM/DTM export, and Georeferenced orthomosaic export.

Tags: Photogrammetry, 3D Mesh Processing

CMPMVS

http://flightriot.com/post-processing-software/cmpmvs/

CMPMVS is a multi-view reconstruction software. The input to our software is a set of perspective images and camera parameters (internal and external camera calibrations). The output is a textured mesh of the rigid scene visible in the images. Non-rigid objects are implicitly ignored.

Tags: Multi-view Reconstruction, Opensource

DroneMapper

http://dronemapper.com/

DroneMapper software offers accurate geo-spatial mapping solutions generated from 2D aerial imagery. High resolution Digital Elevation Model (DEM), Digital Surface Model (DSM),

Orthomosaic and Point Cloud creation from fixed wing or UAV platforms. The DroneMapper workflow allows for automated and operator assisted imagery processing.
Tags: Image Stitching, Image Processing

OpenDroneMap

www.opendronemap.org
https://github.com/OpenDroneMap
https://github.com/OpenDroneMap/OpenDroneMap
A collection of scripts for installing and running Bundler, CMVS, and PMVS on Debian like Unix systems. Forked from qwesda/BundlerTools (https://github.com/qwesda/BundlerTools). Provides meshing, textured meshing, and orthorectification.
Tags: Multi-View Reconstruction, Opensource

PIX4D Mapper

http://pix4d.com/
Pix4D software automatically processes terrestrial and aerial imagery acquired by light-weight UAV or aircraft using its innovative technology based purely on image content. And converts your images into highly precise, timely and customizable results for a wide range of GIS and CAD applications.
Tags: Image Processing, 3D Mesh Processing

SFM_georef

http://www.lancaster.ac.uk/staff/jamesm/software/sfm_georef.htm
Sfm_georef is software for scaling and geo-referencing structure-from-motion (SfM) point clouds to real-world coordinates, using observations made directly in the SfM image set (rather than identifying and matching features from the point cloud).
Tags: Scaling, Image Processing

SimActive Correlator3D

http://www.simactive.com/en/uav
SimActive's Correlator3D software brings the precision of large format camera photogrammetry to UAV mapping. High quality of results is delivered through a patented technology utilizing advanced computer vision algorithms. Powered by GPU technology and multi-core CPUs, Correlator3D™ ensures matchless processing power to support rapid production of large datasets. Correlator3D™ performs aerial triangulation (AT) and produces dense digital surface models (DSM), digital terrain models (DTM), orthomosaics and vectorized 3D features.
Tags: Image Processing, 3D Mesh Processing

Visual SFM

http://ccwu.me/vsfm/

VisualSFM is a GUI application for 3D reconstruction using structure from motion (SFM). The reconstruction system integrates several other projects: SIFT on GPU(SiftGPU), Multicore Bundle Adjustment, and Towards Linear-time Incremental Structure from Motion. VisualSFM runs fast by exploiting multicore parallelism for feature detection, feature matching, and bundle adjustment.

Tags: Multi-View Reconstruction, Opensource (non-commercial)

3D Processing

3DM Analyst

http://www.adamtech.com.au/3dm/Analyst.html

3DM Analyst is a rapid 3D data extraction package for use with digital imagery. The software uses pairs of overlapping or convergent aerial or terrestrial digital images that can be obtained either from digital cameras or scanned images. 3DM Analyst offers advanced functionality for model orientations, using any combination of control points and camera stations and also allows the use of natural image points as additional input to enhance orientations.

Tags: 3D Measurements

Apero/MICMAC

http://www.tapenade.gamsau.archi.fr/TAPEnADe/Tools.html

Apero is the acronym for Aérotriangulation Photogrammétrique Expérimentale Relativement Opérationnelle. This software, working on Linux and MaxOs, is used for automatic tie point extraction, initial solution computation, bundle adjustment for relative and absolute orientation.

http://logiciels.ign.fr/?-Micmac,3-

MICMAC (Multi-Images Correspondences, Méthodes Automatiques de Corrélation) uses the orientations and calibrations processed by Apero to create depth maps and dense 3D point clouds. The matching has a multi-scale, multi-resolution, and pyramidal approach.

Tags: 3D Mesh Processing

Autodesk ReCap

http://www.autodesk.com/products/recap/overview

Capture and integrate reality data directly into your design process with ReCap™ reality capture software and services. ReCap works with Autodesk design and creation suites, so you can start your design with accurate 3D data and full photo-quality context rather than a blank screen.
Tags: 3D Mesh Processing, Image Processing

CloudCompare

http://www.cloudcompare.org/
CloudCompare is a 3D point cloud (and triangular mesh) processing software. It has been originally designed to perform comparison between two 3D points clouds (such as the ones obtained with a laser scanner) or between a point cloud and a triangular mesh. It relies on a specific octree structure that enables great performances in this particular function. It was also meant to deal with huge point clouds (typically more than 10 millions points, and up to 120 millions with 2 Gb of memory).
Tags: 3D Mesh Processing, Opensource

Meshlab

http://meshlab.sourceforge.net/
MeshLab is an open source, portable, and extensible system for the processing and editing of unstructured 3D triangular meshes. The system is aimed to help the processing of the typical not-so-small unstructured models arising in 3D scanning, providing a set of tools for editing, cleaning, healing, inspecting, rendering and converting this kind of meshes.
Tags: 3D Mesh Processing, Opensource

PhotoModeler

http://www.photomodeler.com/index.html
The PhotoModeler Software extracts 3D Measurements and Models from photographs taken with an ordinary camera. A very cost-effective way of doing accurate 3D scanning, measurement and surveying.
Tags: 3D Measurements

Quick Terrain Modeler

http://appliedimagery.com/
Quick Terrain Modeler is the world's premier 3D point cloud and terrain visualization software package. Designed for use with LiDAR, but flexible enough to accommodate other 3D data sources, Quick Terrain Modeler provides an easy to use software experience that allows users to work with significantly more data, render larger models, analyze data faster, and export a variety of products. These benefits enable very powerful, yet simple and intuitive, terrain exploitation.

Tags: Data Visualization, 3D Mesh Processing, Opensource

Object Based Classification

eCognition

http://www.ecognition.com/

eCognition Essentials software is an all-in-one solution that allows users of any skill level to quickly produce high-quality, GIS-ready deliverables from imagery. Based on core eCognition software technology, eCognition Essentials' guided workflow makes analysis of remote sensing data faster, saving time in ruleset definition.

Tags: Object Based Classification

MicroMappers

http://www.MicroMappers.org

Crowdsourcing platform for feature detection in aerial imagery (as well other data sources). A joint initiative with the United Nations Office for the Coordination of Humaniarian Affairs.

Tags: Crowdsourcing, Object Based Classification, Opensource

Data Management/Platforms

dat

http://dat-data.com/index.html

The high level goal of the dat project is to build a streaming interface between every database and file storage backend in the world. By building tools to build and share data pipelines we aim to bring to data a style of collaboration similar to what git brings to source code.

Tags: Data Interface

GeoGig

http://geogig.org/
https://github.com/boundlessgeo/GeoGig
GeoGig draws inspiration from Git, but adapts its core concepts to handle versioning of geospatial data. Users are able to import raw geospatial data (currently from Shapefiles, PostGIS or SpatiaLite) in to a repository where every change to the data is tracked. These changes can be viewed in a history, reverted to older versions, branched in to sandboxed areas, merged back in, and pushed to remote repositories.
Tags: Data Management, Opensource

git

http://git-scm.com/
Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency.
Tags: Development Tool, Opensource

Google Earth Pro

https://www.google.com/enterprise/mapsearth/products/earthpro.html?utm_campaign=freemium&utm_medium=et&utm_source=earth-en-home
Google Earth Pro is a 3D interactive globe that can be used to aid planning, analysis and decision making. Businesses, governments and professional users from around the world use Google Earth Pro data visualization, site planning and information sharing tools.
Tags: Mapping

GeoExpress, LizardTech

https://www.lizardtech.com/geoexpress/overview
Pixels add up. Compress your raster and LiDAR data with LizardTech's GeoExpress software and make snappy, high-fidelity MrSID imagery while saving on storage costs. Shrink file size and convert your geospatial files to industry-standard formats like MrSID, JPEG 2000, and LAZ. Then, make your imagery better with powerful tools for mosaicking, reprojection, and more.
Tags: Image Management, Data Management

OpenAerialMap

https://github.com/hotosm/OpenAerialMap
Imagery from satellites, unmanned aerial vehicles (UAVs) and other aircraft is becoming increasingly available after a disaster. It is often difficult to determine what is available and easily access it. OpenAerialMap (OAM) seeks to solve this by providing a simple open way to process and provide imagery for humanitarian response and disaster preparedness.
Tags: Image Processing, Image Management, Opensource

OpenGeo Suite

http://boundlessgeo.com/solutions/opengeo-suite/

OpenGeo Suite is a complete geospatial platform for managing data and building maps and applications across web browsers, desktops, and mobile devices. Built on leading open source geospatial software, OpenGeo Suite has a robust and flexible architecture that enables organizations to reliably manage and publish geospatial data.

Tags: GeoSpatial Platform

QGIS

http://www.qgis.org/en/site/

QGIS is a user friendly Open Source Geographic Information System (GIS) licensed under the GNU General Public License. QGIS is an official project of the Open Source Geospatial Foundation (OSGeo). It runs on Linux, Unix, Mac OSX, Windows and Android and supports numerous vector, raster, and database formats and functionalities.

Tags: Geographic Information System, Opensource

Versio

http://vers.io/

Versio is flexible and easily integrates into your workflow. Unlike solutions that rely on exchanging files or syncing to a central database, Versio provides tools that enable your team to collaborate and edit simultaneously. You can even use the Versio API to build your own customized solution. With Versio, you have full ownership and control over your data.

Tags: Data Management

Computer Vision

Bundler

https://www.cs.cornell.edu/~snavely/bundler/

Bundler is a structure-from-motion (SfM) system for unordered image collections (for instance, images from the Internet) written in C and C++. Bundler takes a set of images, image features, and image matches as input, and produces a 3D reconstruction of camera and (sparse) scene geometry as output.

Tags: Multi-view Reconstruction, Opensource

CMVS

http://www.di.ens.fr/cmvs/

Many multi-view stereo (MVS) algorithms do not scale well to a large number of input images (lack of computational and memory resources). This software (CMVS) takes the output of a

structure-from-motion (SfM) software as input, then decomposes the input images into a set of image clusters of manageable size. An MVS software can be used to process each cluster independently and in parallel, where the union of reconstructions from all the clusters should not miss any details that can be otherwise obtained from the whole image set. CMVS should be used in conjunction with an SfM software Bundler and an MVS software PMVS2.
Tags: Multi-view Reconstruction, Opensource

Computer Vision Online

http://www.computervisiononline.com/
Links to source codes (e.g. Matlab, C++) and software packages (both commercial and open-source) related to computer vision. Links to free data sets for computer vision applications.
Tags: Compendium

MAP-Tk

https://github.com/Kitware/maptk
MAP-Tk is an open source C++ collection of libraries and tools for making measurements from aerial video. Initial capability focuses on estimating the camera flight trajectory and a sparse 3D point cloud of the scene. These products are jointly optimized via sparse bundle adjustment and are geo-localized if given additional control points or GPS metadata.
Tags: Video Processing

OpenCV

http://docs.opencv.org/
OpenCV (Open Source Computer Vision Library: http://opencv.org) is an open-source BSD-licensed library that includes several hundreds of computer vision algorithms. The document describes the so-called OpenCV 2.x API, which is essentially a C++ API, as opposite to the C-based OpenCV 1.x API.
Tags: Image Processing, Video Processing, Opensource, Computer Vision

openMVG

http://imagine.enpc.fr/~moulonp/openMVG/
"open Multiple View Geometry" is a library for computer-vision scientists and especially targeted to the Multiple View Geometry community. It is designed to provide an easy access to the classical problem solvers in Multiple View Geometry and solve them accurately.
Tags: Multi-View Reconstruction, Opensource

PMVS

http://www.di.ens.fr/pmvs
PMVS is a multi-view stereo software that takes a set of images and camera parameters, then reconstructs 3D structure of an object or a scene visible in the images. Only rigid structure is reconstructed, in other words, the software automatically ignores non-rigid objects such as pedestrians in front of a building. The software outputs a set of oriented points instead of a polygonal (or a mesh) model, where both the 3D coordinate and the surface normal are estimated at each oriented point.
Tags: Multi-View Reconstruction, Opensource

Simple CV
http://simplecv.org/
SimpleCV is an open source framework for building computer vision applications. With it, you get access to several high-powered computer vision libraries such as OpenCV – without having to first learn about bit depths, file formats, color spaces, buffer management, eigenvalues, or matrix versus bitmap storage.
Tags: Opensource, Computer Vision

Camera

CHDK
http://chdk.wikia.com/wiki/CHDK
CHDK is useful for UAV mapping because it allows options for control of canon point and shoot cameras that you would not otherwise have. I use the Canon S100 and Canon SX260 primarily for mapping though I have used SX230 and others in the past. Canons with CHDK as a mapping camera configuration offer a great way to capture remotely sensed imagery from your UAV, fixed wing or multi-rotor.
Tags: Opensource