Understanding OpenRelief

Planning disaster relief efforts is like trying to see through fog.

Image by dicktay2000: http://www.flickr.com/photos/34094515@N00/5888974488/sizes/o/in/photostream/

OpenRelief is a project to develop better communications tools for disaster relief efforts: the tools to clear the fog.

Public domain image: http://goo.gl/ulyox

OpenRelief solutions will gather critical information for relief workers on the ground

U.S. Navy photo by Mass Communication Specialist 3rd Class Dylan McCord: http://www.fotopedia.com/items/flickr-5540847894

This information will help the right aid to get to the right places at the right time.

U.S. Navy photo: http://www.fotopedia.com/items/flickr-4317637016

Our first step is to create a robot plane to investigate and map disaster zones.

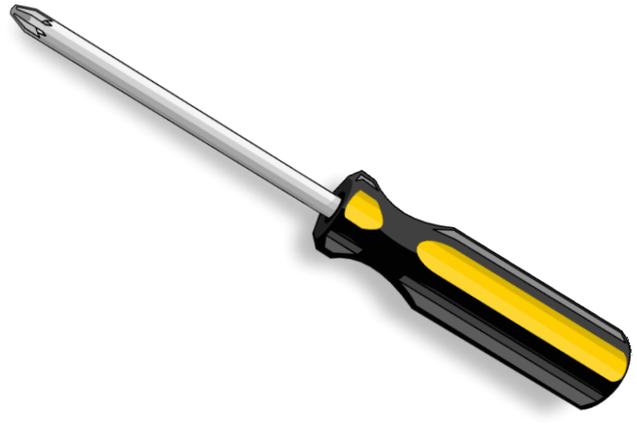
Illustrative image from eranmutai's pre-existing 168 FPV airframe on YouTube: http://www.youtube.com/user/eranmutai

What The Plane Does

- It can take off from footpaths.
- It can recognize roads, people and smoke.
- It can photograph, film and map the landscape.
- It can measure weather, radiation and other conditions via modular sensors.

Seeing Stuff

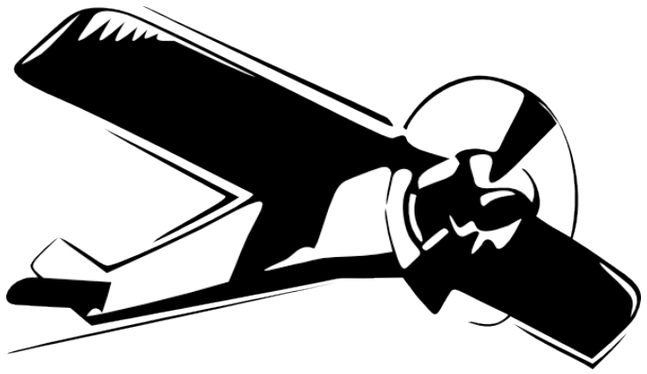
How The Plane Is Made



- Many off-the-shelf components.
- Open Hardware computer, autopilot and sensors.
- Free and Open Source Software throughout.

ZAP®
C48A
PT-20
SLO-ZAP®
Thick CA
• Slow Cure
• High Strength
• Maximum Gap Filling Formula
DANGER: BONDS SKIN AND EYES IN SECONDS. EYE IRRITANT. KEEP OUT OF REACH OF CHILDREN. See Cautions - back panel.
1 oz (28.3 g)
161255D

The Airframe



- Body: Fiberglass and balsa wood.
- Wing Span: 1660mm.
- Fuselage: 1190mm.
- Weight: 2 - 3kg.
- 20 - 30 minutes endurance.

The System

- Ardupilot Mega to fly the plane.
- Super HAD CDD fisheye camera to see.
- Arduino-based sensors to gather information.
- Raspberry Pi to process data.
- Debian OS to analyze the results.

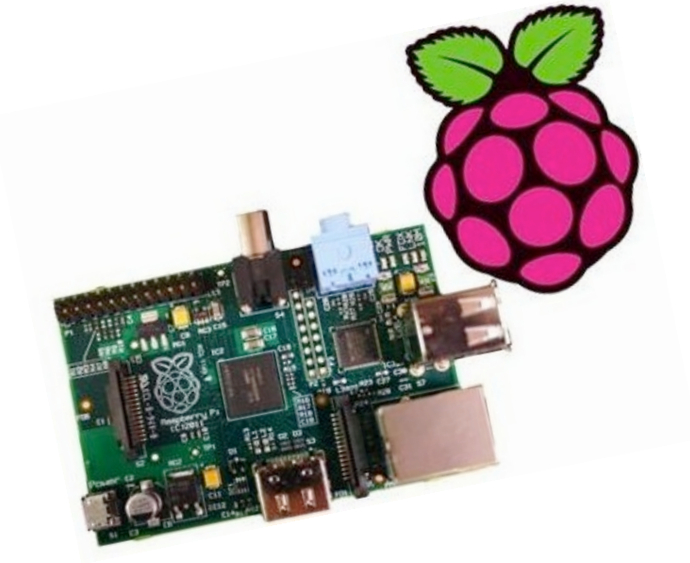
Autopilot Specs

- 16MHz Atmega2560 processor.
- 256k Flash Program Memory, 8K SRAM, 4K EEPROM.
- 600 3D waypoints and mission commands.
- 16MB Data Logger (Black Box).
- Can reboot the processor in mid-flight.

Camera Module Specs

- Sensor: 1/3" Sony Super HAD ii CCD
- Lens: 1.78mm170 degree view angle.
- Minimum Light: 0.1Lux at F1.2.
- Auto Tracking White Balance.
- Operating Temp.: -10°C ~ +50°C

Computer Specs

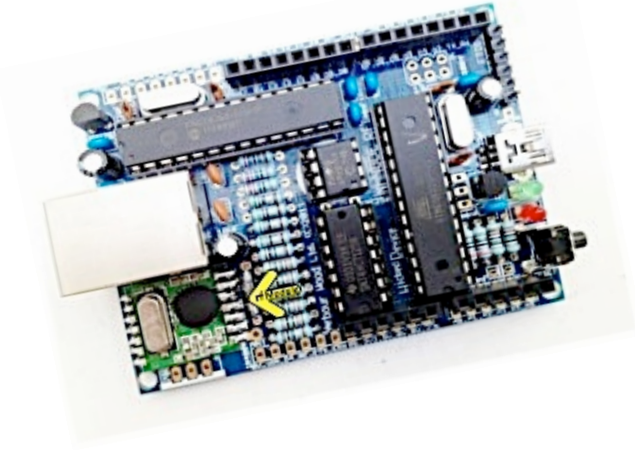


- BCM2835 700 MHz ARM11
- 256-MB LPDDR RAM.
- 1080p30 H.264 encode/decode, HDMI.
- GPIO pins, Serial Bus (SPI), UART and 10/100 wired Ethernet RJ45.
- SD / MMC / SDIO card support.

Software Specs

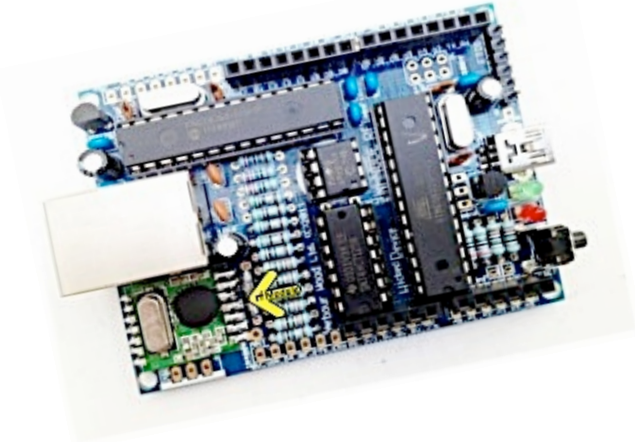
- ArduPlane 2.32 (autopilot).
- Debian 6 (OS).
- OpenCV 2.3.1 (visual recognition).
- Custom code for smoke, people, roads and SfM (structure from motion).

Weather Module Specs

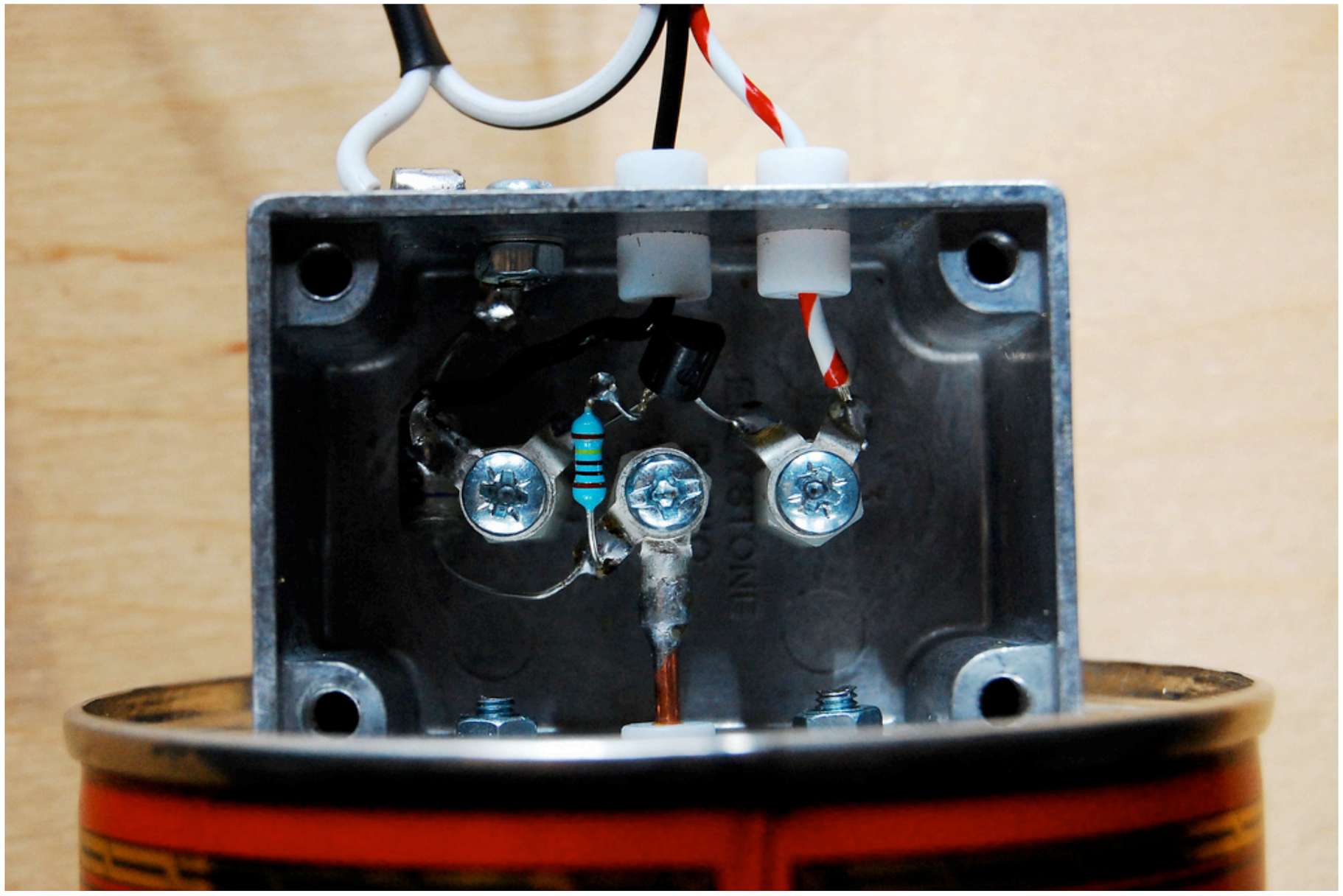


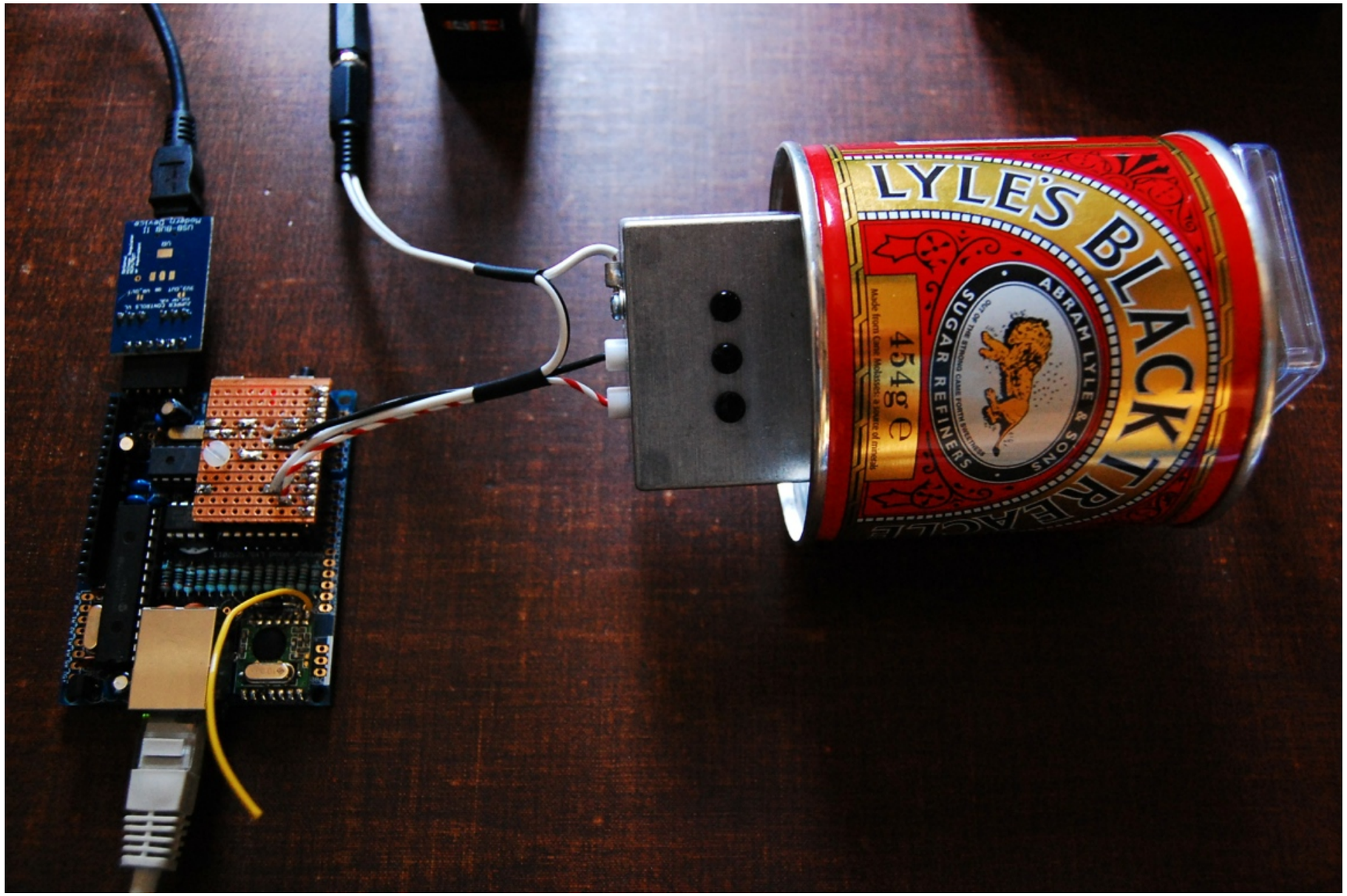
- Nanode RF:
  - ATmega328p 8-bit RISC microprocessor.
  - RFM12B radio module (100 meter range).
- Off-the-shelf sensors with RJ11 terminated cables.

Radiation Module Specs



- Nanode RF:
  - ATmega328p 8-bit RISC microprocessor.
  - RFM12B radio module (100 meter range).
- Custom Ionization chamber or J305β Geiger Tube.

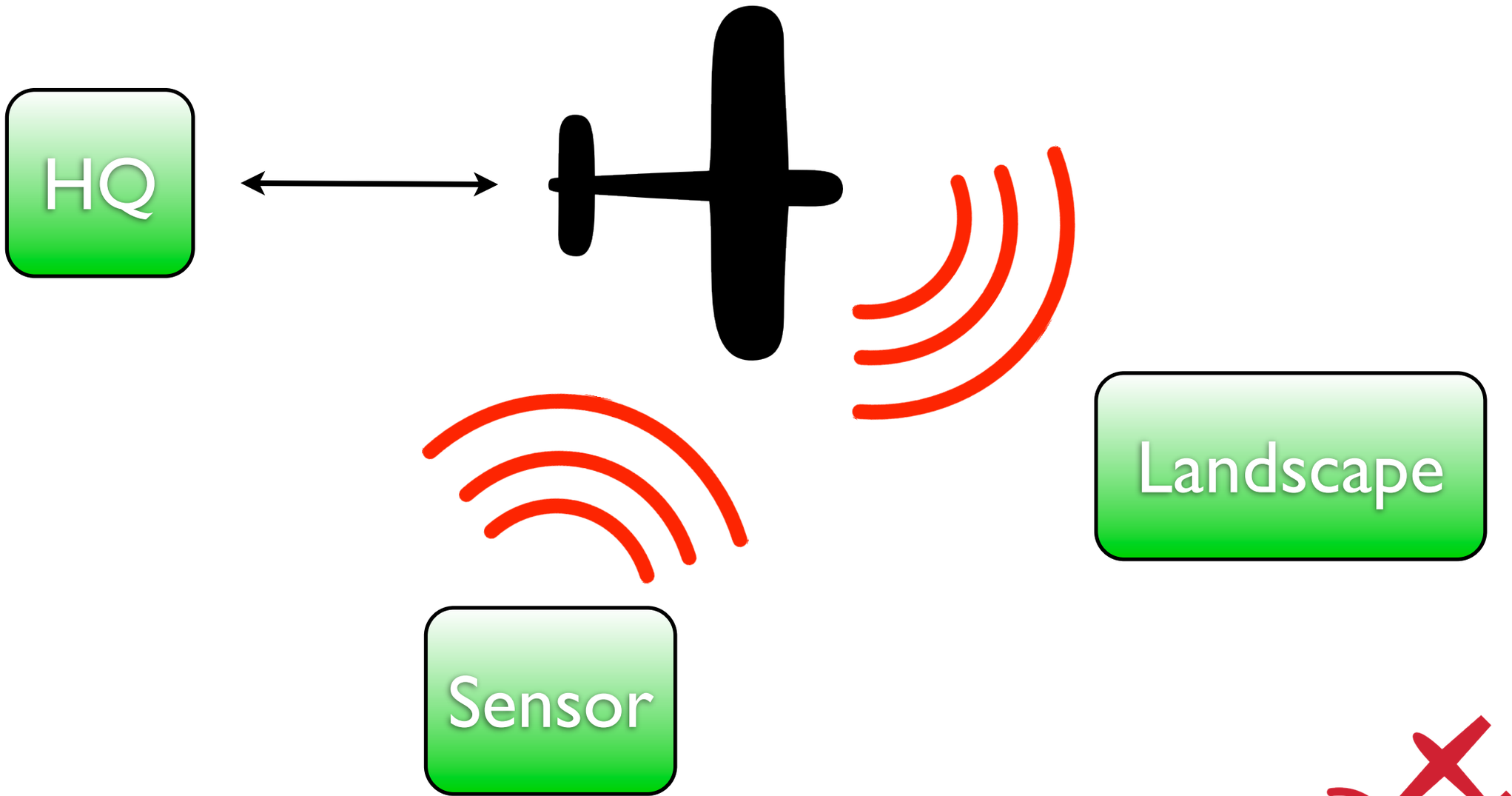



LYLE'S BLACK
ABRAM LYLE & SONS
SUGAR REFINERS
454g e

Mission Control

- Laptop with a USB connection.
- Debian 6, Ubuntu 11/10 or Windows.
- Mission Planner 1.1.89.
- VLC Player 2.0.1.
- Disaster management software at HQ (Sahana Eden or similar)

Putting It All Together



Three Cool Things

- OpenRelief solutions can provide GIS data to existing disaster management platforms.
- They can use OpenStreetMap as the basis for maps and contribute back updated data.
- They can work alongside existing processes to provide next generation abilities.

Milestones

Jan 2012
Development

Jul 2012
UK/Japan Testing

Jul 2011
Research

Jun 2012
Project Launch

Dec 2012
Production Ready

We use crowd-sourcing for rapid development, improvement and distribution.

Public domain image: http://goo.gl/thrcS

We are building a community to test and share our solutions around the world.

NASA Goddard Space Flight Center: http://visibleearth.nasa.gov/view.php?id=57723

Eco-System!

pendawn

CodeMiner

nanode
open source

Who We Need

- Technologists who can help design, refine and advocate the OpenRelief solutions.
- Professional and volunteer emergency relief workers who can help design, test and advocate OpenRelief solutions.
- Commercial enterprises who can put these solutions into production.

Be Part Of This

- Visit www.openrelief.org
- Join our user list to get up to speed.
- Join our developer list to work on tools.
- Join our outreach list to help spread the word.

Get Our Tools

- You will find our code at:
  www.gitorious.org/OpenRelief
- You will find our schematics at:
  www.solderpad.com/OpenRelief

Stay Informed

- www.facebook.org/OpenRelief
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The Future