

DEMO: UAVs in crowd tagged mountain rescue

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ABSTRACT

This project explores the potential for users to interact with live events in a new and dynamic way. It draws on fixed wing unmanned aircraft and associated sensor systems to provide real-time video and image data. It uses a web based software package as a crowd sourced imagery analysis tool allowing user involvement in the tagging and sorting of images. This technology allows a simulation of how the power of crowds [1] could be combined with Unmanned Aerial Vehicle (UAV) to monitor video footage and identify areas of particular interest by interacting with live video. A test flight in collaboration with Patterdale Mountain Rescue is used. The system fosters active citizenship by connecting communities to real life, live events in open-source creative communities. It explores the barriers and potential for an entirely new capacity for users to choose the perspective and proximity of their view by interacting with images from a UAV through ambient media.

General Terms

Documentation, Performance, Reliability, Experimentation, Security, Human Factors, Verification.

Keywords

crowd-sourcing, drones, journalism, rescue, tagging, UAV.

1. PROJECT INCEPTION

The University of Central Lancashire is growing its aerospace engineering and media innovation activities. As such, funding was allocated in December 2012 for a joint research project between the schools of Computing, Engineering and Physical Sciences and the Journal and Digital Communication. A multidisciplinary team with experience in UAVs, journalism and community engagement was formed. Two collaborations were set up: Patterdale Mountain Rescue partnered to experiment using UAV in a practice rescue situation as a controlled civil storytelling experience. E-migs were identified as a suitable operator. Their role was to support the experimental system included in the trial and then to conduct flight testing. They were also commissioned to provide web-based imagery analysis software to enable the tagging of images by users on Mozilla Firefox and Chrome browsers.

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2. DRONES AND UAVs

A 2012 aerospace market study estimates that UAV spending will almost double over the next decade from current worldwide UAV expenditures of \$6.6 billion annually to \$11.4 billion, totalling just over \$89 billion in the next ten years [2]. There is a body of research dedicated to the use of UAV in military situations. Civil uses of UAV are emerging in exploratory and commercial fields. Drone journalism is emerging in media research. It started in earnest after a Polish activist flew a drone over riot police lines in Warsaw to record a violent demonstration in 2008 [3]. There is interest in using UAVs in the context of news. Organisations like the BBC in the UK and ABC Australia are beginning to experiment with them. Financial pressure on news gathering resources is prompting them to explore new ways of collecting and verifying stories. There are many perceived advantages for drone journalism: allowing broadcasters to pool footage, providing a different perspective, saving costs however there is also debate and skepticism [4].

3. RESEARCH

3.1 Research questions

This project crosses research from the humanities and social sciences with aerospace engineering. As such the project and demonstrators have a diverse range of research questions at its core: What are the current social and ethical barriers to drone operation? What is the value of aerial footage gathered by an operative stationed 10miles away to both news and rescue? What technologies are required to operate a UAV safely, securely and efficiently and could this offer economic viability to commissioning teams? How will the drone navigate and make best use of its sensing capability in unstructured, dynamic environments? What is the impact of user tagged images and what is the validity of this content in terms of verification and corroboration? What role can crowd sourcing play in interpreting imagery and video gathered by a drone, to compensate for lack of reliable onboard image processing power? What role can crowd sourcing play in aspects such as remote control of the sensor payload? What role can crowd sourcing play in directing or requesting the route the drone will fly? What is an ideal relationship between the collective crowd sourced input with the drone ground pilot and their responsibilities for safely operating the vehicle?

3.2 Method

The project used a fixed wing aircraft with at least ten minutes of flying time between battery charges. It was capable of operating up to 400ft altitude and carrying both video (Panasonic Lumix

1080HD reduced to Pal format for transmission) and thermal camera (Miricle) which could be transmitted in real time back to a UAV control station located up to 1km away. New images were created approximately every 1.5secs during flight time. Initial site visits to Patterdale, Lake District, identified the need for suitable transmitters and receiver modules in order to use wifi signals and permit both sensors to be used at once. The software was required to offer crowd use functionality. Specifications included: must retrieve and display an image from a web server, by first querying a MySQL open-source database which will return the link to an image; display images alongside a range of tag words which can be selected by a user; users can place several moveable tags on an image, and delete them; a submit button.

3.2.1 Site testing

A series of site tests and test flights were carried out in Patterdale in May and June 2013. An initial integration test was carried out at Uclan followed by a preliminary site view and feasibility study at Patterdale. Test flights were then carried out in Patterdale over suitable periods to assure weather and team availability. The dry run flight trial was carried out in June.

Figure 1. Feasibility visits and map study were carried out at Mountain Rescue HQ in Patterdale



3.3 Demonstration

Media Innovation Studio team members will show footage from the test flights and the tagging system in order to demonstrate the potential for users to interact with live events in a new and dynamic way.

3.3.1.1 The drone

Where possible, an example UAV will be available to view. This will assist in the visualization of what drones are and how they can be deployed. A range of images will be showcased.

3.3.1.2 The web interface

The tagging software will be demonstrated, with users able to see the system for tagging, editing and storing images from the footage. This will stimulate discussion on the research questions as to the scope and potential for UAVs in rescue and news situations including the implications of crowd involvement.

3.3.1.3 Test feedback

Footage from test flights and 'making of' records from the test flights will be demonstrated. This will include videos from setting up to review. A large screen or monitor will be required for this, with audio.

3.4 Drone

If drone journalism is to be adopted by mainstream media organisations there are a number of direct questions around the practical operation of drones for gathering video content that news organisations must consider. There are also a range of issues for the use of UAV in rescue operations, be them mountain rescue, fire or police. Equally, the novel perspective of crowd tagging brings new potential for sustainable societies and open-source creative communities, content and idea. At present, these questions remain largely open.

3.4.1.1 Future applications

The Media Innovation Studio has been set up within the School of Journalism and Digital Communication to embark on a range of projects around storytelling, value exchange and community engagement. This project will be moved on by combing the functionality for live streaming to a mobile phone app, thus opening up the interactive facilitation process. The application shall resize and be fully functional when accessed via a browser on an iPhone 3,4 &5 and on an Android powered devices. This will allow users around the world to interact with footage and tag images as they are beamed, further adding to the database of categorised material. A further test flight is planned in East Africa with a target date of July 2013. This will allow for further exploration into the power of crowds to identify areas they would like to see in more detail by tapping the surface of their smart phone. It is hoped to explore the potential for this action, when repeated by others watching the same piece of live footage on their phone, to command the drone to return to the site where the footage was recorded and descend so viewers can have a second, closer look.

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