Eyescores: an open platform for secure electronic data and photographic evidence collection in ophthalmological field studies

In ophthalmological studies, the need to take photographs as evidence introduces additional complications to fieldwork. A recent report has highlighted the usefulness of smartphones in the collection and grading of photographic evidence of trachoma. We have recently considered the wider potential of portable computerised equipment to integrate the recording and management of trachoma photographs with field data and biological specimens.

While the overall resolution of smartphone cameras increases rapidly, an outstanding issue with smartphone photography is the phenomenon of shutter lag, a significant time interval between actuation and the recording of an image. Shutter lag is associated with image blurring as the subject or camera may have moved out of focus by the time of image recording. Recently released smartphones such as the HTC One X and Samsung Galaxy S3 are robust against shutter lag, but are currently the exceptions in a telephony market that has responded slowly to the problem. Light Field Photography (LFP) technology (http://www.lytro.com) has the potential to eliminate blurring and increase the amount of information available to the researcher. LFP cameras generate images that can be viewed and analysed on multiple focal planes. With portable LFP cameras as yet untested in a medical setting and with shutter lag a continuing problem for smartphone cameras, we continue to view digital single lens reflex (SLR) photography as the gold standard for trachoma studies. Smartphone applications such as Epicollect2 and OpenDataKit (http://www.opendatakit.org) have made attempts to integrate electronic data capture with photographic evidence, but while smartphones may be convenient for photographic purposes, a previous study found that Netbooks may be superior to smartphones for high-quality electronic data collection and our own experiences support this.

With these issues in mind, we developed ‘Eyescores’, a flexible, open and modifiable software/hardware platform for the collection and management of data, bio-samples and photographs in trachoma and other ophthalmological field studies. Integral to the system is the use of an Eye-Fi memory card (EYE-FI Inc. Mountain View, California, USA) in a digital SLR camera. This inexpensive (~$50) hardware device is used to create a local wi-fi connection between any camera with a secure digital (SD) memory slot and a netbook computer. Eyescores allows data transfers, watermarking and renaming of photograph image files in real time with almost zero user involvement. Eyescores is customisable, minimises user involvement in data entry and validates data using the powerful language of regular expressions. Data is stored in customisable formats and is automatically backed up to external solid-state USB hard drive. Eyescores performs on-the-fly encryption of subjects’ personal data using openssl (secure sockets layer) protocols (http://www.openssl.org). This makes the transfer of data files by email, cloud server or other similar electronic connections a secure and practical option for data management and sharing between sites. From the point of collection, Eyescores data is fully protected against loss or theft of the computer.

We trialled Eyescores on 93 samples from The Gambia which had been surveyed using paper forms 2 years previously. We found good accordance between the two data sets and being satisfied with the outcome of our trial, we have now fully deployed Eyescores in our ongoing trachoma field studies in Tanzania. Since February 2012 we have collected more than 800 samples without significant incident or error and with zero missing data.

Eyescores is written in the programming language Perl. It runs on very low-specification hardware, is cross platform and is reasonably simple to install. Support is available from the authors if you wish to implement Eyescores. This software is released under the GNU General Public License. To download Eyescores in its current beta version or to view examples of the data output, please visit http://chrissyhroberts.lshtm.ac.uk/eyescores/

Chrissy h Roberts, Tamsyn Derrick, Matthew J Burton, Martin J Holland

1Clinical Research Department, London School of Hygiene and Tropical Medicine, London, UK
2Kilimanjaro Centre for Community Ophthalmology, KCMC Hospital, Moshi, Tanzania

Correspondence to Dr Chrissy h Roberts, Clinical Research Department, London School of Hygiene and Tropical Medicine, London WC1E 7HT, UK; chrissyhroberts@yahoo.co.uk
Contributors ChR designed the Eyescores platform, wrote the software codes and drafted the letter. TD and MJH trialled the platform in The Gambia. TM and MJB deployed the platform in Tanzania. All authors critically appraised the letter and gave final approval of the version to be published.

Funding This work was funded by the Wellcome Trust, Grant number GR079246MA.

Competing interests None.

Ethics approval LSHTM Ethics committee—5988 The Gambian Government/MRC Laboratories Joint Ethics committee National Health Research Ethics Review Committee, NIMR, TZ Kilimanjaro Christian Medical Centre Ethics committee, Moshi, TZ.

Provenance and peer review Not commissioned; externally peer reviewed.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 3.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/3.0/


Published Online First 21 December 2012


doi:10.1136/bjophthalmol-2012-302653

REFERENCES


Eyescores: an open platform for secure electronic data and photographic evidence collection in ophthalmological field studies

Chrissy h Roberts, Tara Mtuy, Tamsyn Derrick, Matthew J Burton and Martin J Holland

Br J Ophthalmol 2013 97: 671-672 originally published online December 21, 2012
doi: 10.1136/bjophthalmol-2012-302653

Updated information and services can be found at:
http://bjo.bmj.com/content/97/5/671

These include:

References
This article cites 3 articles, 1 of which you can access for free at:
http://bjo.bmj.com/content/97/5/671#BIBL

Open Access
This is an open-access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits use, distribution, and reproduction in any medium, provided the original work is properly cited, the use is non commercial and is otherwise in compliance with the license. See: http://creativecommons.org/licenses/by-nc/3.0/ and http://creativecommons.org/licenses/by-nc/3.0/legalcode

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections
Open access (255)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/