Horizon 2020 Grant agreement no: 732613

Glaucoma – Advanced, LAbel-free High resolution Automated OCT Diagnostics

GALAHAD

Deliverable D9.7
Project intro video

Technical Coordinator: Andrew Robertson
Organisation: Gooch and Housego (Torquay)
Start date of project: 01-Dec-2016

Date of issue: 23-Jan-2018

Due date: 31-Aug-2017

Ref: GALAHAD_VIV_071_A_WP9

Leader in charge of deliverable: Bruce Napier
Vivid Components

Project co-funded by the European Commission within the Horizon 2020 programme		
Dissemination level		
PU	***Public***	***X***
PP	***Restricted to other programme participants (including the Commission Services)***	
RE	***Restricted to a group specified by the consortium (including the Commission Services)***	
CO	***Confidential, only for members of the consortium (including the Commission Services)***	

Contents

Change register

Version	Date	Author	Organisation	Changes
A_DRAFT_SCRIPT	13-Nov-2017	Bruce Napier	Vivid	Initial script for comment
A_DRAFT_VIDEO	15-Jan-2018	Bruce Napier	Vivid	Draft video circulated to consortium for comment
A	23-Jan-2018	Bruce Napier	Vivid	Updated with stills of final video

Reviewed by Consortium 13-Nov-2017; 15-Jan-2018

1. Statement of independence

The work described in this document is genuinely a result of efforts pertaining to the GALAHAD project: any external source is properly referenced.

Confirmation by Authors: Bruce Napier Vivid Components
Jason Buckley Vivid Components

2. Executive summary

A video (4 min 24 s) has been made to promote the GALAHAD project. The video gives a high level overview of the background for a non-technical audience with contact information for deeper technical enquiries.

The video is available on YouTube (https://youtu.be/m23Xe1oHbIM), and there is a link from the GALAHAD website homepage (www.galahad-project.eu).

3. Introduction

This video is the result of a collaborative effort between several GALAHAD partners. The development process for the video was as follows:

- An outline script was prepared by BN (Vivid Components) in early Nov-2017 (GALAHAD_VIV_052_A_WP9 Video outline script for D9.7).
- An updated version of this document was circulated to the consortium for comment 13-Nov-2017.
- JB visited G&H on 15-Dec-2017 and undertook the filming using Vivid equipment. AR was the narrator/ presenter, with assistance from several others at G&H.
- JB edited the video in Dec-2017/Jan-2018. This included using some stock images and video kindly supplied by the partners.
- Draft video was sent to the GALAHAD partners for comment 15-Jan-2018.
- Minor changes were suggested by the consortium; all comments were positive.
- Final version was made public 23-Jan-2018. The link was put on the GALAHAD website and YouTube.

The video (4 min 24 s) promotes the GALAHAD project, giving a high level overview of the background for a non-technical audience with contact information for deeper technical enquiries.

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4. Guiding Principles

The video had the following guiding principles:

- Provide a concise, understandable and interesting introduction to the GALAHAD project for an audience described as 'the man in the street'.
- Be sensitive to the audience who may themselves be undergoing testing for glaucoma, or have relatives suffering from the disease.
- Consist of a single video, in English, of c. 2-4 min duration which will be hosted on an existing public-facing web site.
- Raise awareness of the project, the consortium method of delivery, and the EU funding mechanism, Horizon 2020.
- Assume very limited scientific knowledge on behalf of the viewer.
- Direct viewers towards the project website for further info.

5. Outline Content

The video consists of a series of interlinking shots, including a combination of static photographs, graphics and video. The core of the video is an interview/talking head giving the details of the following content. The voice-over runs for the duration of the video, providing a structured explanation of the project, backed up by the appropriate visuals.

The video content is split into a series of sections for the purpose of production. The transitions between these are smooth and not made obvious to the viewer. Each of the sections is described below.

NB There is no time in this snapshot video to describe technical details such as the principles of OCT or the component functionality. This video is intended to provoke interest and follow up, with more information available on the website.

5.1. Lead-In: project objective

Aims:

- Grab the attention of the viewer
- Relate the purpose of the project directly to them and their families.
- Explain the role of the EU and H2020

Message:

- Glaucoma is the second leading cause of blindness (after cataracts).
    - Slow onset and gradual degeneration make it difficult to spot in initial stages
- It cannot be cured, but disease progress can be halted using low cost treatments, especially in initial stages
    - Early diagnosis greatly improves patient outcome but accurate testing is difficult, time-consuming and costly.
    - There are currently no cost-effective screening tests.
- GALAHAD is a collaborative project funded by the European Union
    - It is part of the Horizon 2020 framework programme
    - It brings together industrial companies and academic research groups from four countries
    - GALAHAD aims to develop technology capable of low cost glaucoma screening and hence improve patient outcome.

Visuals:

- Voice-over images of diseased eyes and standard glaucoma diagnosis apparatus *e.g.* Optos
- Consortium logos

5.2. OCT

Aims:

- Introduce OCT in very high level and non-technical terms
- Explain the need for research to improve resolution and PS functionality

Message:

- By exploiting the properties of laser light a technique known as optical coherence tomography or OCT can image several millimetres into the retina
    - This procedure is non-contact and label free
    - OCT has been around for about thirty years and is a very active area of research
- Currently the resolution of all but the most expensive OCT systems is insufficient for glaucoma screening

- Improving the resolution, including polarisation sensitivity and reducing the cost could make effective glaucoma screening viable
- Polarisation sensitive OCT is a recent innovation which uses the polarisation of light to gather even more information
  - Fish and some other animals have polarisation sensitive vision
  - This is probably to see transparent objects like plankton, or to improve vision in scattering environments
  - Similarly a PS-OCT system may allow improved imaging of retinal features known to be important in glaucoma

Visuals:

- Interview
- OCT retinal images
- Fish and plankton images
- Images of commercial Optos OCT systems

5.3. Machine learning

Aims:

- Introduce machine learning
- Show its relevance to cost reduction for glaucoma screening

Message:

- Machine learning technology enables computers to be trained to recognise characteristic features in images
  - This technology is advancing rapidly, for example face recognition on mobile devices
  - There are many other potential applications including medical diagnostics
  - GALAHAD aims to train computers to analyse high resolution PS OCT images to identify the early stages of glaucoma
  - This would reduce cost and could allow cost-effective screening

Visuals:

- Interview
- Generic computer and code images to signify machine learning

5.4. Photonic hardware advances

Aims:

- Explain that to deliver UHR-PS-OCT will require hardware development
- Outline the areas of photonic hardware technology development in GALAHAD

Message:

- Increasing the range of wavelengths captured in an OCT system improves the resolution of the imaging technique
  - This requires a broadband light source as well as components which can faithfully carry the whole range of wavelengths
- PS-OCT also requires that the two polarisations be carried through the system
  - Any differential loss between the two polarisations will compromise the PS information
- GALAHAD will exploit low noise supercontinuum sources to provide a new type of polarised source optimised for OCT
- GALAHAD also requires polarisation maintaining system components which can manage this wide range of wavelengths
  - Fused fibre couplers can split the light into different branches of the network and combine them together again
  - Optical delay lines allow the system to scan beams inside the retina to provide

depth information
- The diffraction grating separates the different wavelengths of light onto a detector
  - Complex calculations of the interference patterns allow the extraction of a high resolution 3D image of the back of the eye
  - GALAHAD will develop low cost high efficiency gratings and spectrometers

Visuals:
- Interview
- Video and stills of hardware in laboratory settings

5.5. Machine learning 2

Aims:
- Describe the automated feature extraction and analysis process in simple terms

Message:
- The OCT images of the retina may be represented by a simplified series of tissue layers
- This feature extraction requires expertise based on the analysis of many existing OCT images
- The simplified image can be assessed based on rules gathered from a large database of existing OCT images of healthy and diseased patients
  - This database will be extended following analysis of the new information from higher resolution and polarisation sensitive OCT
- Patients showing signs of potential disease may be sent for more detailed examinations by eye care professionals

Visuals:
- Interview
- OCT image with segmentation (see presentation).

5.6. Lead-Out and Direction to Web Sites

Aims:
- Indicate that there will be a project demonstration in due course
- Thank the viewer for watching.
- Direct the viewer to the GALAHAD project website for further information.

Message:
- GALAHAD will bring all this technology together in a project demonstration
  - More details will be revealed in due course so please check back
- For further information, or to make contact with the project, please refer to this website.

Visuals:
- Video of the re-iterating the purpose of the project, fading to a final graphic with the project website.

6. Screen Shots

The video went online on 23-Jan-2018 on YouTube (https://youtu.be/m23Xe1oHbIM), and there is a link from the GALAHAD website homepage (www.galahad-project.eu).

A few stills from the video are shown below for illustration.