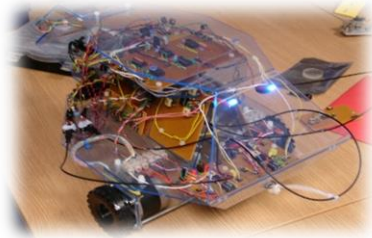


## The Versatility and Realm of Photonic Concepts



**Laser Speckle Controlled Robotic Hand**



**Laser Speckle visually impaired person's "Guide Dog"**

### **Communications**

Solitons / Non-linear Material Information Transmission / Linear Material Information Transmission, Visible spectrum / IR Fibre Optics, Satellite / Telephone communications, Networking, www, Laser Guidance Systems

### **Material Working**

Etching, Welding, Cutting, Marking, Hardening, Machining, Paint Stripping, Stone & Picture Restoration

### **Measurement, Analysis, and Inspection**

Fluorescence, Interferometry, Optical and Opto-Acoustical Scattering, Alignment, Flow Velocities, Surveying

### **Laser Physics Research**

New Laser Materials, Media, Semiconductor Lasers, Optical Fibre Lasers, Optoelectronic Circuitry

### **Medical and Dental**

Invasive / Non-Invasive Surgery, Photodynamic Therapy, Cutting, Cancer Treatment, Medical Robotics  
Water Treatment

### **Optical Computing**

Holographic Information Storage, Photon Pulsing and Switching, Quantum Computing

### **Reading, Writing, and Recording of Information**

Bar Code Systems, Compact Discs, Printers, Photocopiers, Personal Computers, Mobile Telephones, iPads,

### **Holographic Interferometry**

Phase Interferograms, Vibration Analysis, Embossed Card Security Systems, Creative Art and Design Holograms

### **Spectroscopy and Analytical Physics**

Photochemistry, Emission / Absorption Spectra / Raman Spectroscopy

### **Environmental Sensors**

Smart Structures, Intelligent Structures, Brilliant Structures, Astronomical Adaptive Optics, Space Technology,

### **Remote Sensing - Lidar and Ladar Sensors**

Ocean Depth, Temperature, Atmospheric Gases, Pollution, Hazard Gases, Ozone Layer

### **Guidance Systems**

Aeronautical Optical Gyroscope / Navigational systems, Aeronautical Fly-by-Light, Mobile Robot Laser Guidance

### **Laser Induced Nuclear Fusion**

Inertial Confinement Nuclear Fusion research (Hiper Project)

### **Isotope Enrichment**

Particularly Uranium and Plutonium

### **Plasma Diagnostics**

High Temperatures, Space Propulsion Techniques

### **Protection Mechanisms**

Monitoring and Attenuation of incoming Comets and Asteroids

### **Visually Attractive Presentation Displays**

Orchestral Concert and Special Effects Laser Displays.

**Linking Photonics Ingenuity to Designer Ingenuity**



**Optics and Photonics Up-Skilling**

**User-driven Photonics Skills Improvement via Life-long Learning**

**An Opportunity and Invitation to become involved with**

**Getting Light to Work - GLOW**



**Academi Ffotoneg Cymru @ Bangor**  
**Photonics Academy of Wales @ Bangor (PAWB)**

**Chair Professor K Alan Shore**

**Director Ray Davies**

**OPUS Support Officer Laurel Hopkins**

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PROGRAMME RHAGLEN  
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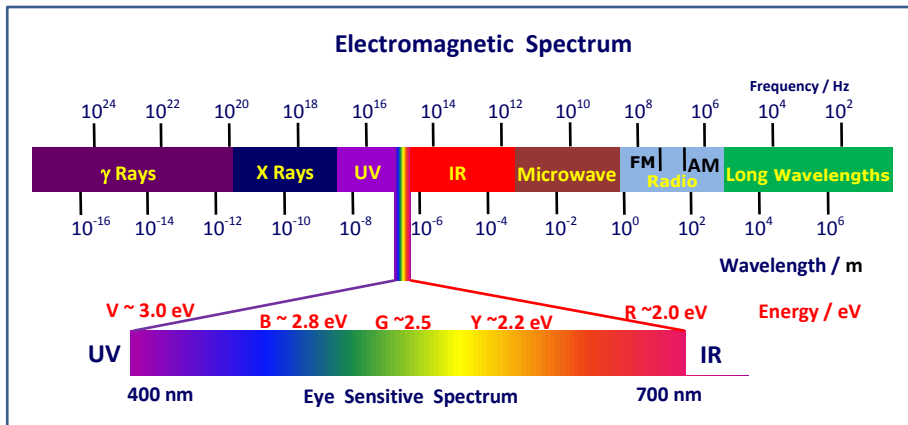
**PRIFYSGOL  
BANGOR  
UNIVERSITY**



**Ewrop & Chymru: Buddsoddi yn eich dyfodol**  
Cronfa Gymerthasol Ewrop  
**Europe & Wales: Investing in your future**  
European Social Fund

# OPUS - Getting Light to Work - GLOW

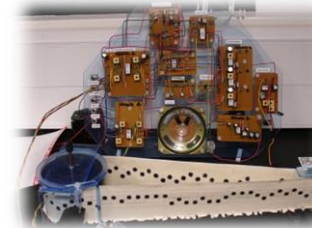
- 1 The **OPUS** initiative is specifically designed to bring Photonics into Company Work-places around Wales.
- 2 The **OPUS** Initiative is specifically designed so that Participants, drawn from Welsh Companies, can be enabled to **Learn** about, and to acquire **Experience** in, the various **Concepts of Light** which will lead to the development of new applications in the **Utilization of Light**. Participants will be encouraged to become involved in a series of **Light-based Observations, Hands-on Investigations, and the Design** of highly innovative new **Outcomes**.
- 3 **Photonics** is the **Science of the Harnessing of Light**, and involves the utilization of **LASERS** and **Optical Sources, Fibre Optic Waveguides, and Optoelectronic Transducers** – absolutely anything to do with **Light** is **Photonics**.
- 4 The Photonics Academy of Wales @ Bangor ( **PAWB** ) has produced a sequence of SIX Principles of Photonics Modules, which have been validated by Bangor University for the award of a **Certificate of Photonics at Level 4** (HE First Year Course Level) with 10 Credits awarded for EACH of the SIX Photonics Modules.
- 5 These 6 Photonics Modules will be delivered by **PAWB** through the auspices of the **European Social Fund** Initiative of **OPUS**, which is a **Work Based Learning** opportunity for Participants who are employed in various Companies throughout Wales. **OPUS** presents an opportunity for Employees to be involved with the acquisition of personal learning through a **Hands-on** experience in the **Utilization of Light** within entirely new applications.



- 6 The **OPUS style** of Presentation of each Module will involve a **Hands-on** consideration of the potential **Outcome** possibilities which might be derived from carrying out **Observations** and **Investigations** of the amazing versatility of the Light from Low Power **LASERS**. Each Participant will be encouraged to utilize their individually acquired **Observations** and **Investigations** to create a highly imaginative **Design Specification** for an entirely new and novel application of Light, thus forming the basis of a Prototype Design **Outcome** of some novel significance.
- 7 **OPUS** is designed to encourage each Participant's inherent skills of **Imagination, Insight, and Ingenuity** to design and create entirely new applications in the **Utilization of Light** in ways that are of Benefit to Mankind
- 8 The SIX Photonics Modules (presented at Level 4) consist of the following **Light-based** concepts, with the **Learning** emphasis being achieved entirely through **Hands-on** encounters with **Light** in practical involvements:-
  - 8.1 Module 1 (IPT1501) - **Low Power LASER Light Interactions with surfaces and optical components.**
  - 8.2 Module 2 (IPT1502) - **Low Power LASER Light and LED Sources.**
  - 8.3 Module 3 (IPT1503) - **Utilization of Low Power LASER Light in Optical Instruments.**
  - 8.4 Module 4 (IPT1504) - **Design and Tweak-ability of Low Power LASER Light based Components.**
  - 8.5 Module 5 (IPT1505) - **Innovative Design of novel Low Power LASER Light Applications.**
  - 8.6 Module 6 (IPT1506) - **Laboratory and Commercial Utilization of Low Power LASER Light.**

# OPUS - Getting Light to Work - GLOW

9 **Light** is involved with a huge range of considerations within our Universe, and **Light** is playing an ever increasing role in all human activities, through its significance within new Medical Diagnostic and Treatment applications, World-wide Communication Networks, and the vast array of 21<sup>st</sup> Century Applied Engineering Technologies for which **Light** has proved to provide the all-important resource for so many emergent solutions.



*Laser Music Reader for a Blind Musician*



*Laser Detector of Runway Debris*

10 Industries which utilize **Light** are major **Economic Drivers**, creating new jobs, which in turn initiate new technological solutions to global challenges in the development of new approaches to Energy, Education, Manufacturing, Medical, Agricultural, and all World-wide Communication endeavours. **Light** also is utilized extensively within our cultural heritage, through the provision of **Information Storage** facilities, as well as through the **Preservation Techniques** applied to works of art and literature.



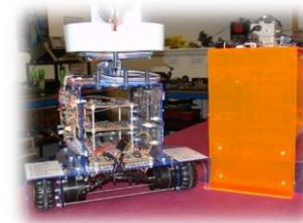
*PAWB Photonics Designers at work*



*Laser Letter Recognition / Braille Indicator*



11 **Light** has become a key enabling and cross-boundary empowering discipline in all of the Scientific and Engineering challenges which face the world today. An awareness, as well as an appreciation, of the versatility and significance of **Light** seem to offer **invaluable scope for creativity in the imaginative Utilization of Light**.



*Laser Beam Following Mobile Robot*



*International Students at a PAWB Challenge Event*

12 **OPUS** will reveal that **One can achieve anything - with a Laser.**