Helping students into the job market?

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Quality Assurance Agency (Scotland)
Enhancement theme - Employability
Major Themes

Subject specific Expertise

Project work

Transferrable skills

Work Placement

Personal development Planning

Student Enterprise

Embedded within the curriculum
A significant piece of original research leading to a thesis

- Independent thought
- Deductive reasoning
- Literature abstracting
- Research planning
- Research skills and instrumentation
- Communication (Colloquium, poster, writing)
- Publications or patents
Transferable skills Embedded in the Curriculum

Posters
Oral presentations
Essays
Chemical Newspaper
Miniproject

All involve Teamwork
Continuous motion of interference patterns using the angular Doppler effect

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Introduction
Interference patterns are used in optical tweezers to enhance trapping and manipulation of microscopic objects.
Creating motion in an interference pattern requires a frequency difference of few GHz between the co-propagating beams.
We create this very small frequency difference in the optical domain using the angular Doppler effect (also known as the relativistic frequency shift).
This frequency shift is 4 orders of magnitude smaller than the laser driving frequency.

Optical Tweezers

Optical tweezers make use of the gradient of a light field and can trap transparent microscopic objects without deformation.
In single particles, the angular momentum transfer that particles are given to the optical tweezers
is single-beam Rayleigh scattering and can be used to manipulate individual microscopic objects in optical tweezers.

The angular Doppler effect

Deleting the interference pattern through a half-wave plate transgender (1/4 WPT) allows for single particle trapping and manipulation of the optical tweezers.
The frequency of light is downshifted or upshifted by the Doppler effect, depending on whether the particles are moving towards or away from the laser.

Experimental Set-up

1. Create laser interference pattern. 2. Half-wave Plate (HWP) for the horizontal or split finely between two.
Each HWP is then inserted into a 1/4 WPT that makes them circularly polarized with orthogonal orientations.
When the interference pattern is passed through a rotating analyzer, the rotation rate of the analyzer is then measured.
The rate of rotation of the analyzer can be used to determine the angular Doppler effect.

Future Application

Future application of the technique is for trapping and manipulation of individual particles.

Posters

ELEMENTS OF A SMARTPHONE

Elements Colour Key: Gold Metal, Alkaline Earth Metal, Transition Metal, Group 13, Group 14, Group 15, Group 16, Halogen, Lanthanide

SCREEN

Indium tin oxide is a mixture of indium oxide and tin oxide, used in a transparent film on the screen that conducts electricity. This allows the screen to function as a touch screen.

ELECTRONICS

Copper is used for wiring in the phone, whilst copper, gold and silver are the major metals from which microelectronic components are fashioned. Tantalum is the major component of microcapacitors.
Miniproject

- Not research
- Students (team of 5 or 6) given a project
- Research Literature
- Allocate tasks
- Design experiments
- Do Risk Assessments
- Conduct experiments
- Write Individual and group reports
- Give a joint presentation
- Peer assess one another
Oral Presentations
Chemical Newspapers

Put together by a team of 5-6 students
Work Placement

8 months – 1 year

Vacation job 1-3 months

Period spent working outside the University
Usually in a company or Research Institute

Huge change in maturity after Placement

- Company focussed research
- Patents
- Increased profits or decreased costs
- Team work
- Reports Oral and Written
- Often students receive job offers
- Paid as an employee

Integrated into programme
Other Disciplines

Employment or Internship

Politics
International relations
Languages
History
Psychology
Law
Media
Geography
Creative Writing

European Parliament
United Nations
Embassy
Archival retrieval
Mental Hospital
Law Practice
Television
Demographic surveys / Soil analysis
Journalism
Undergraduate Skills Record
Royal Society of Chemistry
Why do Personal development Planning

If I ask a student at interview –
“Did you do any group work during your undergraduate degree?”
and they think for a while before saying
“I seem to remember putting a poster together with some other students in Second year”
I am not impressed.
If they can reply immediately with details of various activities, they are much more likely to get the job

Recruitment Officer, Quintiles, Edinburgh
Undergraduate skills record

- Student centred
- Regularly updated
- Read over before interviews etc.
- Covers academic and non-academic activities
- Paper, on-line and downloadable formats available
Showing PDP is worthwhile

- Personal Development planning is for the benefit of the students
- They need to see it as worthwhile
- Senior students acting as mentors help because they can give practical examples of where it was important (Industrial Placement or job interviews)
- A staff member committed to the scheme makes the scheme work.
Student Enterprise

Business Plan competition

• Work in groups to create a business plan
  – Idea
  – Market research
  – Costing
  – Timescale

• Substantial prizes

• Legal assistance in setting up a spin-out company
How you can help

• Raise awareness of employability issues within your department
• Think how you can include transferable skills within the modules you teach
• How can external placements be introduced into your department?
• Help and encourage students with personal development planning
• Encourage students to become involved in Student Enterprise

Teach your own subject brilliantly