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# Engineering Community of Practice within the National Digital Learning Repository

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# *Impetus for Repositories*

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- Central online service
- Hold Reusable learning objects
- Greater range of resources to each lecturer
- Improve educational standards
- Minimise cost to organisations
- Minimise the workload to individuals

# *Repository Examples*

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- Canadian repositories: MERLOT, CAREO, POOL , CLOE
- UK: JORUM
- Education Network Australia (EdNA)
- MIT Open Course Ware
- National Engineering Education Delivery System
- EducaNext

# *National Digital Learning Repository*

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- HEA pilot project
- Irish Universities & Institutes of Technology
- Online resource repository
- Sharing of teaching and learning resources
- Encourage collaboration within subject communities

Quality control by members of the Communities

# *Challenges in engineering education*

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- Make concepts interesting
- Ease transition from theory to reality
- Keeping equipment working
- Keeping up to date
- Lack of time & budget for course revamps

# *Computer based learning*

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- Also known as Computer Based Training (CBT) and Computer Assisted Learning (CAL)
- CBL is the use of learning objects to aid the learning process
- Learning objects are defined here as any entity, digital or non-digital, which can be re-used or referenced during technology supported learning

# *Learning objects*

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- Powerpoint presentation files
- Corpus files
- Photograph files
- Video and Audio files
- Web sites
- Web-building technologies, including W3C standards like HTML, XHTML, CSS, XML and other technologies like ASP and ADO
- Blogs\*
- E-books \*
- Pedagogical course management systems: Moodle, WebCT, Blackboard\*
- Computer gaming\*
- Virtual Instruments (programs)\*

# *Evolution of Engineering CoP*

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- National Digital Learning Repository
- 2007 to 2009 - Mechanical Eng CoP
- April 2010 - Engineering CoP
- Open repository / Creative Commons

# *National Level Funding*

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Strategic Innovation Funding (SIF)

National Digital Learning Respiratory (NDLR)

National Academy for Integration of Research,  
Teaching and Learning (*NAIRTL*)

Local T&L committees

# *Strategic Innovation Funding*

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- Institutional level schemes including some individual fellowships in the scheme as well e.g.: *Teaching and Learning fellowship scheme at DCU*
- A multi-annual fund, amounting to €510 million over the period 2006 – 2013, which is directed towards support for innovation in higher education institutions.

# *National Digital Learning Resources (NDLR)*

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- Recent call for NDLR LInCS (Learning Innovation Community Support)
- Bids from €3,000 to €20,000.
- Applications due by Friday 28<sup>th</sup> May 2010.
- Outcomes of applications on Friday 18<sup>th</sup> June 2010.
- Approx. 12 applications of 40 received awarded.

# *National Academy for Integration of Research, Teaching and Learning (NAIRTL)*

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- Grants from €5,000 to €20,000.
- Grants Initiative Schedule
- Call for Applications January 2010
- Application Submission Deadline 10th May 2010
- Evaluation of Grant Applications June/July 2010
- Notification August 2010
- Interim report April 2011
- Final report September 2011

# Experiment of Inertia



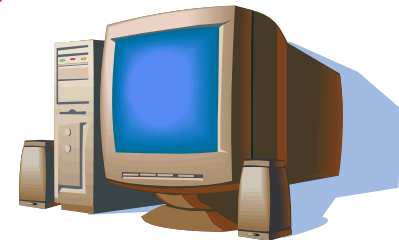
Flywheel  
Experiment



Rotational  
Sensor



Data Acquisition Box



PC

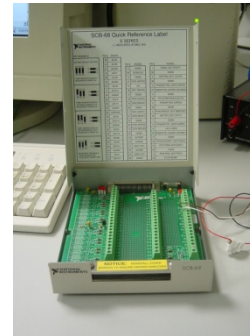
# Compound Pendulum



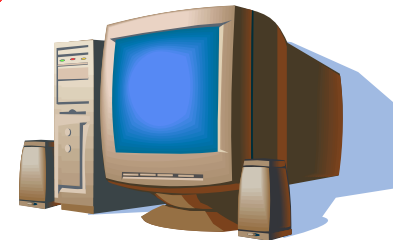
Compound  
Pendulum  
Experiment



Optical  
Sensor



DAQ Box



PC

*Virtual Instrument –  
home screen for both experiments*

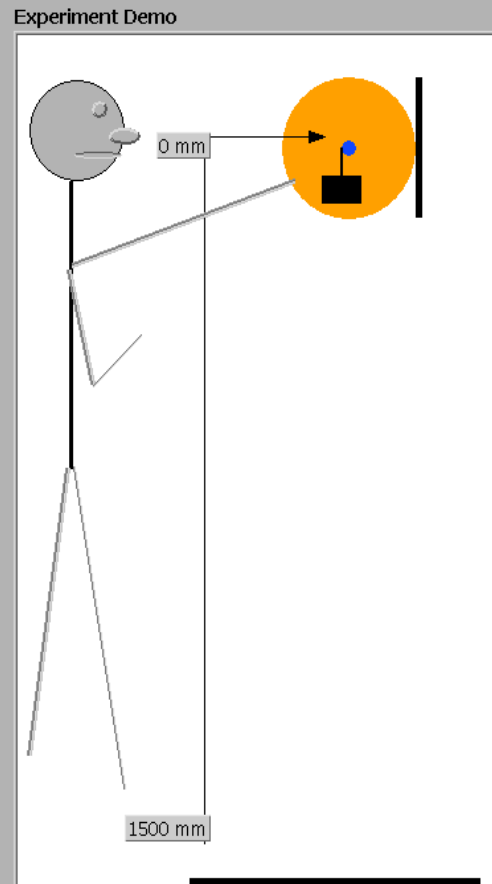
View virtual animation of experiment

View data logged experiment

View analysis with theory

STOP

# Virtual Instrument - animation



Run animation

Run

Finished with animation?

Yes

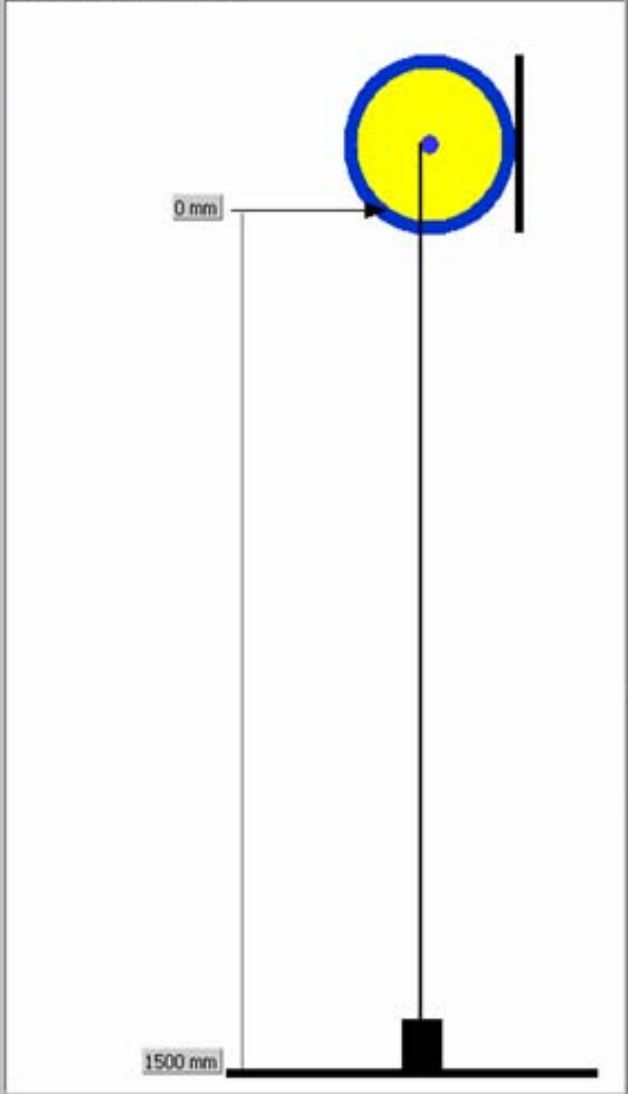
# Data log of Flywheel experiment

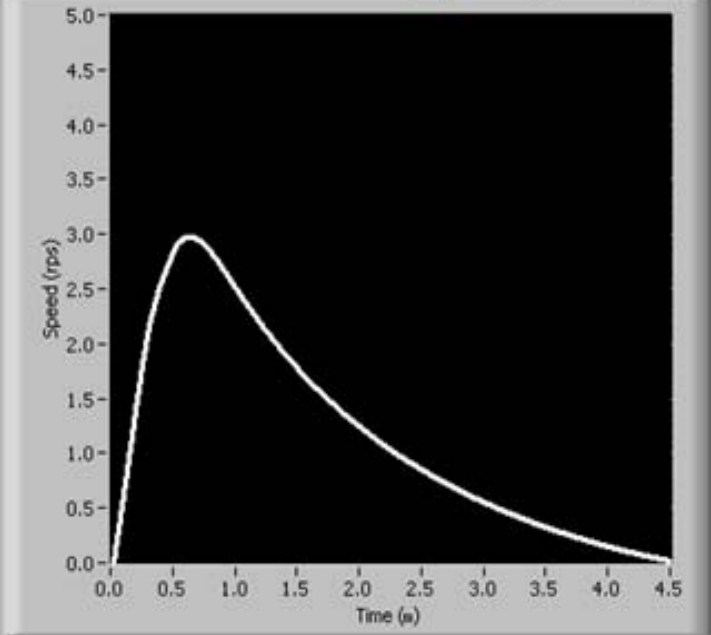
**Experiment Data Logging**

Length of rope (m): 30.47

Number of turns: 325

RPS: 0    Plot: 0





**Note:** Two straight lines may appear on the graph at 2 RPS and 4 RPS respectively. This is due to the drop off voltage levels in the pc. You may ignore these values.

Finished with datalogger?

# Virtual Instrument – theory I

## Calculation of moment of inertia theory:

**Eq. 1**  $m g h = 1/2 ( m v^2 ) + 1/2 ( I \omega^2 ) + 2 \pi n T_f$

**Eq. 2**  $1/2 ( I \omega^2 ) = 2 \pi ( N - n ) T_f$

- where
- m = mass of hanger plus load = 0.3 kg
  - g = gravitational acceleration = 9.81 m / s<sup>2</sup>
  - h = height fallen by carrier = 1.5 m
  - v = velocity of hanger just prior to impact = 0.12 m / s
  - ω = velocity of flywheel just prior to impact = 8 rad / s
  - n = number of revolutions of flywheel with carrier attached = 16
  - N = total number of revolutions of flywheel = 105.5
  - T<sub>f</sub> = frictional torque in the bearings (Nm)
  - I = moment of inertia of flywheel and axle (kg.m<sup>2</sup>)

Solve the above two simultaneous equations to get T<sub>f</sub> and I

Access password

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Solve equations

Moment of Inertia (kgm<sup>2</sup>)

0

STOP

# Virtual Instrument – theory II

## Calculation of moment of inertia theory (continued):

**Eq. 3**  $\rho = M / V$

**Eq. 4**  $I = 1/2 M r^2$

**Eq. 5**  $I_T = I_1 + I_2$

where

$\rho$ = density of flywheel material	=	7870	kg / m <sup>3</sup>
$M_1$ = mass of narrow section	=	0.46	kg
$M_2$ = mass of flywheel	=	11.58	kg
$V_1$ = volume of narrow section	=	5.895E-5	m <sup>3</sup>
$V_2$ = volume of flywheel	=	0.001472	m <sup>3</sup>
$r_1$ = radius of narrow section	=	0.0125	m
$r_2$ = radius of flywheel	=	0.125	m

Calculate moment of inertia

Calculate volumes and masses

Calculate moment of inertia

Volume section 1 (mm <sup>3</sup> )	Mass of section 1 (kg)	Volume section 2 (mm <sup>3</sup> )	Mass of section2 (kg)
58905	0.463582	1472630	11.5896

I1	I2	It
3.59375E-5	0.0904688	0.0905047

STOP

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**Thank you**