

A New Web Based Teaching Tool for  
Engineering Surveying  
NEST  
Nottingham e-learning Surveying  
Tool

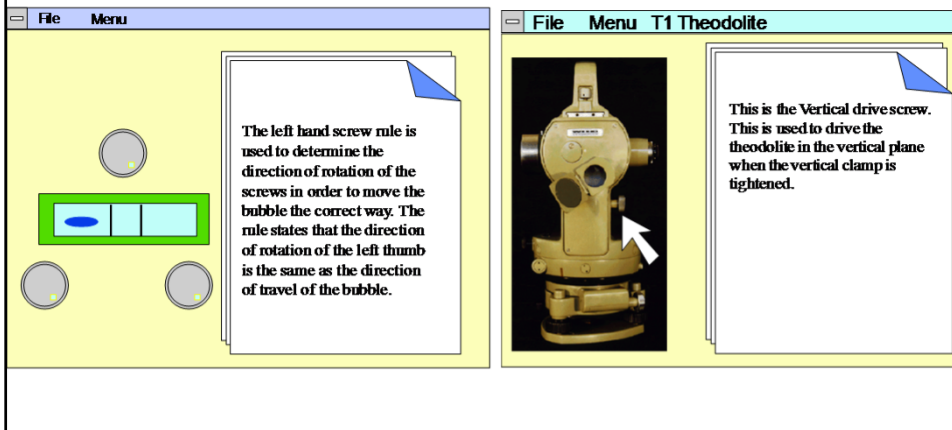
Dr Gethin Wyn Roberts and Joshua Gray



- Large teaching groups 146 civil engineering students
- 2 x 2hour practical classes, simultaneously to lectures
- 1 week field course
- Need an appreciation of the equipment and techniques

- Computer Aided Learning (CAL) packages previously developed, 1993 onwards
- Using Authorware
- PC based, stand alone
- Successfully used for many years
- BUT, Outdated in look and feel as well as the equipment used


## SurCAL, plate bubble levelling tutorial and "parts of the theodolite"



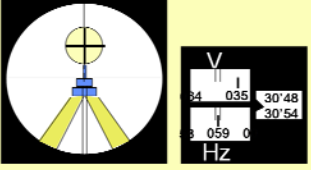
The left hand screw rule is used to determine the direction of rotation of the screws in order to move the bubble the correct way. The rule states that the direction of rotation of the left thumb is the same as the direction of travel of the bubble.

This is the Vertical drive screw. This is used to drive the theodolite in the vertical plane when the vertical clamp is tightened.

## SurCAL levelling tutorial and angle measuring tutorial



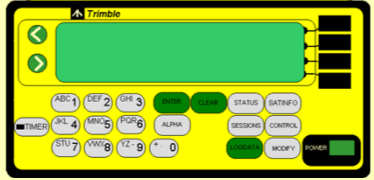
Looking through the telescope at the rocking staff, the lowest staff reading is the vertical height. The staff is rocked slowly through the vertical in order for the true vertical reading to be taken.




The next stage is to read the micrometer and book the reading as shown

At	To	Face	Rdg	Angle	Cmt
B	A	L	59°30'51"		

## TrimCAL and AshCAL Easier to animate, boxes with buttons



A Fast static survey is started from the main menu, this is called up with the "logdata" key if the power is already turned on or by pressing the POWER key.



This section is a simulation of each of the receiver's screens. The user can proceed through the screen in order or jump to a screen of particular interest.

## NEST

- Developed by Josh Gray
- University of Nottingham development grant
- Using Xerte toolkit and flash

## NEST – basic principles

The screenshot displays two pages from an interactive learning system. The left page, titled 'Equipment', contains text about the total station, tripod, and tribrach, along with an image of a green tribrach. The right page, titled 'Levelling the Total Station 1', contains text about leveling the total station and an image of a total station with leveling screws. Both pages have a navigation bar at the bottom with buttons for 'Continue' and 'Back'.

## NEST – Levelling; parts of a level and tutorial

**NEST Equipment Overview**

Click on the highlighted sections of the photograph to display annotations.

**Levelling Staff**  
A telescopic aluminium staff that measurements are taken from.  
The staff is segmented with an E-Pattern, with each square being 10m apart. It can be read directly to 0.01m and then interpolated to 0.001m.

**NEST Levelling Staff**

The correct value is therefore: 2.950m

Click button to play again

## Angle Measurement procedure and tutorial

**NEST Survey Procedure**

**Table of Contents**

- The Total Station
- Chapter Information
- Introduction
- Equipment
- Total Station Preparation 1
- Total Station Preparation 2
- Using the Plummet
- Laser and Optical Plummet
- Leveling the Tripod 1
- Leveling the Tripod 2
- Leveling the Total Station 1
- Leveling the Total Station 2

At	To	Face Left HCR	Face Right HCR	Reduced HCR	Angle	Mean Angle
W	Y					
W	X					
W	Y					
W	X					
W	Y					
W	X					

Use the telescope  
Locate the Prism above point Y

next

## Conclusions

- Currently being implemented with first year civil engineering students
- Feedback to be sought for evaluation
- Previous experience shows usage and improvement in students' abilities