Lab4: Using the TIMSP430 to measure gravity.

Background
When an object is dropped from a height it begins to accelerate. After a certain time,t, the distance it has travelled is given by the following equation:

$$s = ut + \frac{1}{2}at^2$$

where
's' is the distance travelled, 'u' is the initial or starting velocity and 'a' is the acceleration it experiences. If an object is held and then dropped its initial velocity is zero. The acceleration experienced is simply 'g' (gravity) and so the equation becomes.
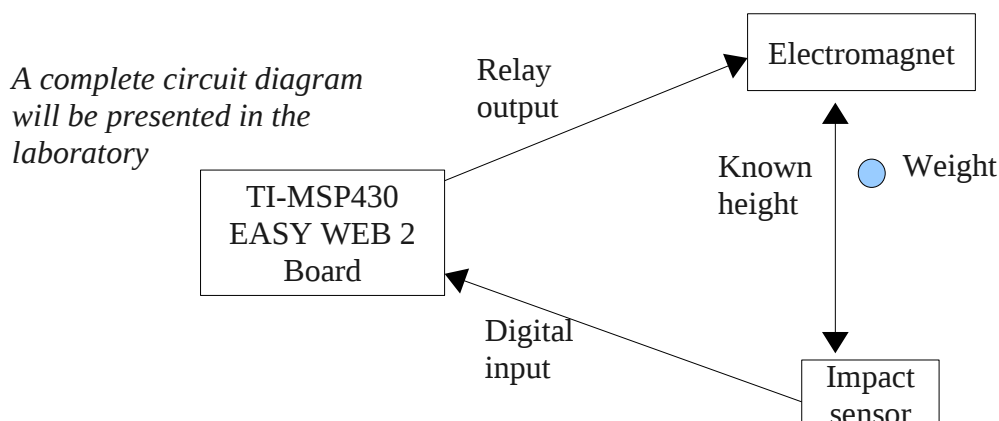
$$s = \frac{1}{2}gt^2$$

Now, if we know the distance travelled and the time for the journey we can calculate 'g' as follows:

$$g = \frac{2s}{t^2}$$

The aim of this laboratory exercise is to use the MSP430 to estimate the acceleration due to gravity.

Program execution.

A complete circuit diagram will be presented in the laboratory

The EasyWeb2 board controls an electromagnet. When a user presses a button on the board, the magnet is de-energized and the weight drops. A program monitors the impact sensor. When it detects the arrival of the weight it notes how much time has passed since the weight was released. The equation above is used to calculate gravity and the result is displayed.

Debugging. There will only be one electromagnet and one impact sensor available in the laboratory. You should debug the program using a button to fake the behaviour of the impact sensor prior to moving to performing a real test.

Initial skeleton code:
An initial skeleton program is available from webcourses. You must download this as well as the code for the display in order to complete the task.

Timing: The EasyWeb2 boards do not have a usable crystal oscillator attached to the MSP430 microcontroller. A reasonably stable internal oscillator is used to pace the microcontroller. The frequency of this oscillator varies from board to board and so calibration is required. You will be assisted with this during the lab.