

Start taking the tablets?

Many teachers, and indeed students, own smartphones and tablets. Here we look at some interfacing and analysis applications from two companies associated with datalogging hardware and software.



Figure 1 - iPad and iCelsius Pro temperature probe.

iCelsius temperature probe

The iCelsius is a temperature probe that plugs into the Apple iPhone or iPad. With the help of a free app, the phone or tablet becomes a thermometer with logging and alarm facilities. Our model was the iCelsius Pro, which has a range of -30°C to 150°C , with a claimed accuracy of $\pm 0.2^{\circ}\text{C}$ at 25°C and a data capture rate of 2 Hz. As of summer 2012, this cost £45 before VAT. For £5 less, a base model is available but it cannot read beyond 70°C . (Figure 1)

What you see on the screen when you run the app depends on whether you have an iPad or iPhone. Figures 2 and 3 show, respectively, the readout and graphing screens for the phone. These are combined into a single screen for the pad.

The graph can be scrolled and zoomed in the usual manner for iOS applications. It is also possible to set an alarm to sound if the temperature falls outwith a certain range (Figure 4). Indeed, with the iPhone, you can make it call another phone should this happen. We are struggling to find a laboratory use for this beyond “because we can”.

Data captured can be e-mailed for analysis using a package such as Microsoft Excel. We wonder

if this heralds a range of probes for tablets and smartphones. The makers of the iCelsius, a company called Aginova, seem to deal only in temperature measurement. Indeed, the iPad app has a barbecue mode. Were it not for the data export and graphing facilities, an iCelsius linked to an iPhone would be in danger of falling into the “extremely expensive thermometer” trap. The device is available from Instruments Direct Services [1], who are more often associated with Vernier systems and Logger Pro software.

Vernier Video Physics

Vernier Video Physics is an application for the iPhone, iPod Touch or iPad that lets the user

analyse video footage of a moving object. The app is available from the Apple App Store and costs £1.99 at the time of writing. Objects captured on video playable on these mobile devices can be tracked and corresponding motion graphs plotted (Figures 5 and 6). These graphs are limited to a y versus x displacement plot, x displacement versus time, y displacement versus time and x or y velocity versus time. There is a facility to set axes and to use an object of known length to scale the plots. Whilst it is not possible to zoom or scale the graphs, or to remove the join-the-dots effect loathed by physicists, files can be exported to LoggerPro. LoggerPro is extremely versatile.



Figure 2 - iCelsius readout screen (iPhone).

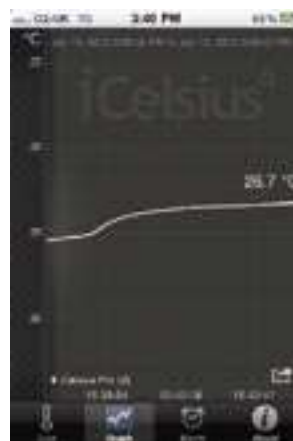


Figure 3 - iCelsius graphing screen (iPhone).



Figure 4 - Alarm facility.

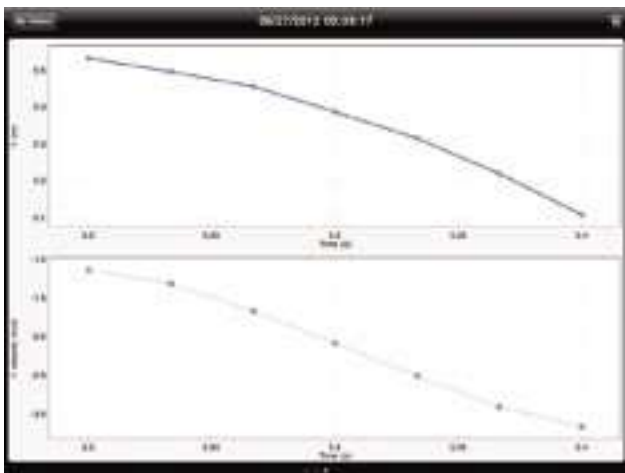


Figure 6 - Graphs that physicists will simultaneously love and hate.



Figure 8 - Sparkvue screen (iPad).



Figure 5 - a ball being tracked using Video Physics.

loggers, or with a USB link to a computer. The Airlink replaces this USB connection with a wireless Bluetooth link. The Sparkvue app is available as a free download, letting an Airlink pair with a single mobile device. Once this has taken place data can be transferred wirelessly at a rate of 100 Hz. Even if you don't have an Airlink, you might like to download the app as it can use the iPhone's accelerometers as sensors. We had fun (carefully) attaching an iPhone to a spring then logging acceleration during simple harmonic motion.

The Sparkvue app allows a user to specify the sensor, measurement units, capture rate and duration of an experiment. Data can be displayed on a graph (Figure 8) or on an analogue or digital readout. Helpfully, it can be exported via e-mail as a CSV file. Though we tried the Airlink with a force sensor, we think that it would be particularly useful when used with accelerometers or with sensors that measure breathing rate, pulse and so on. The Airlink currently costs £169.15 ex VAT.

Note that Pasco equipment is now distributed by Scientific and Chemical [2] in the UK.

Coming soon...

Just as we were about to go to press, we had a call from Instruments Direct, offering to send us a Vernier Labquest 2 for test. This device has built-in Bluetooth and Wifi, promising to allow users to "Collect, analyze, and share sensor data wirelessly on any device with a web browser". We hope to test this in the near future.

Whilst Video Physics is nowhere near as powerful as the motion analysis facilities in LoggerPro, or indeed as those in the quite wonderful free Tracker package (see SSERC Bulletin 225), it is still a very useful app. Given that iPhones and other idevices generally have the ability to shoot video, it is certainly worth a look at the price.

Pasco Airlink

The Pasco Airlink 2 (figure 7) is not designed solely to operate with iPads and so forth but that will be our focus. The company's Passport sensors are generally used with either the Spark or Xplorer data



Figure 7 - The Pasco Airlink 2 and a force sensor.

References

- [1] www.indis.co.uk
- [2] www.scichem.com