Applications and specifications for pendulous devices on the nanoscale

S Hendry
School of Physics and Astronomy
University of Southampton
Southampton
SO17 1BJ
8th February 2009

Applications of pendulums on the nanoscale

There are several possible applications for nano-pendulums, however this report aims to discuss only those applications most relevant to the modern world, especially everyday life at the nanoscale. These pendulous devices, or 'pendulums' as they shall henceforth be known, can make a massive difference to groups of people who have a height of less than one micron, influencing their lives in many ways.

The first application that will be discussed is the use of nano-pendulums in nanoscale clocks. Obviosuly, pendulums have been vital to the keeping of time for hundreds of years. The first pendulum clock was invented in 1657. Although the idea for a pendulum clock had been suggested by Galileo earlier in the 17th century, the invention of the pendulum clock is generally attributed to Christiaan Huygens. This was an important breakthrough in timekeeping for life on a regular scale (people with a height between 1mm and 1km), however, due to the large nature of these pendulums, nanoscale individuals did not benefit much from these advances, and many still had to make do with rudimentary sundials.

Therefore, a possible application for nano-pendulums would be a nanoscale clock, most probably a grandfather clock, as the large pendulum length would make it slightly easier to work with. In addition, it solves having to work with the fiddly mechanics of the more common cuckoo clock.

The concepts and feasibility of the nano-grandfather clock will be discussed later in this document.

A second possible use for nanoscale pendulums is as a dowsing pendulum, such as that used by Prof. C. Calculus in many works by Georges Remi (Hergé). Such a device can be used to find various things when used by a competent doswer, such as the aforementioned Calculus. Although the various difficulties of constructing a nanoscale Calculus are not discussed in this paper, due to its exclusive focus on pendulums, there are obviously some severe problems that must be overcome.

A final possible use for these nanoscale pendulums is as a metronome for musicians working on a scale of between several tenths of a nanometre and up to a micron. Regular metronomes are highly

useful for timekeeping on the regular scale, and due to their small size and enhanced portability, they can be used on both nanoscales and nanoarpeggios. Although less important for those who are already skilled in the field of nanomusic, such as Prof. Johann Sebastian Bach, and Prof. Ludwig van Beethoven, in the learning of a new piece by a newcomer to the field, they can indeed be invaluable.

Nanoscale Grandfather Clocks

Concepts and Feasibility

The basic concept of a nanoscale grandfather clock is to construct a grandfather clock on the nanoscale, possibly at a height of around 8nm. This would involve not only constructing the pendulum however, but also the casing and clock mechanisms contained within the body of the clock. The mechanism must also be corrected to ensure correct timekeeping despite influences such as Van de Waals forces. However, if the decoration on the case was kept to a minimum, then it would seem a feasible proposition, even though it would be sacrificing form for functionality. As technology improves, however, it should be possible to overcome even these drawbacks.

Picture Source http://en.wikipedia.org/wiki/File:Longcase.jpg
Released under GNU public license

Nanoscale Dowsing Pendulums

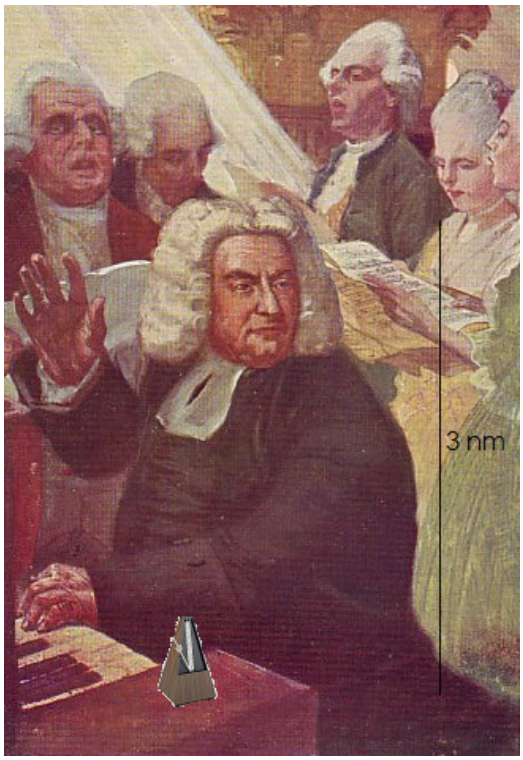
Concepts and Feasibility

Dowsing has long been a scientifically established form of resource location. Although the various advantages and disadvantages of dowsing will not be discussed here, more information can be found in *(Tintin: Prisoners of the Sun, Hergé, 1949, Casterman, ISBN 2-203-00113-5)*. The advantage of a nano-pendulum as opposed to a regular pendulum is that it can be used to dowse for objects on the nanoscale, as well as being able to divine resources on the regular scale to a much higher precision, saving time digging fruitlessly for ores and the like that are not to be found in that exact area. The main problem would be in constructing a nanoscale Professor Calculus or suchlike to operate the device. Living beings are much

harder to construct on this scale than regular pendulums, and so it seems possible it would have to be used by some naturally occurring life such as a bacterium. The difficulties of teaching a bacterium to successfully use a dowsing pendulum will not be discussed here.

Nanoscale Metronomes

Concept and Feasibility



The problems inherent in constructing a nanoscale metronome have been present since the late 1700s, when Prof. Johann Sebastian Bach suggested the idea of using a pendulum of a few nanometres long to keep time to a much higher accuracy. However, the technology existing at that time was not such that the idea was feasible. With today technology, however, it seems possible that a timekeeping device utilising the ideas put forward could successfully be constructed, and more importantly, calibrated. Although it has been pointed out that sound waves have a wavelength in the order of metres, thus rendering a nanoscale pendulum not only pointless, but also downright silly, it is still believed that such a device is not only feasible, but increasingly necessary in today's society.