Classical Mechanics, PHYB54
ESP8266 Project

Professor Hanno Rein

You have the option to work on a project during PHYB54. This is completely optional. Doing a project is not a requirement for achieving a full mark in this course. However, if you choose to do this project, you can boost up your final mark by up to 10%.

The goal of the project is to use an ESP8266 micro-controller and an accelerometer to measure some dynamical system similar to one we encounter in the lectures. For example, this could be a rocket, a projectile, or two coupled harmonic oscillators. You will get points for the creativity and how well the project is executed. I provide you with the following parts for the duration of the course:

- WEMOS D1 mini board with ESP8266 microcontroller

- MPU6050 gyroscope and accelerometer

- USB cable (as soon at it arrives)

- Lithium Ion battery and battery shield (as soon as it arrives)

At the end of the course you need to return the parts. If you want to keep them, you can do so by paying $20. Should you require any other parts or tools such as soldering irons and small electronic components, you can use everything you can find in the physics lab. Please consult with Ken Vincent or Professor Rein before using any of the physics labs.

To get the software development environment running on your computer, you need to do the following.

- Download and install the driver for the USB/serial interface chip CH34x. Instructions can be found at `https://kig.re/2014/12/31/how-to-use-arduino-nano-mini-pro-with-CH340G-on-mac-osx-yosemite.html`

- Download and install the Arduino IDE from `https://www.arduino.cc`

- In the Arduino IDE, go to the Boards Manager to install the ESP8266 board.

If you do not have a computer to install this IDE on, you can use the computers in the physics lab (however, you still need to install the software on those computers yourselve).

What you end up doing for this project is up to you. However, the ESP8266 has a built in wi-fi module which allows you to transmit and receive arbitrary information. I've coded up a simple proof of concept program that reads out the accelerometer data and sends it to a Jupyter notebook where the data can be visualized. You can use this as a starting point for your project. See `https://github.com/hannorein/PHYB54acc`.

The deadline for this project is April 5th 2018. You can either present your project in class or during Prof. Rein's office hours. A presentation in class is preferred.