

OIST

# An open-electronics temperature controller


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Hsieh-Fu Tsai & Amy Q. Shen  
Okinawa Institute of Science and Technology

# Schematics

PC

Versatile  
experiment  
control software



PC

Versatile  
experiment  
control software

The diagram illustrates the components of a 'Suitcase size platform'. It features a central blue rounded rectangle containing three sub-components: a purple rounded rectangle labeled 'Solenoid valve', a green rounded rectangle labeled 'regulator', and a red rounded rectangle labeled 'Microfluidic chip'. To the left of this central assembly is a light green square labeled 'Temp control'. Below the central assembly are two light green rectangles: 'Machine vision & Optical sensor' on the left and 'Electronics for electrokinetics' on the right. All components are set against an orange background.

```
graph TD; subgraph Suitcase_size_platform [Suitcase size platform]; direction TB; subgraph Central_Assembly; direction LR; Solenoid_valve[Solenoid valve]; regulator[regulator]; Microfluidic_chip[Microfluidic chip]; end; Temp_control[Temp control]; end; Machine_vision[Machine vision & Optical sensor]; Electronics[Electronics for electrokinetics];
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The diagram shows a blue rounded rectangle representing a microfluidic chip. Inside the chip, there are three components: a purple rounded rectangle labeled 'Solenoid valve' at the top left, a green rounded rectangle labeled 'regulator' at the top right, and a red rectangle labeled 'Microfluidic chip' in the center. The red rectangle has a white border.

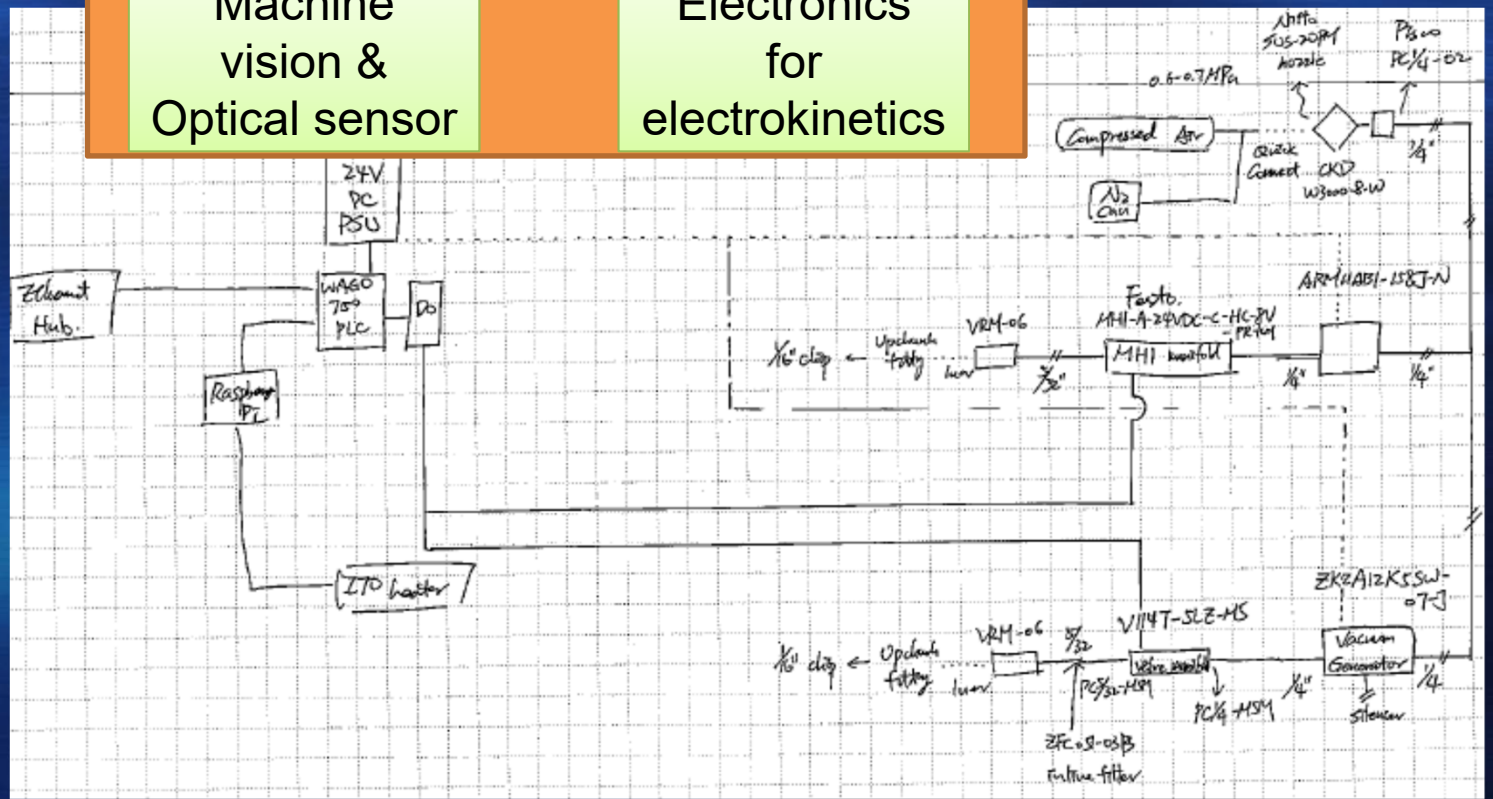
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# Machine vision & Optical sensor

# Electronics for electrokinetics

## Portable Pressure source



# An open-electronics temperature controller

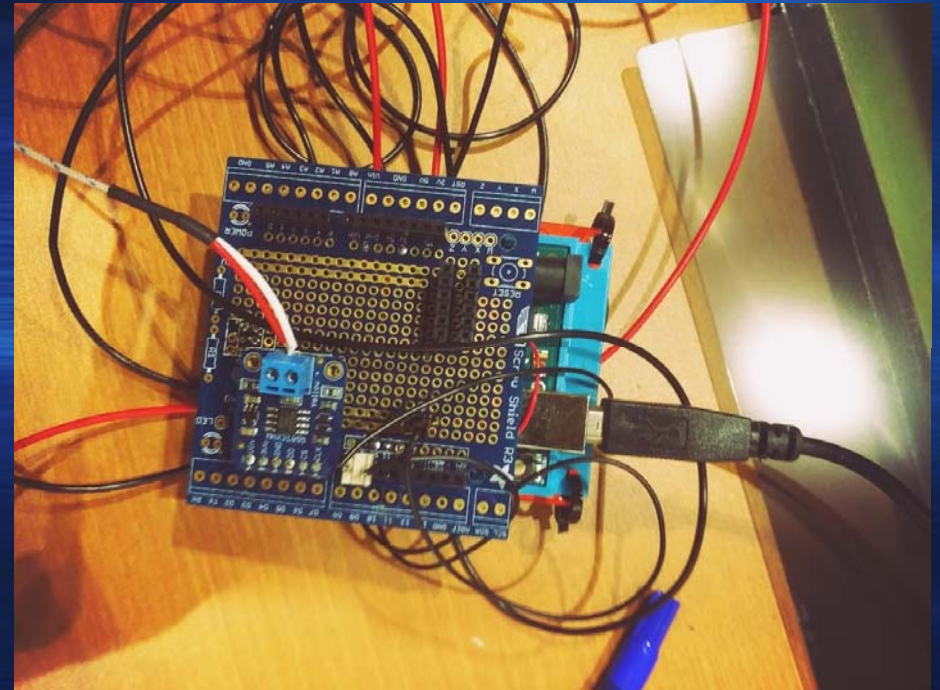
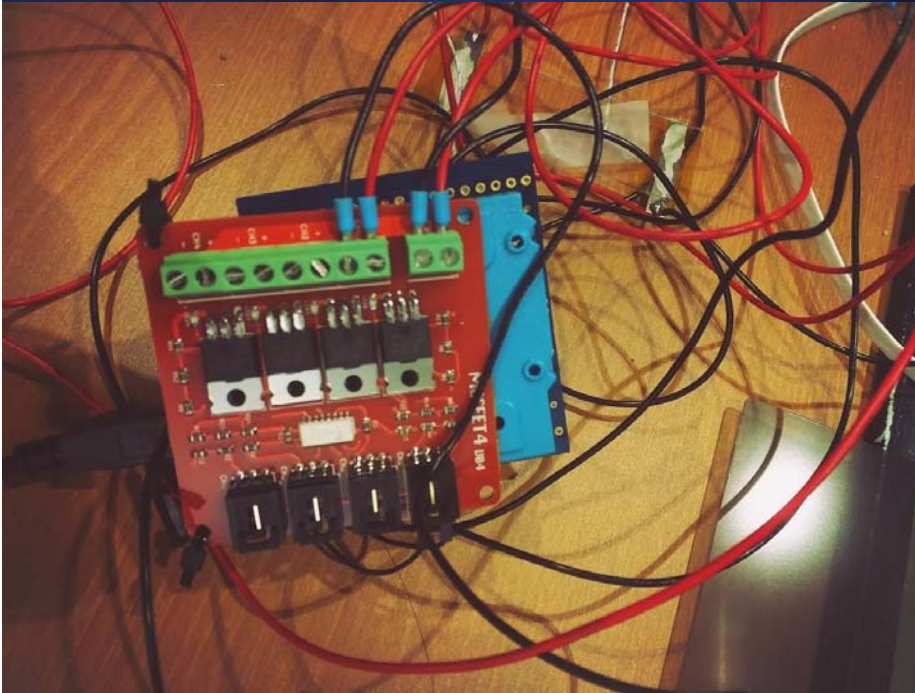
- Arduino powered temperature controller
  - MAX31855 thermocouple amplifier
  - 0.25° C resolution
- Python based control GUI for PC and mac.
- Utilize Python, PyQt4, Pyqtgraph, lxml, numpy
- Fast plotting from Pyqtgraph and Numpy.
- Features direct control with fuzziness and PID mode.
- Supporting K type thermocouple (one-wire sensor, IR thermopile etc)
- Transparent ITO heaters with 12V or 24V PSU

Code: (current)  
Python:496 lines  
Arduino:138lines





# Photo of the Arduino board



MOSFET  
to heater

Thermocouple  
amplifier

Arduino UNO  
Logic  
processing

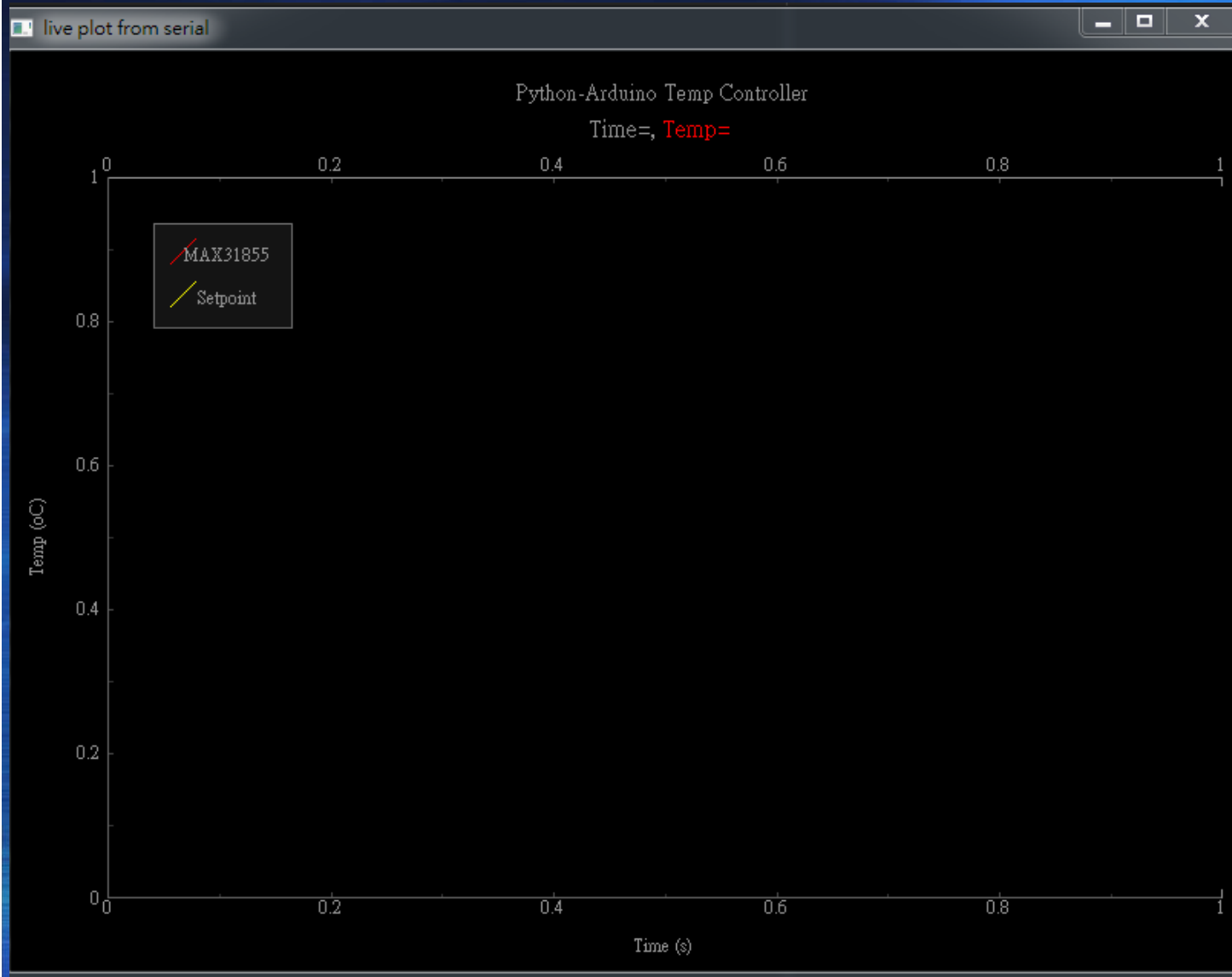
Serial comm

PC

Python GUI



OIST



Temperature Co...

About

Port: COM7 **Connect**

Setting **Load** **Save**

MAX31855

n/a + 0.00 = n/a

Sp 37.00 **ON**

☒ Direct Control ☐ PID

Kc: 2.0100

Ti: 0.0300 **AutoTune**

Td: 0.0100

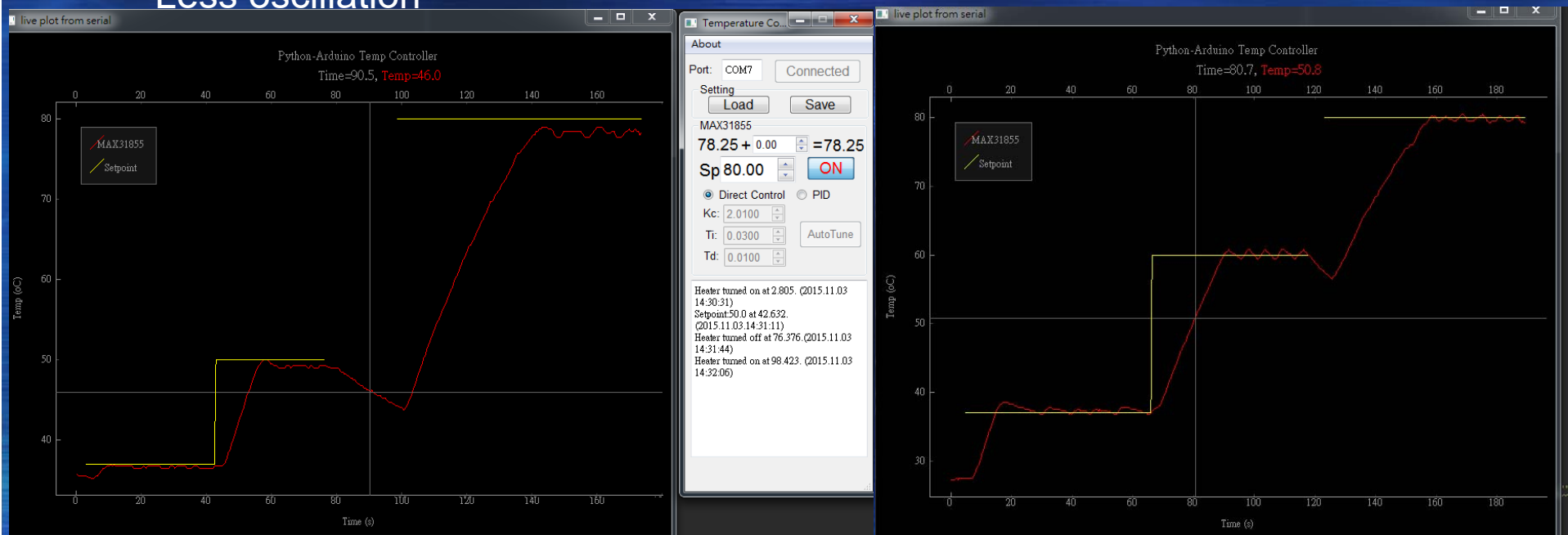
# Fuzziness in direct heating decreases oscillation

## With fuzziness code

- PWM output modulated as temp closes to setpoint
- No overshoot
- Less oscillation


## Simple control

- Simple yes or no logic control
- Have oscillation though less significant at high temperature








# Github

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## Okinawa Institute of Science & Technology

Okinawa, Japan <http://www.oist.jp/> [webmaster@oist.jp](mailto:webmaster@oist.jp)

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Lightweight, Portable, Flexible Distributed/Mobile Deep Learning with Dynamic, Mutation-aware Dataflow Dep Scheduler; for Python, R, Julia, Go, and more  
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### Python-Arduino-TempController

 PRIVATE ★ 0 0  
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 R ★ 0 1  
Forked from [maggimars/SiphamiaProject](#)  
RNA-seq Differential Expression project with Siphamia tubifer and Photobacterium mandapamensis  
Updated on Nov 2

### mucrosquamatus-expression

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Examining gene co-expression in Protobothrops mucrosquamatus

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 26 >  
