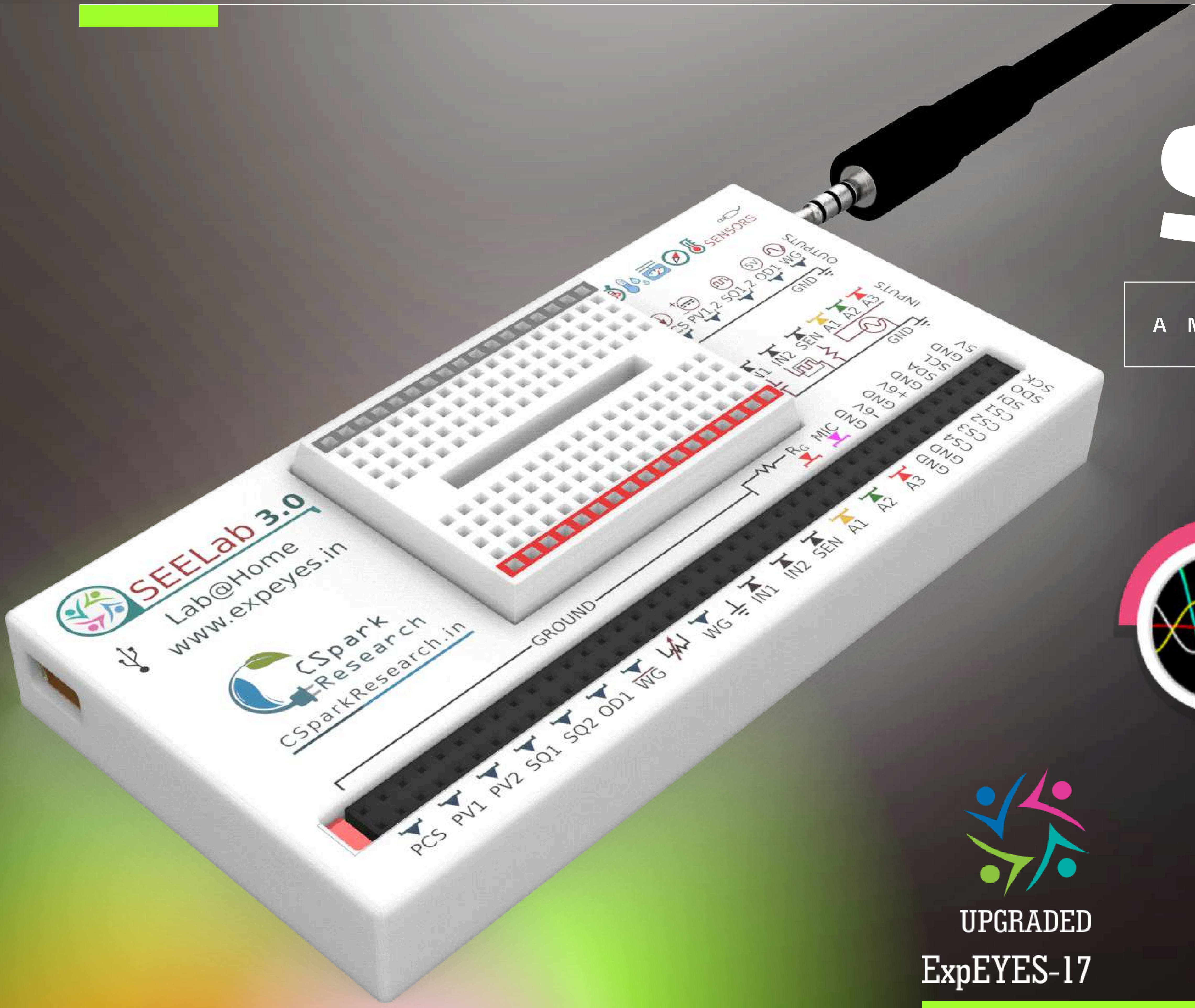
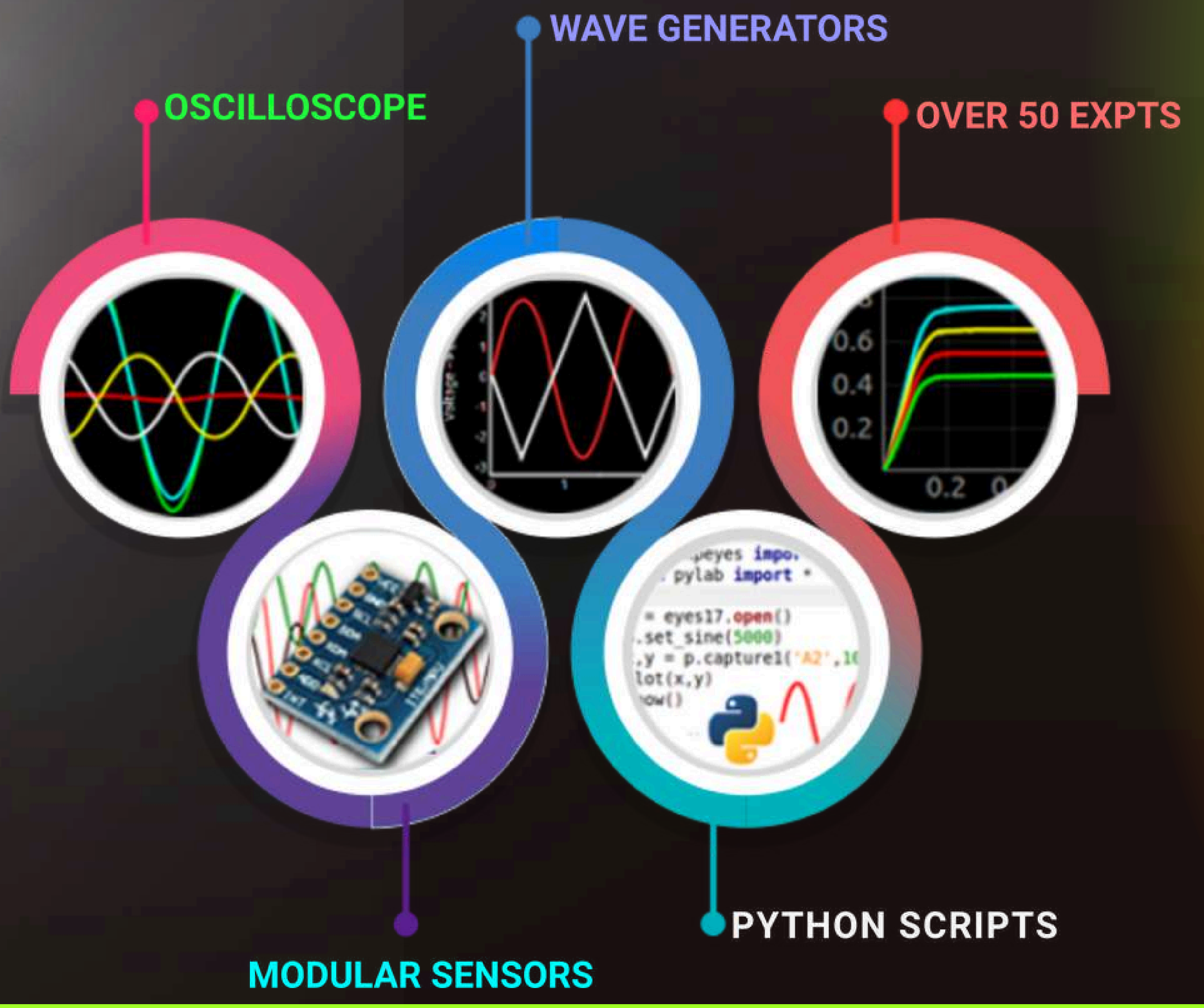


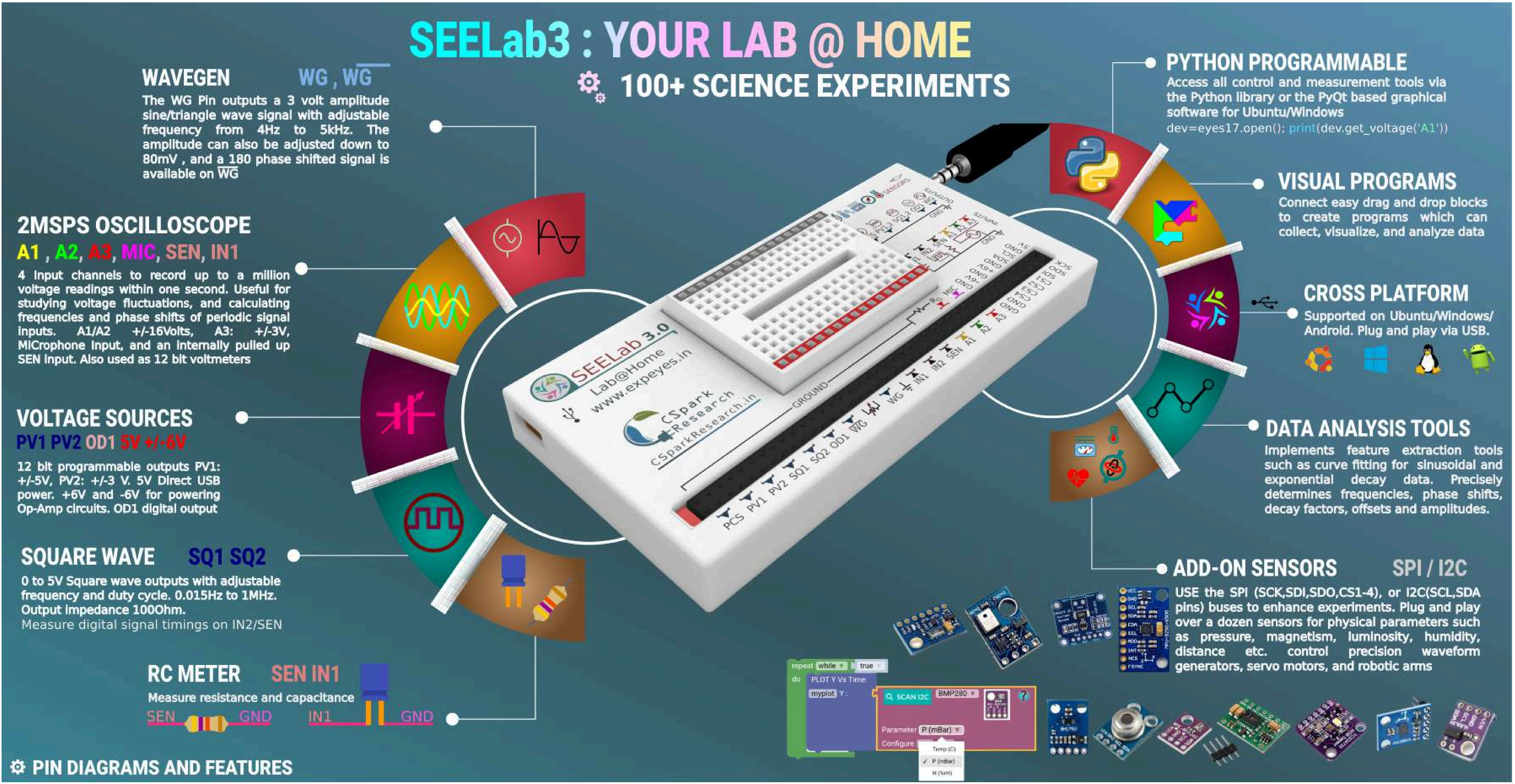
SEELab3

A Multi Purpose Test and Measurement Tool



UPGRADED

ExpEYES-17



Pocket Sized Version : SEELab3

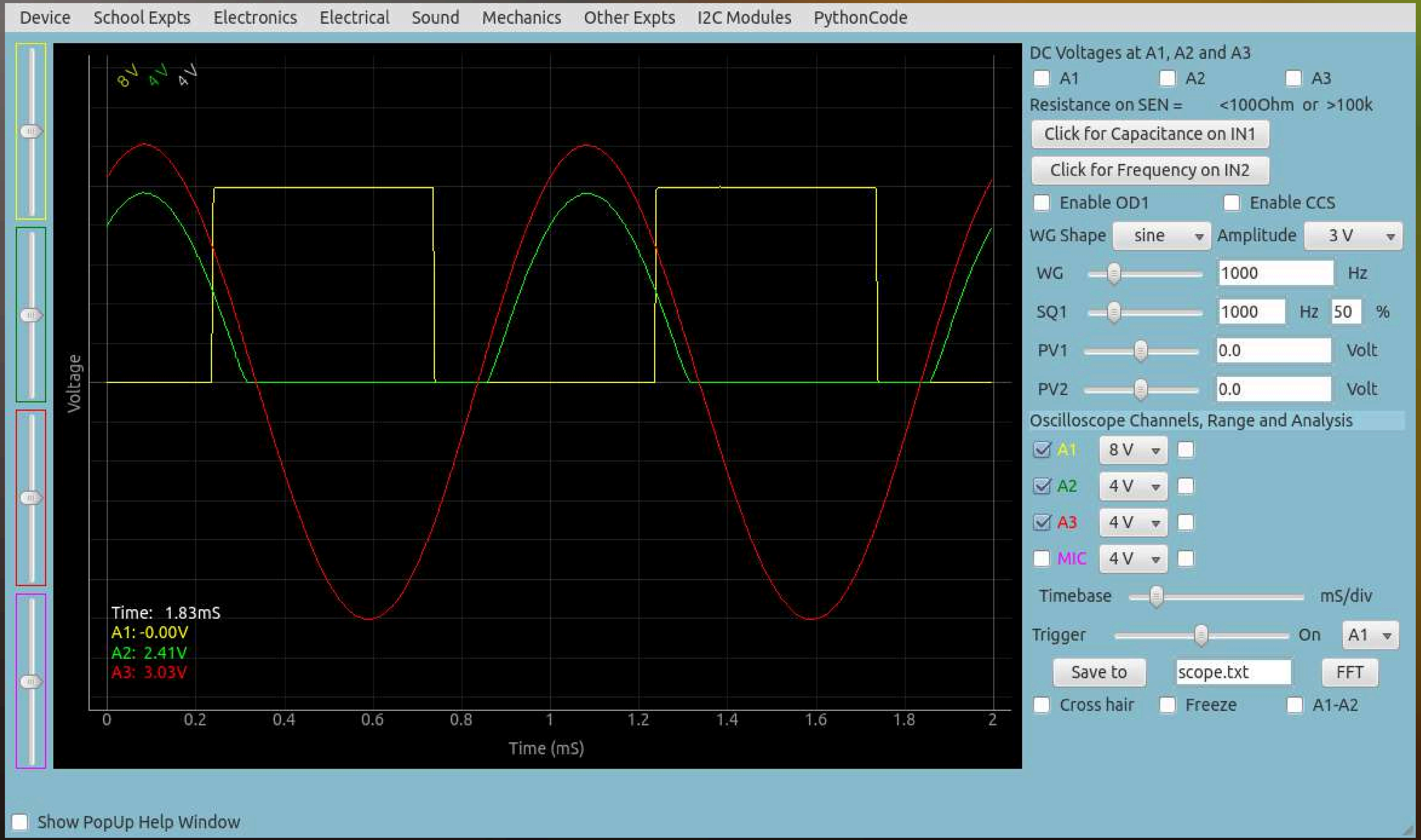
Successor to ExpEYES-17

USB Powered. Swiss army knife of test and measurement equipment.

The SEELab3 kit Contains an essential set of tools for Electronics and Science Labs

Input Instruments

- 4 Channel Oscilloscope
  - Up to 2 Million Voltage Readings per second.
  - 2 +/-16 Range Inputs (A1, A2)
  - Software adjustable Input range
  - +/-3V A3 input with Manual gain
  - MIC Input for condensor microphones
- Capacitance Measurement 10pF to 100uF.
- Resistance Measurement.
- Frequency and Timing Measurements.
- 12 bit voltmeter and data logger.
- Analytical tools for extracting frequency, phase difference, amplitudes, Fourier transforms etc.



Desktop Application for Windows/Linux showing signals input to A1, A2, A3

Compatible with PCs as well as Android Phones.

Output Instruments

Waveform Generators

- WG: +/-3V Sine Wave generator. 4Hz to 5000Hz. Amplitude attenuable to 80mV
- SQ1,SQ2: 0-5V Square Wave outputs. 0.1Hz to 1MHz
- Optional Add-On Module for 24-Bit sine wave generator up to 2MHz. 0.015Hz step size.

Voltage Outputs

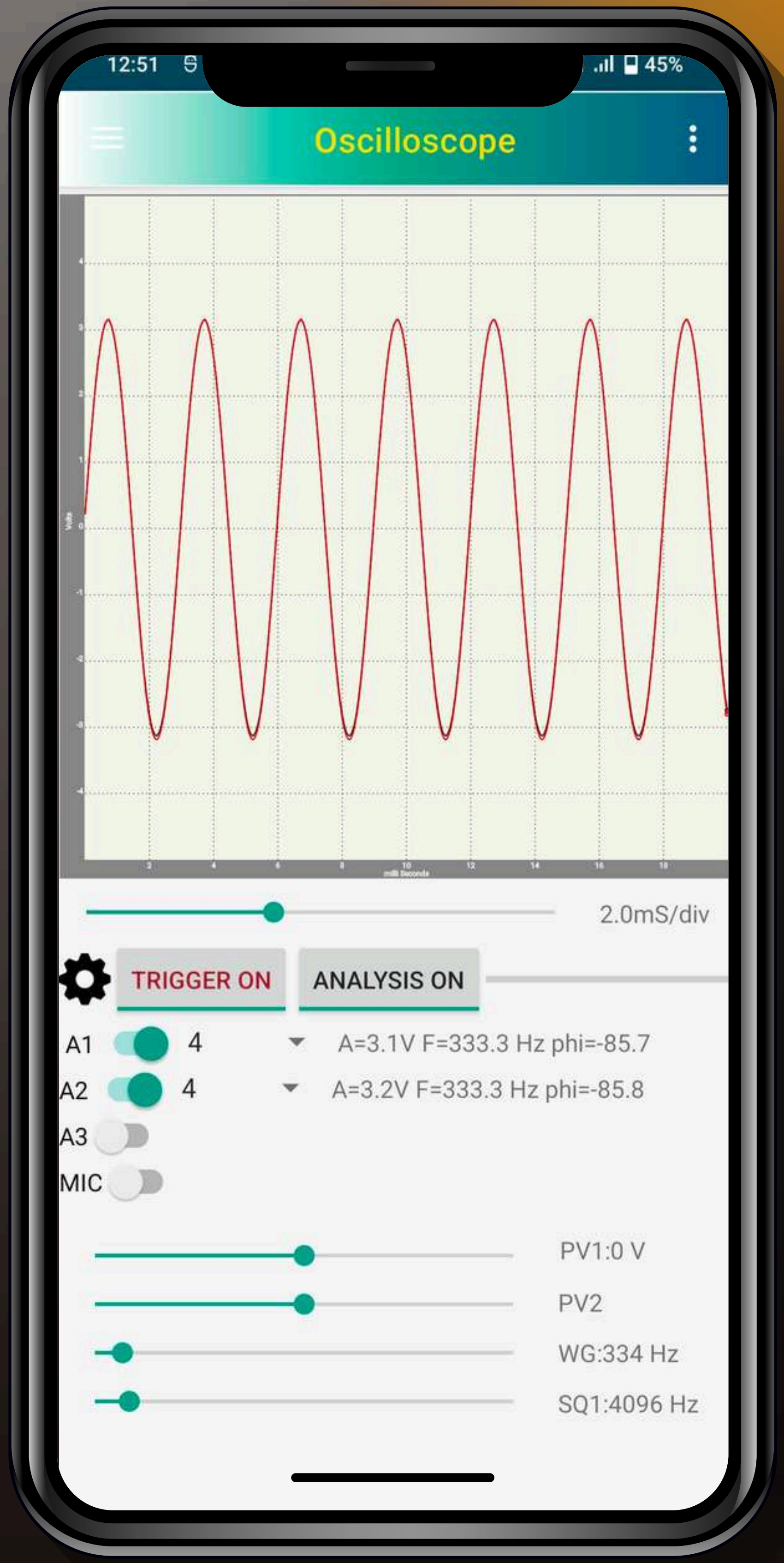
- PV1 : 12 bit, +/-5V voltage source. 20mA
- PV1 : 12 bit, +/-3V voltage source.
- PCS: 12 bit constant current source. max 3mA

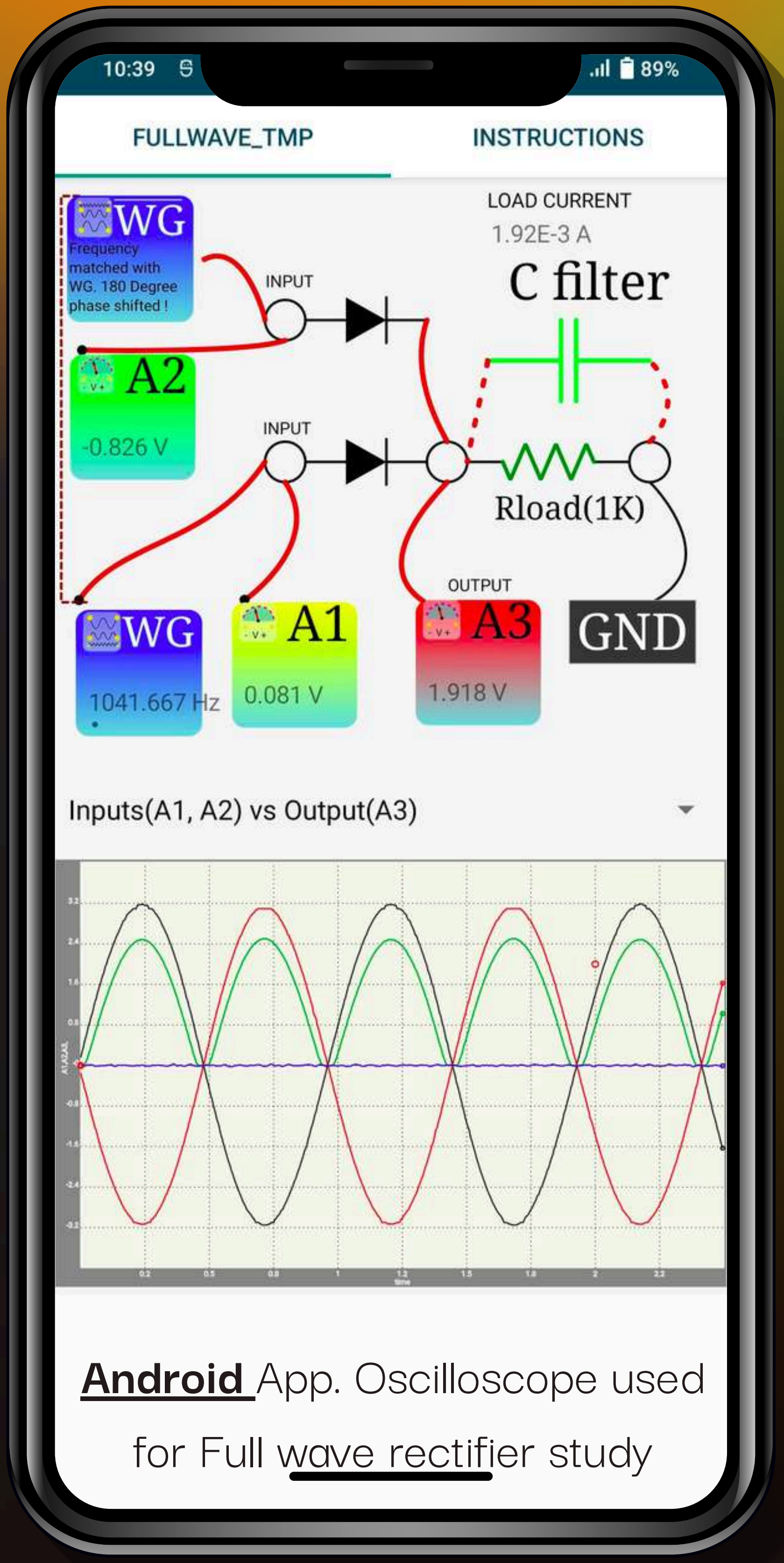
Digital outputs ; 0-5V outputs

- OD1, CS1, CS2, CS3, CS4

Volta

Download the SEElab 3.0 App
3000+ active community (Google Play)

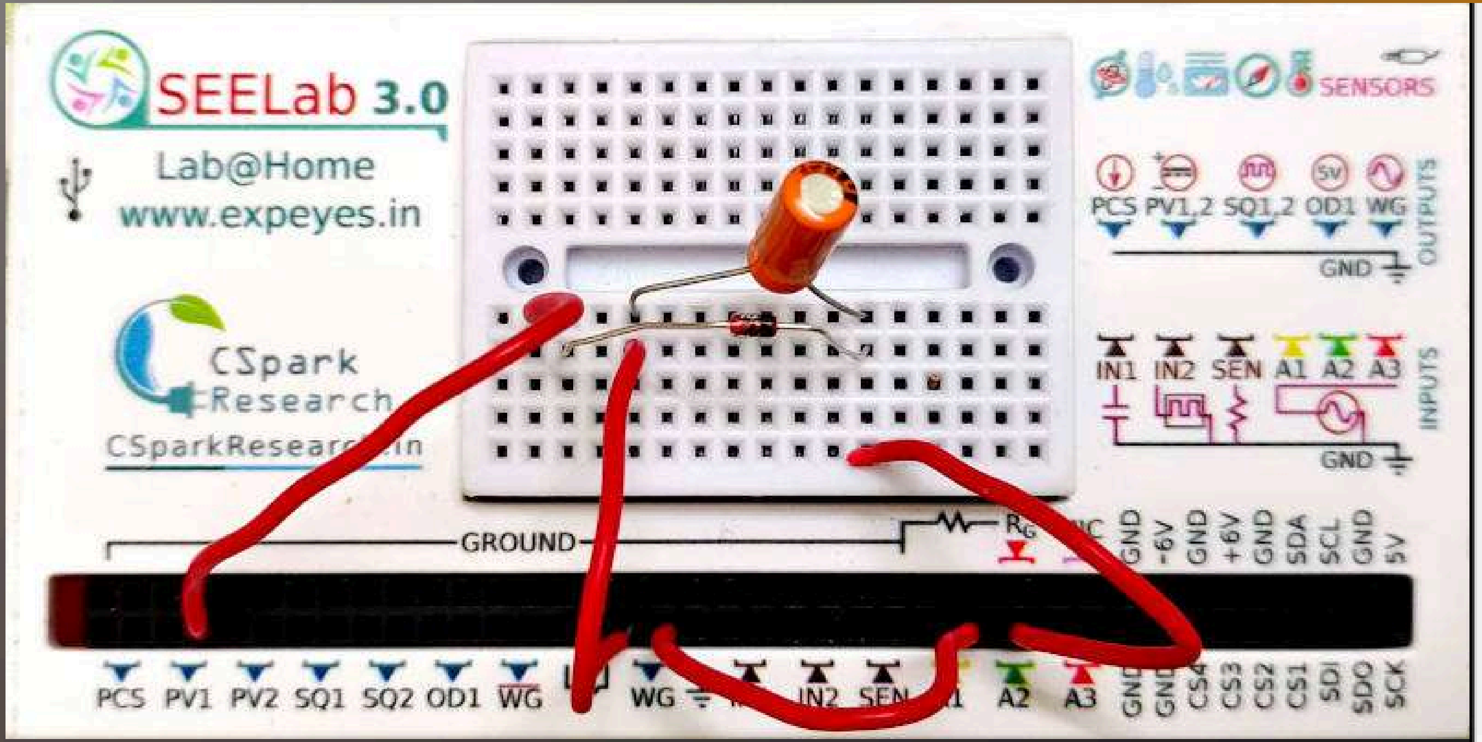


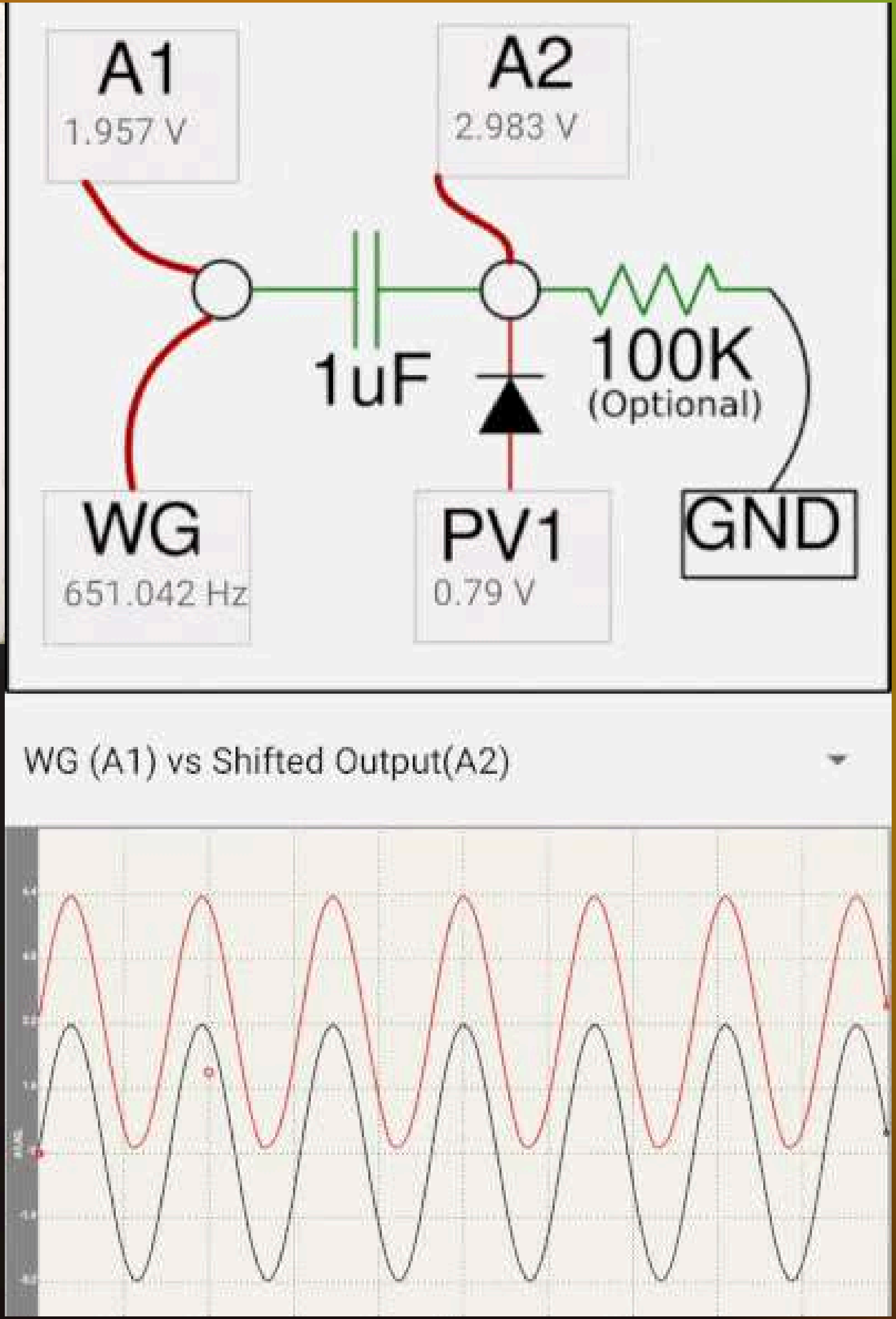


Over a 100 experiments can be performed with this collection !

Electronics 101 Lab

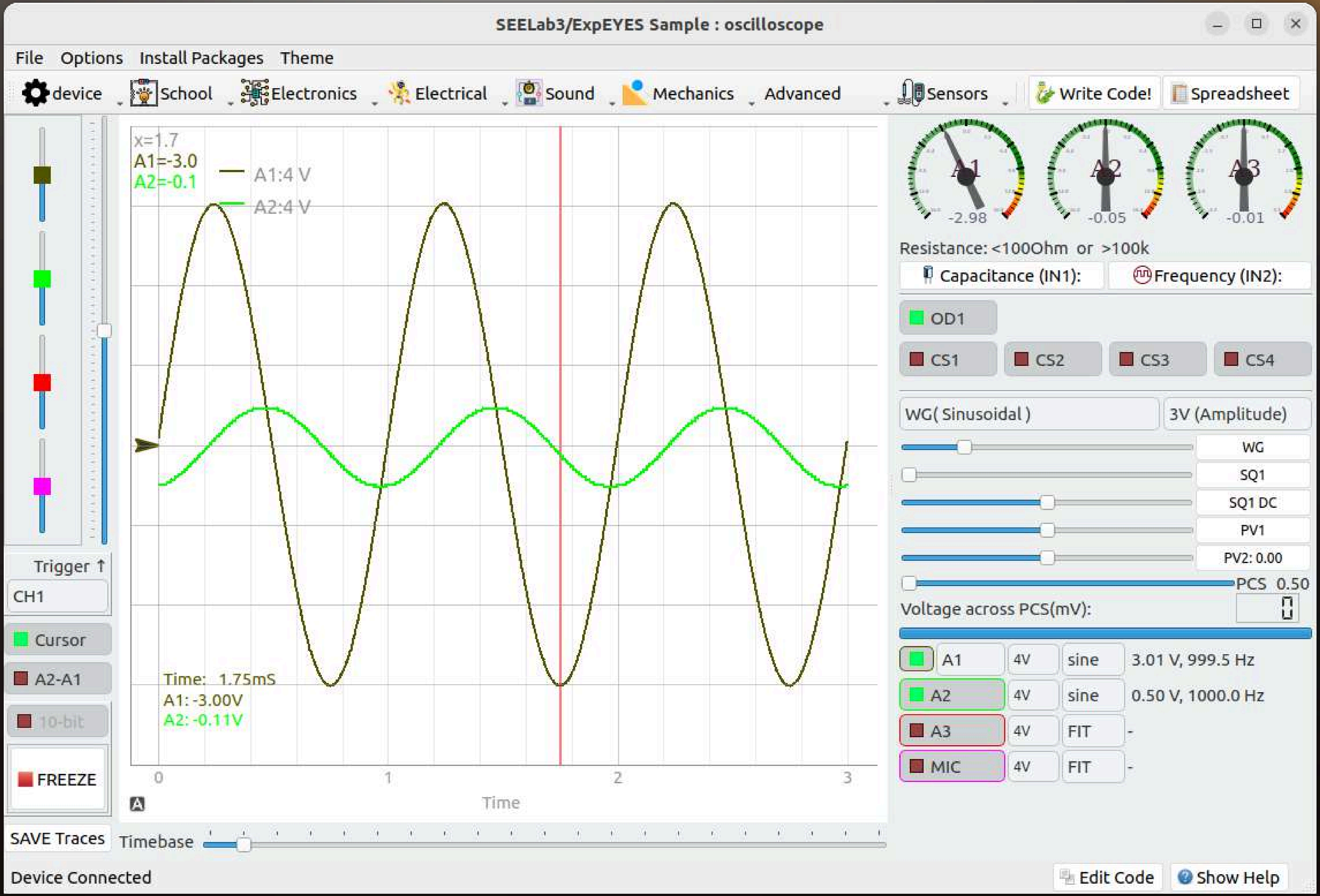
- Transistor CE Characteristics
- Full and Half Wave Rectifiers
- Opamp amplifier circuits
- Diode Clipping/Clamping Circuit
- Summing Amplifier
- Logic Gates, Clock dividers
- Many more characterisation experiments can be performed using the voltage sources, waveform generator, oscilloscope, and timing measurements
- Embedded Circuit simulator
- Programmable in Python/Visual Programming





Diode Clamping Circuit and Measurements

New Desktop App



Installation

Currently available on PyPi

WINDOWS

- Install Python(Make sure

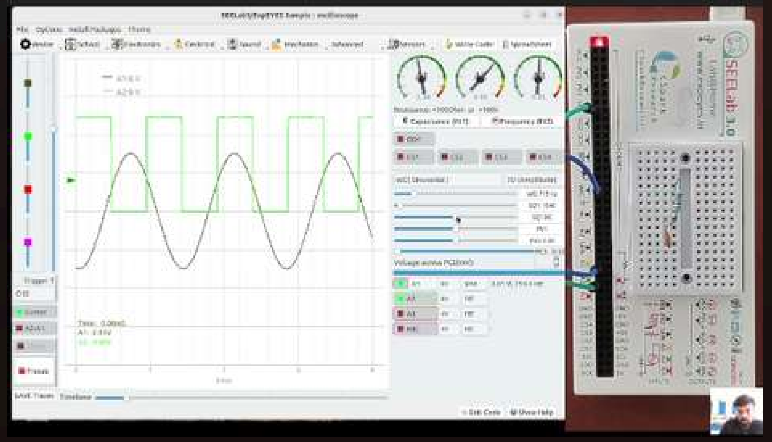
The path option is enabled

- open cmd
- python -m pip install --upgrade pip
- python -m pip install seelab_examples
- python -m seelab_examples

Linux

- pip install seelab_examples
- seelab_examples

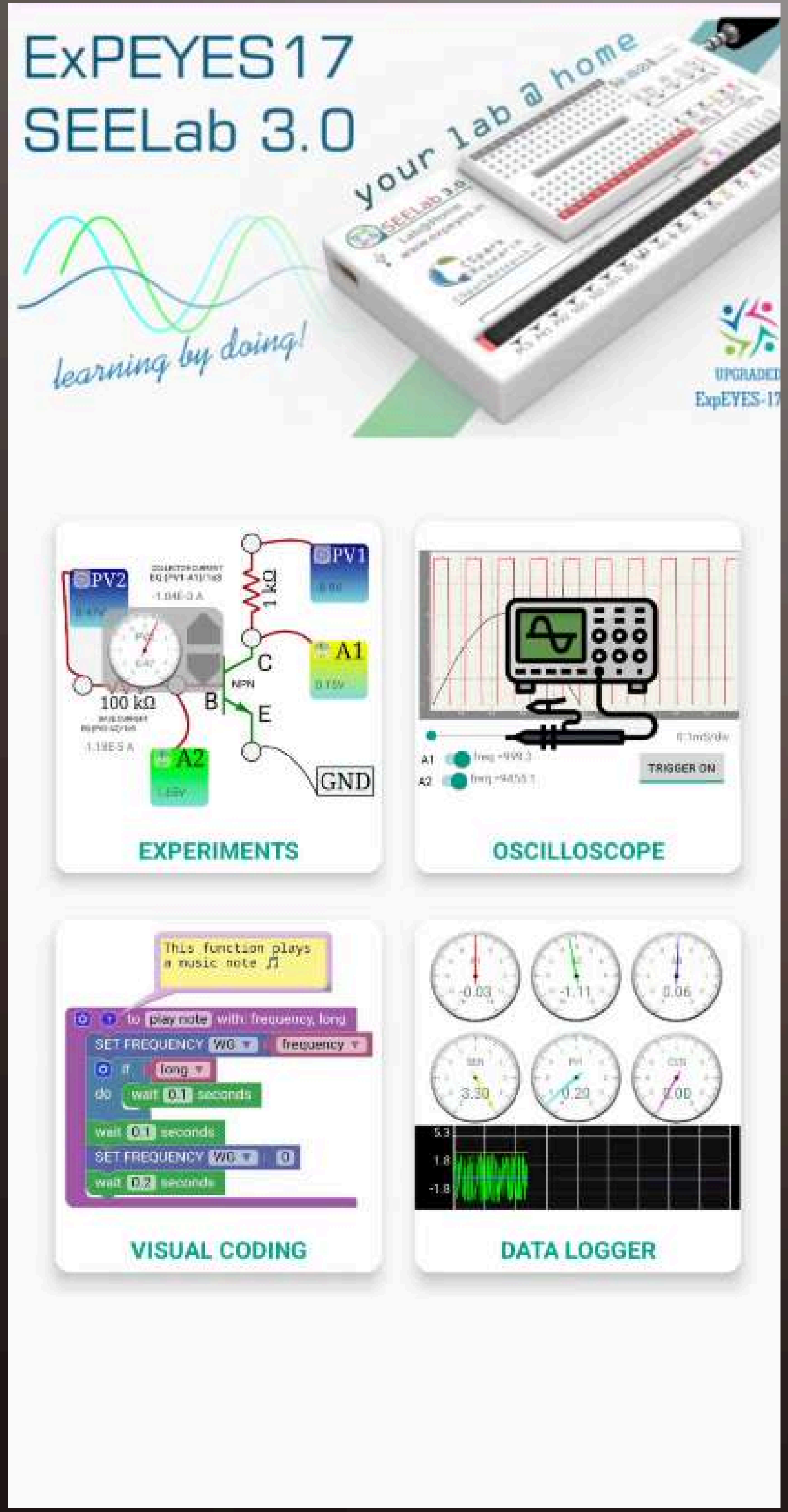
Includes embedded python notebook, circuit simulator, visual programming, and AI based computer vision examples.

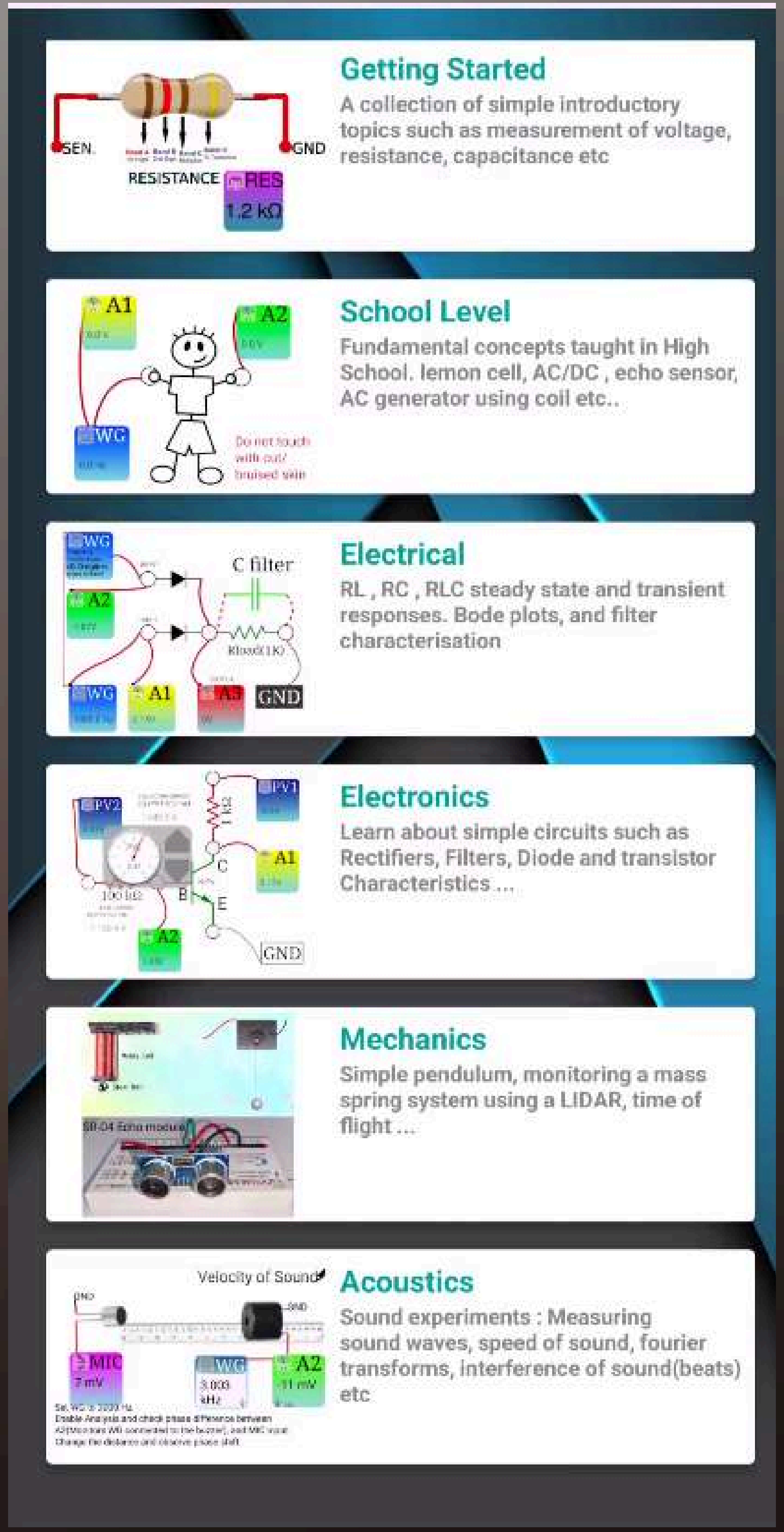


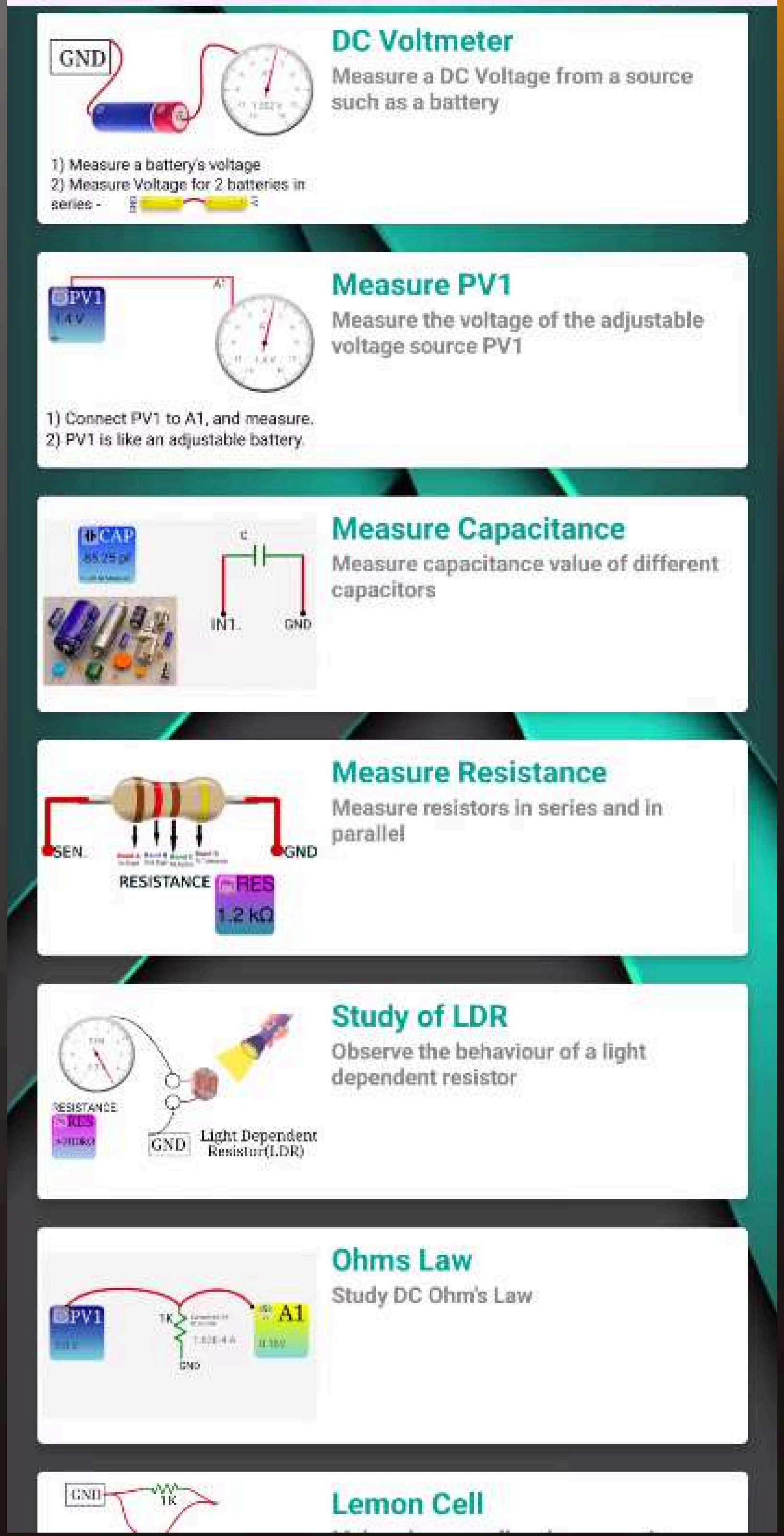
INTRODUCTION [VIDEO]

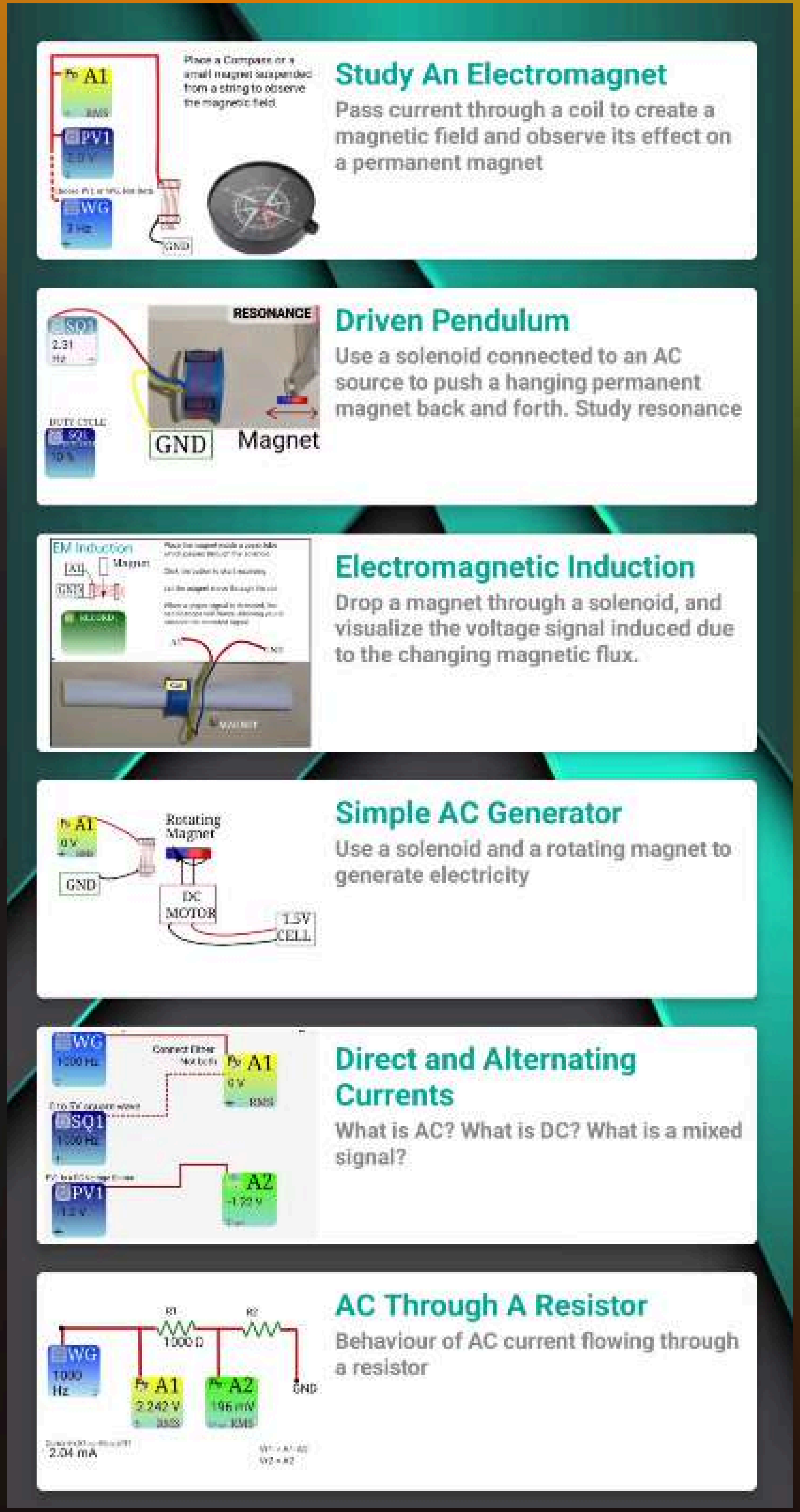
Introduction : Experiments

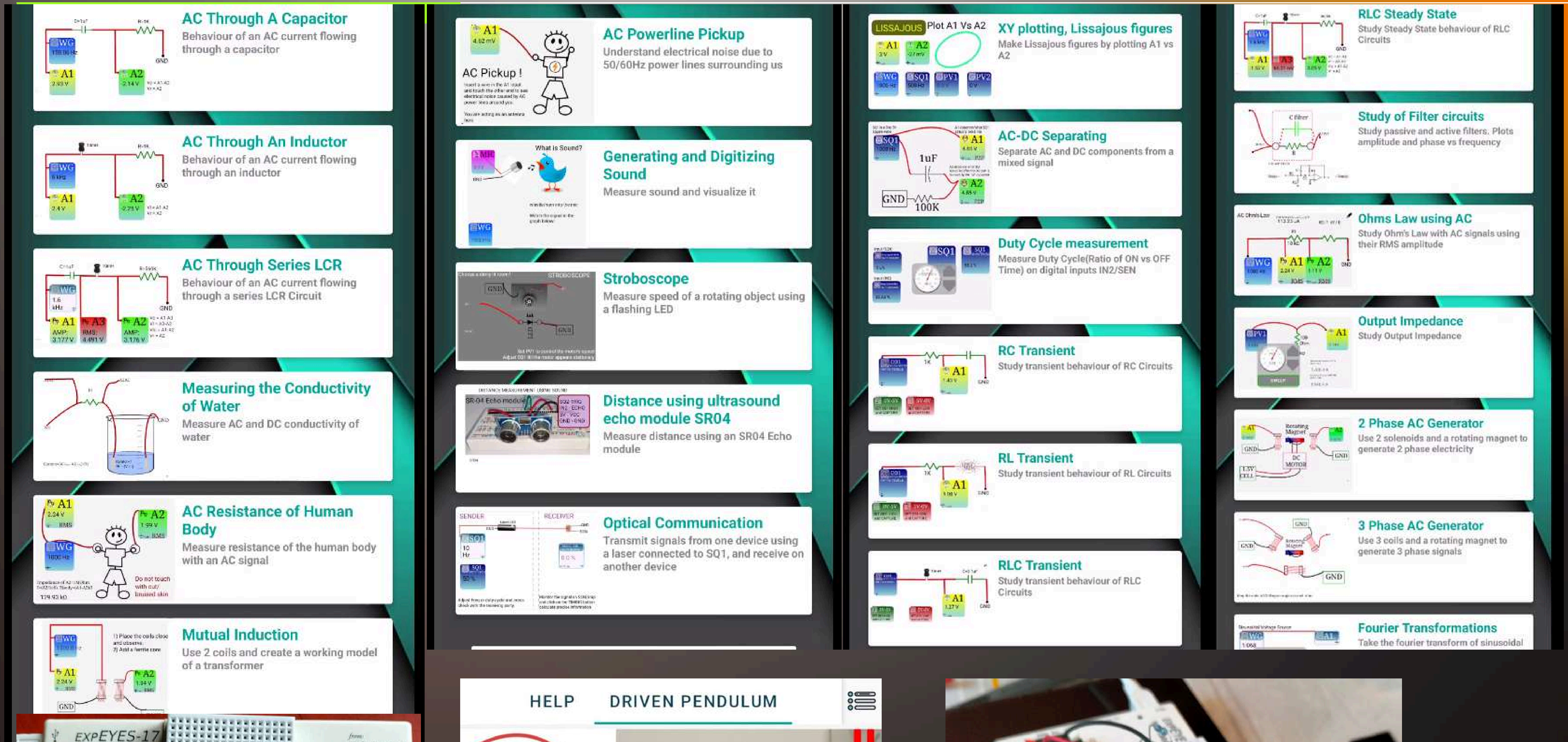
Categorized into clear skill levels ranging from school to post graduate experiments

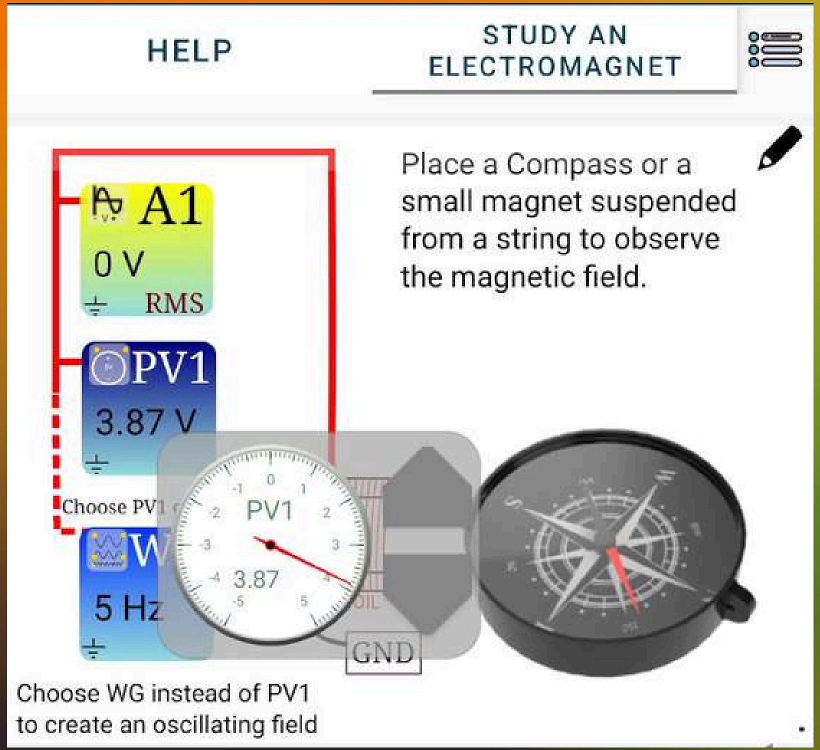


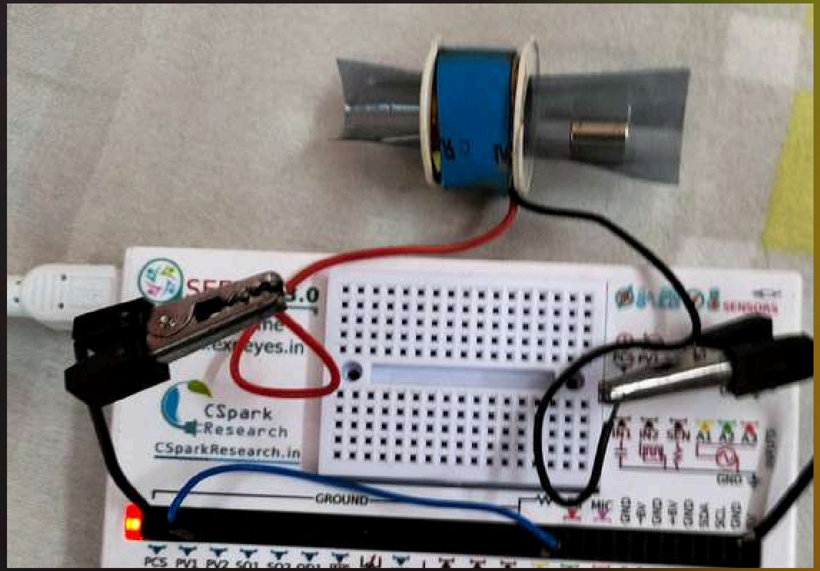


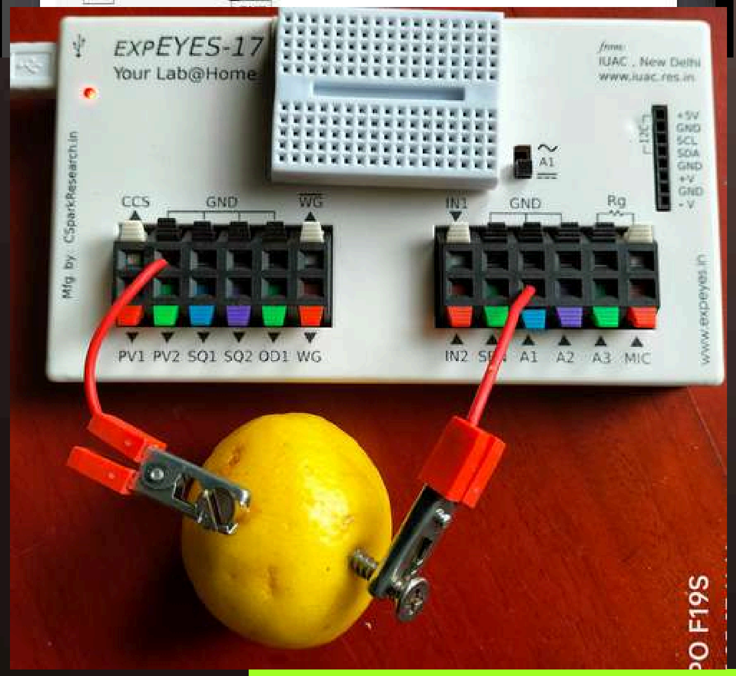


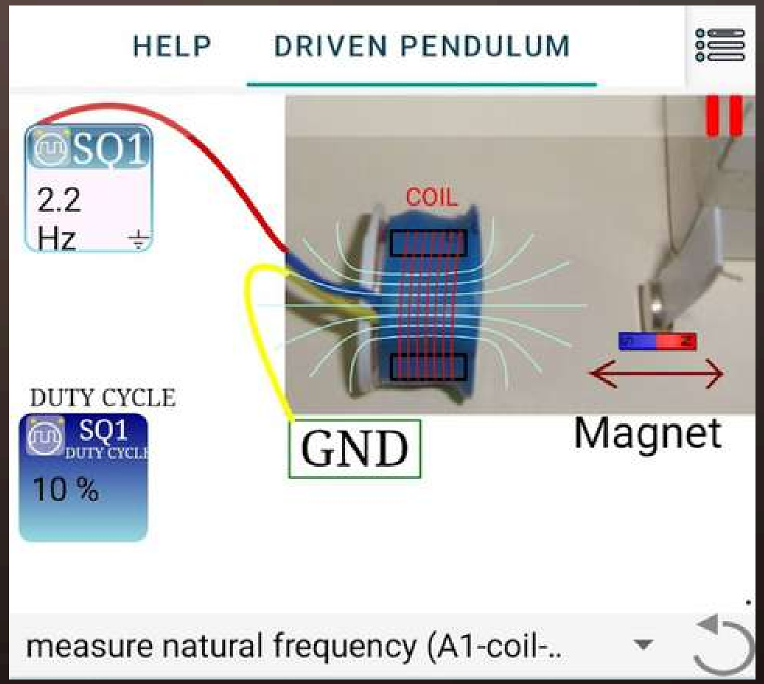


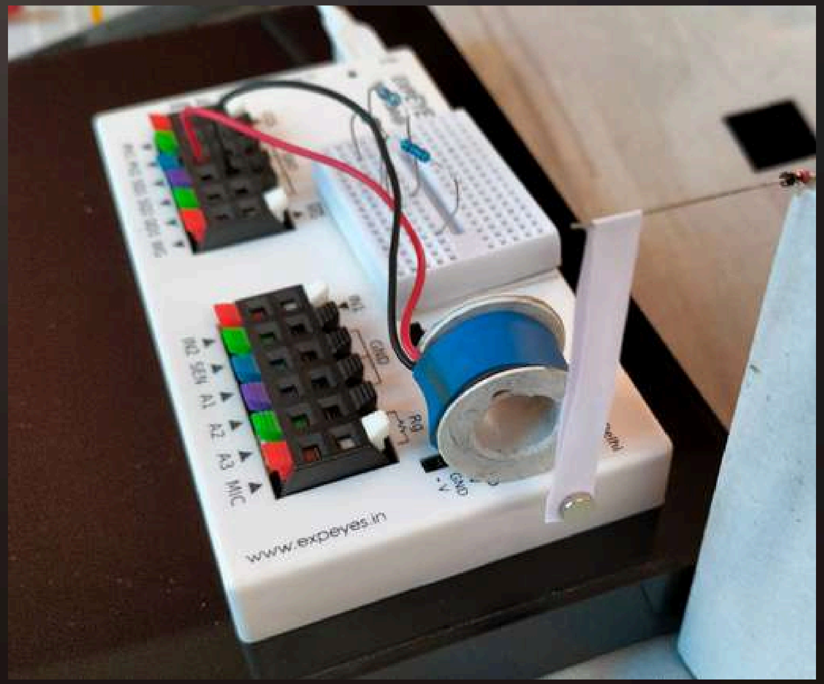






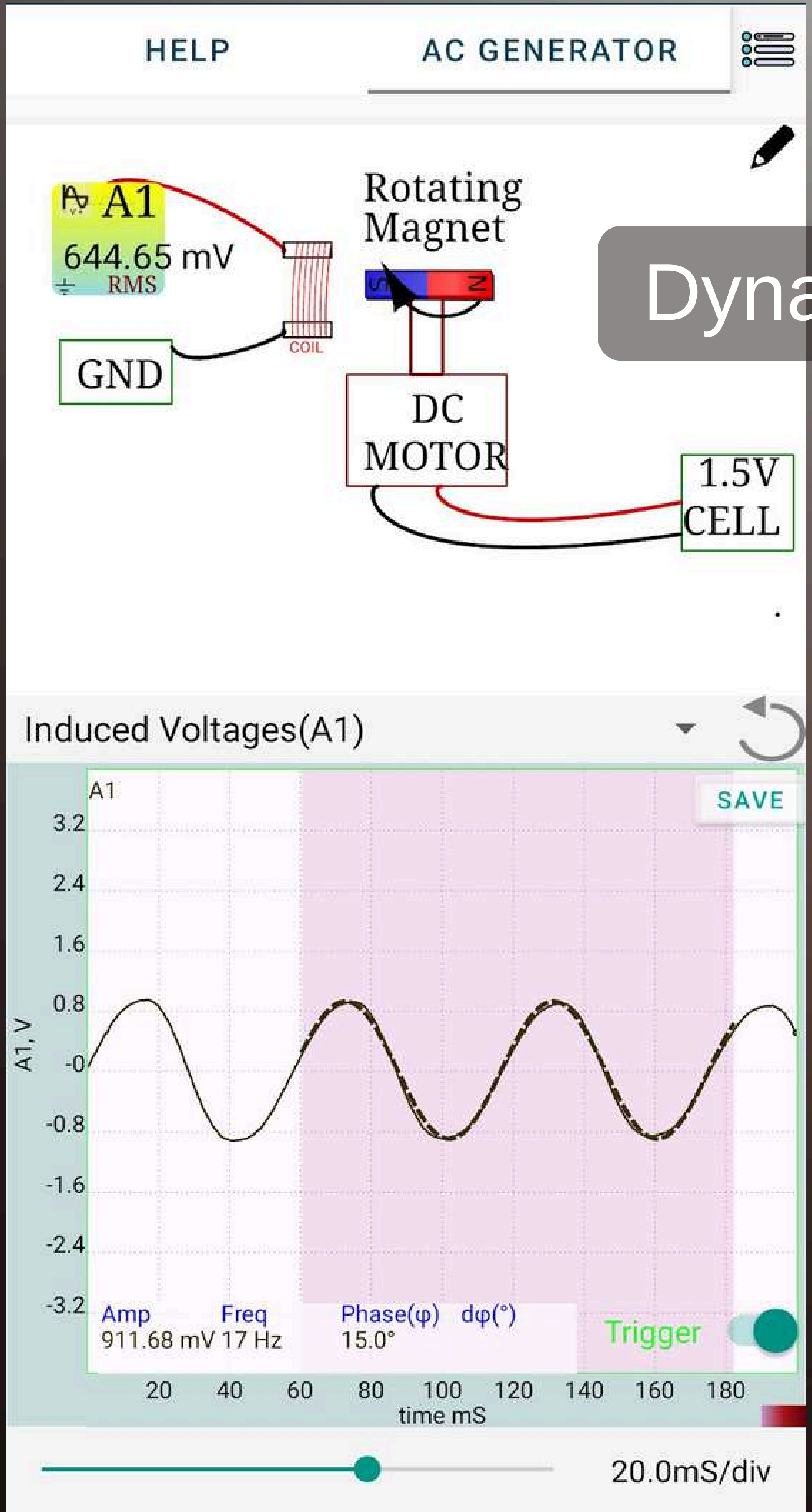


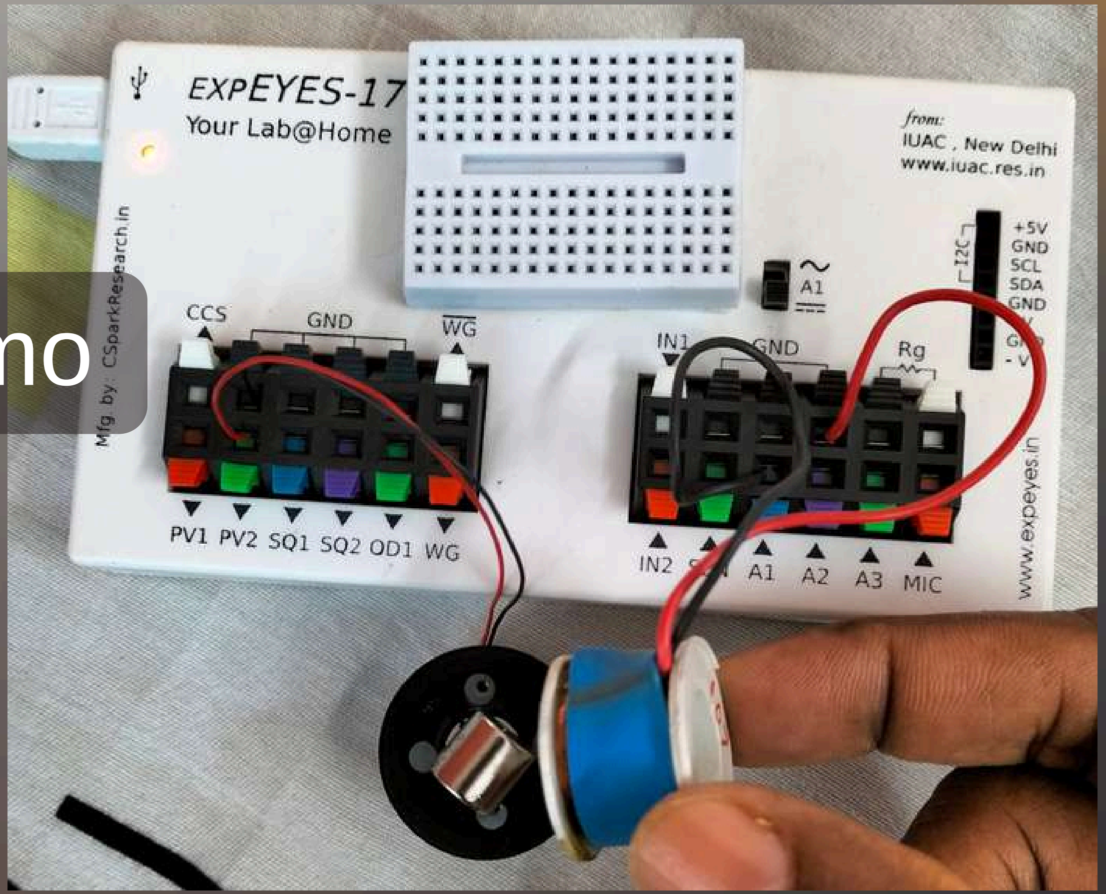




Electricity & Electromagnetism

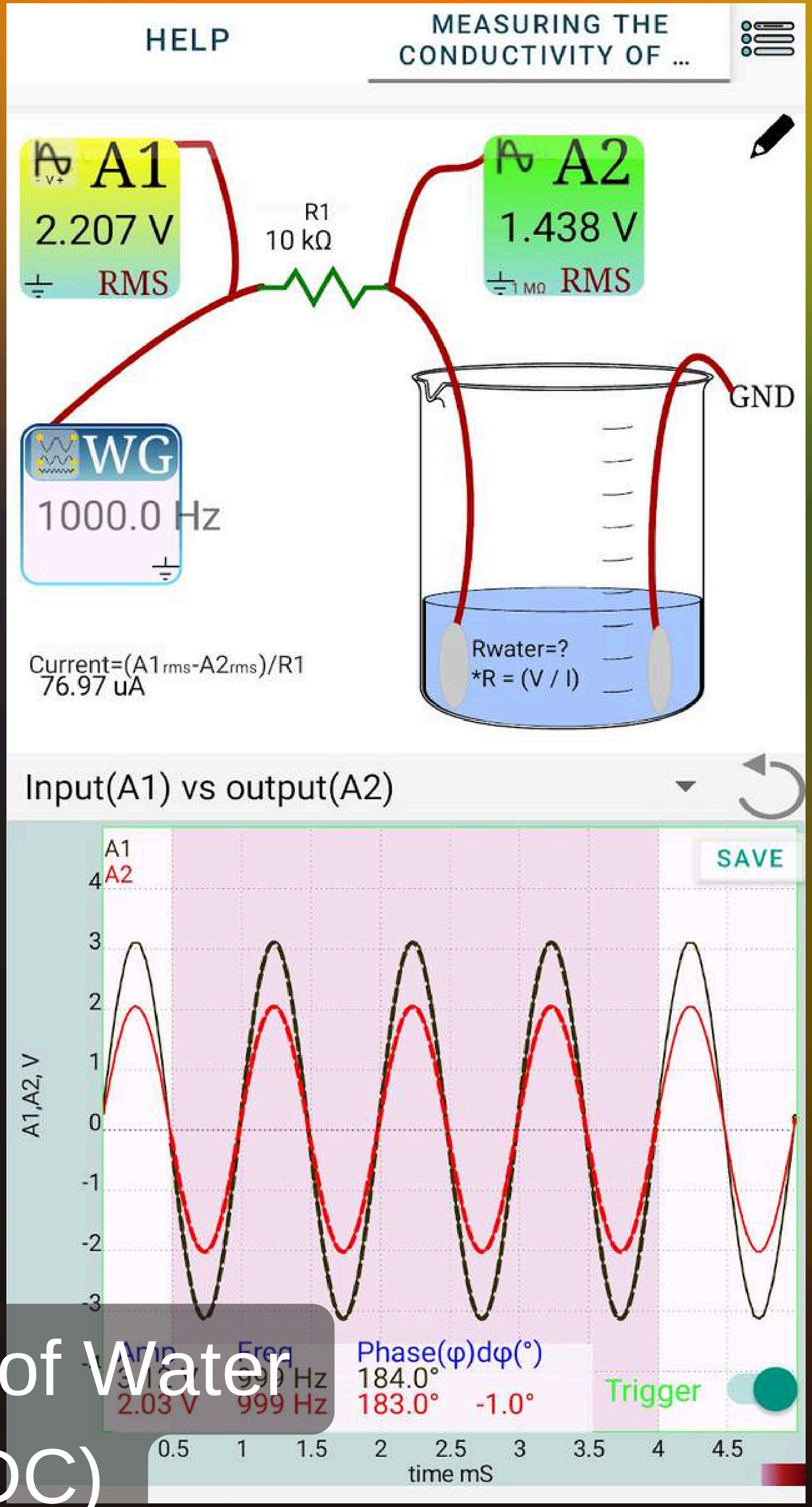
Introduction : Experiments





Dynamo

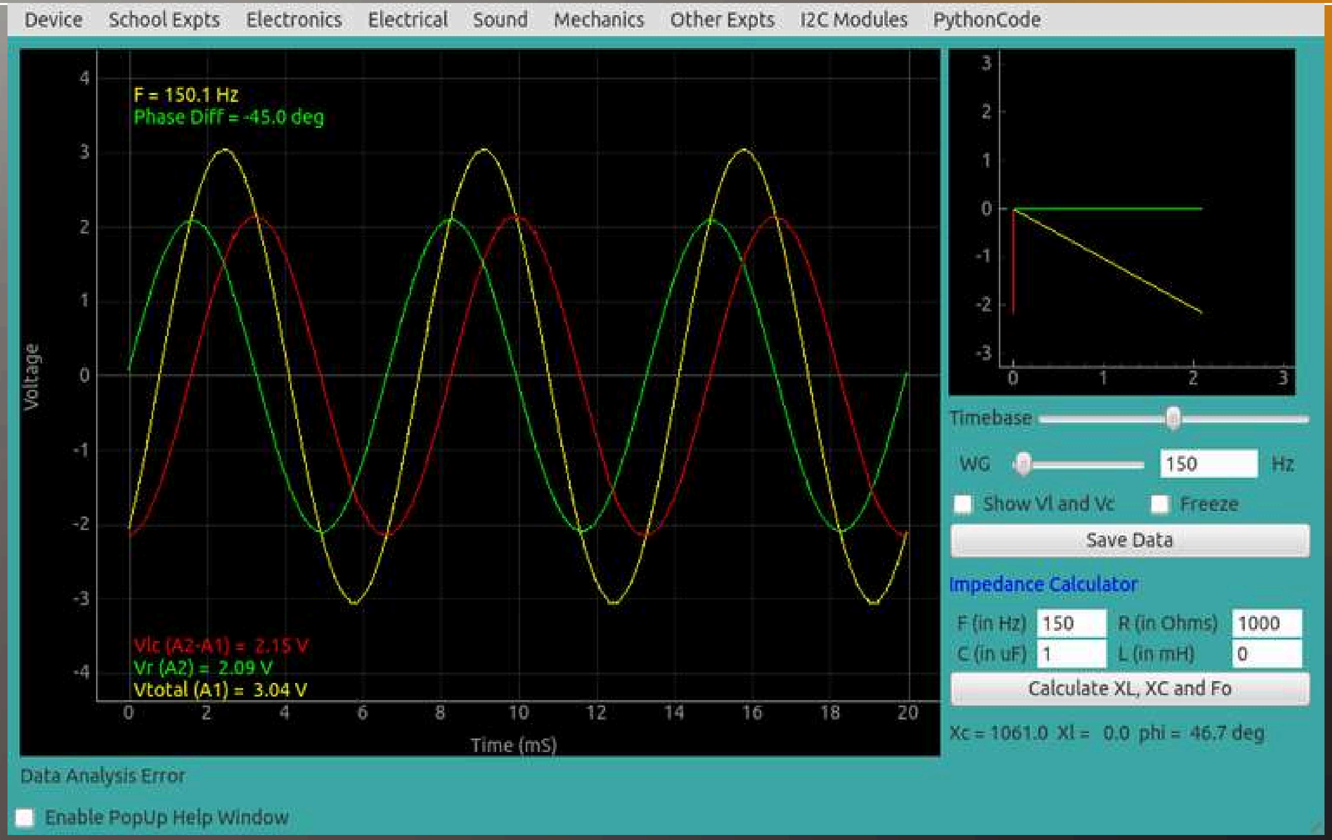
Conductivity of Water (AC & DC)



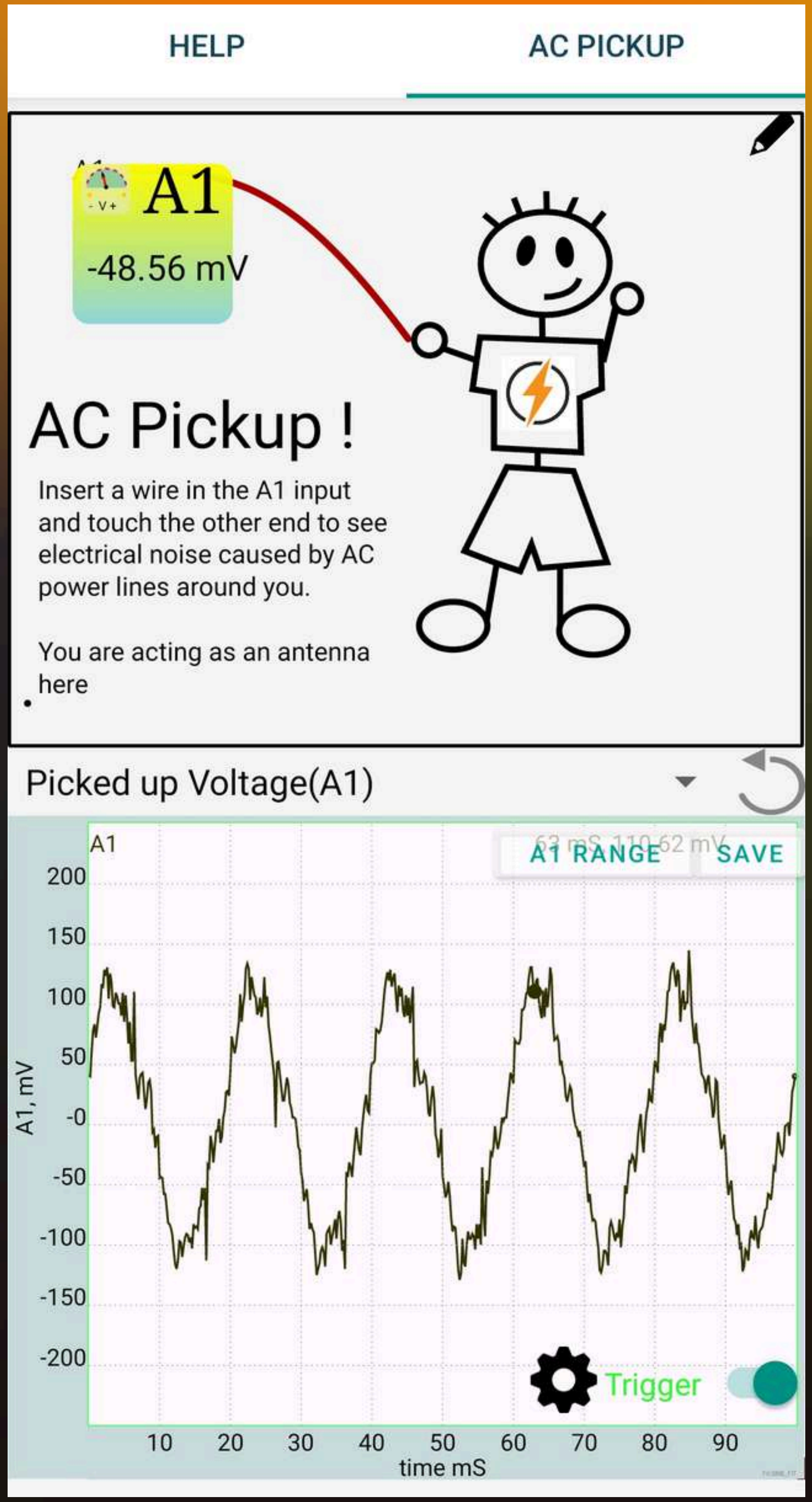
Electronics 101 Lab

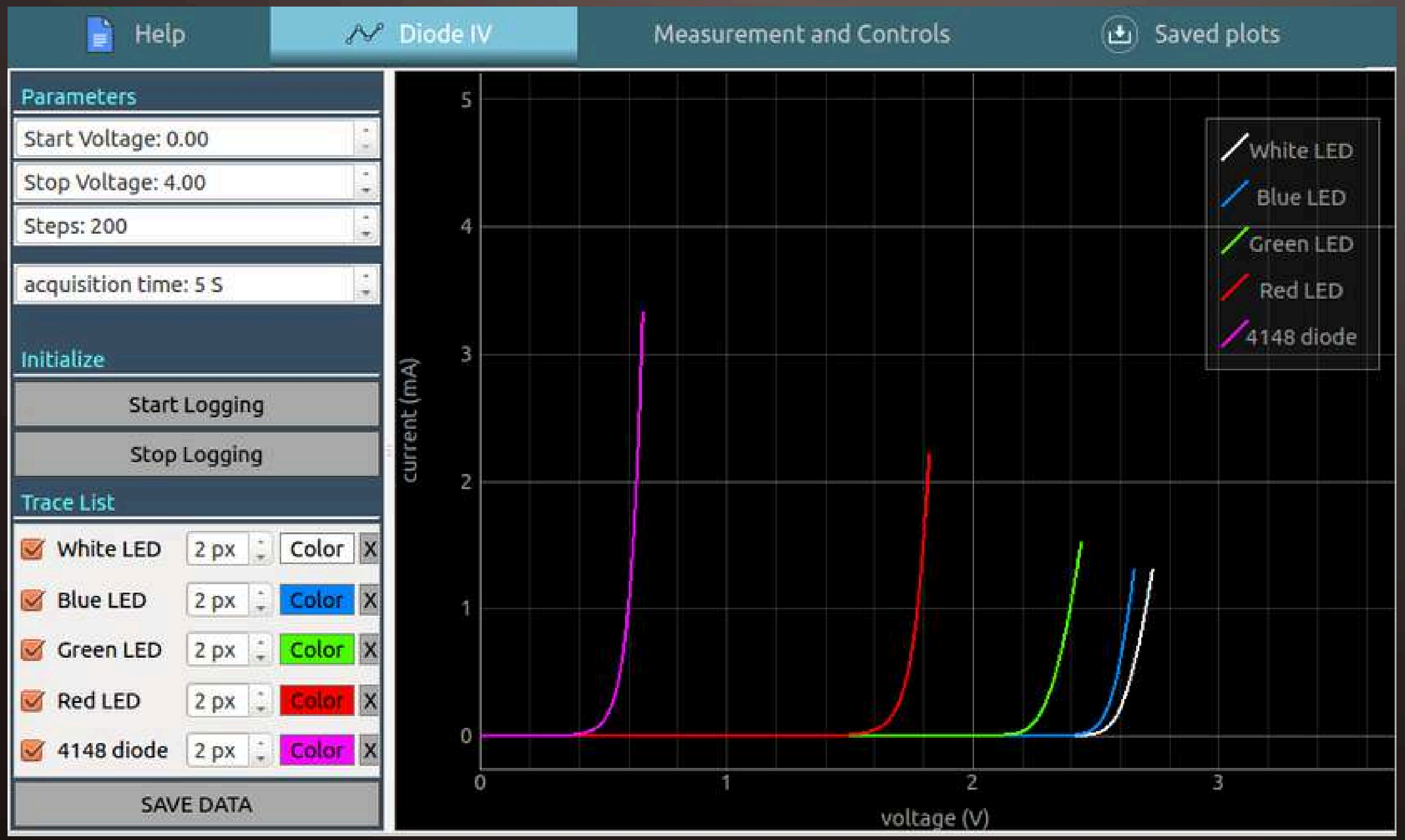
- LCR Resonance
- Frequency response of band pass/low pass/high pass filters [Bode Plots]
- Diode IV Characteristics

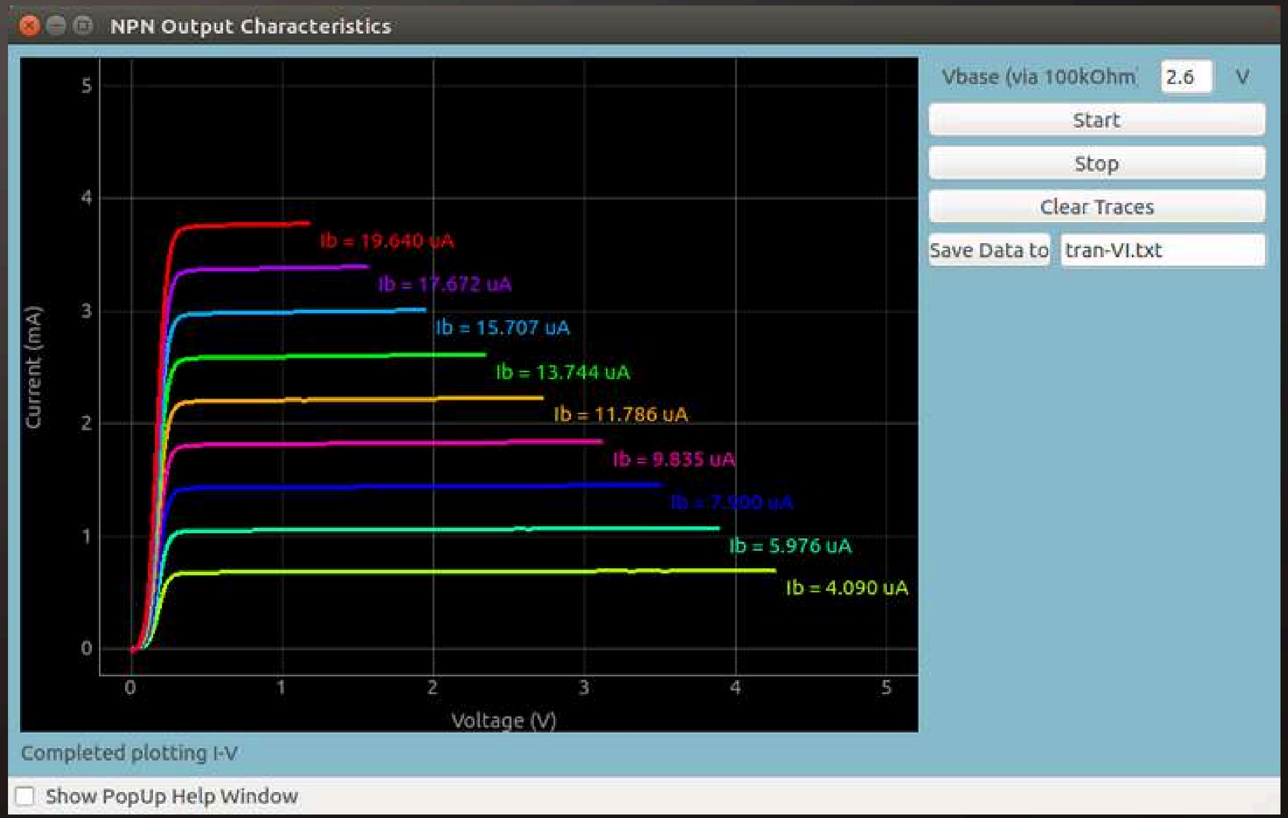
Verify formulae for capacitive and inductive reactance using precisely extracted phase shifts



LCR Resonance Curve



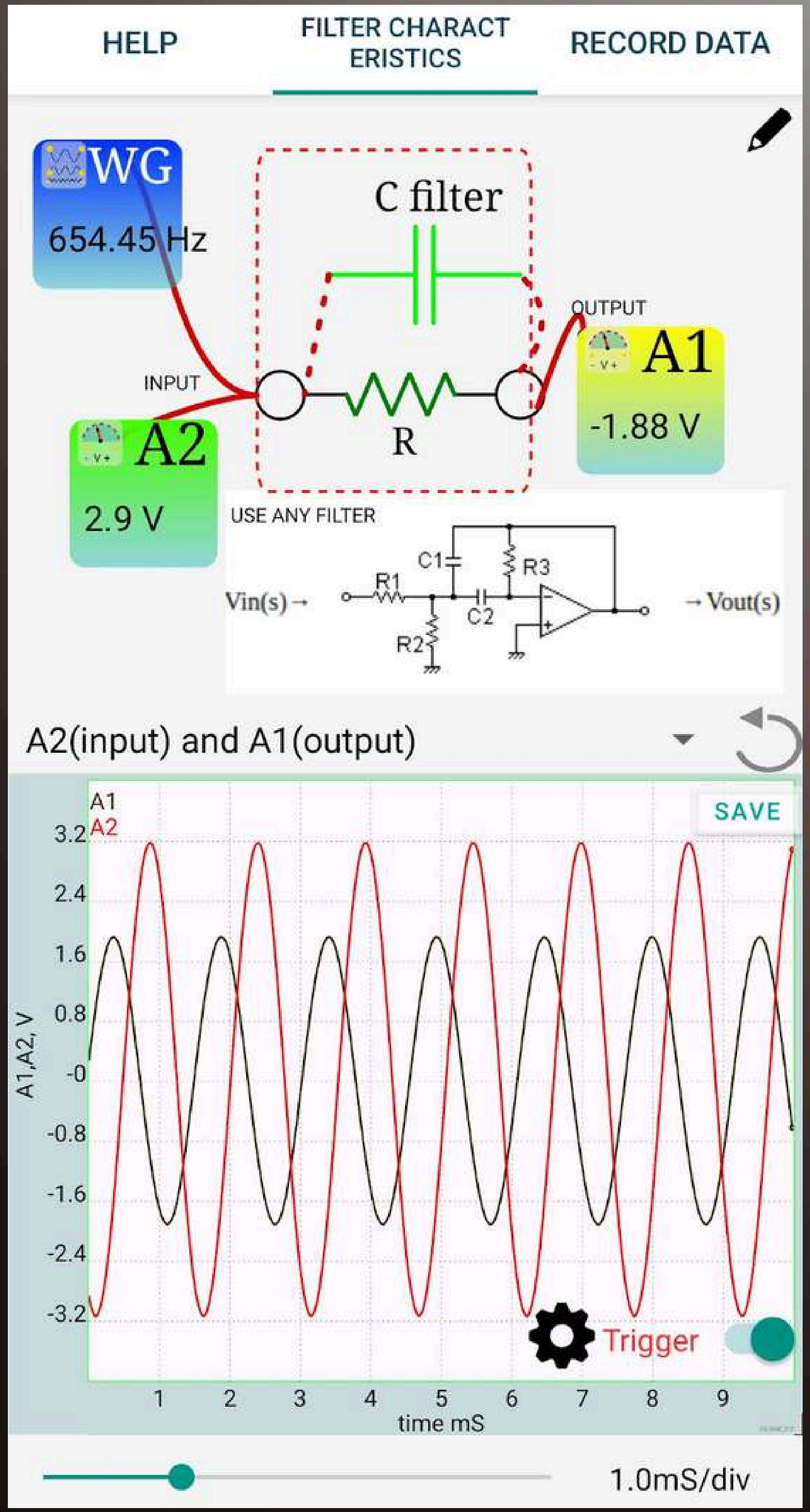


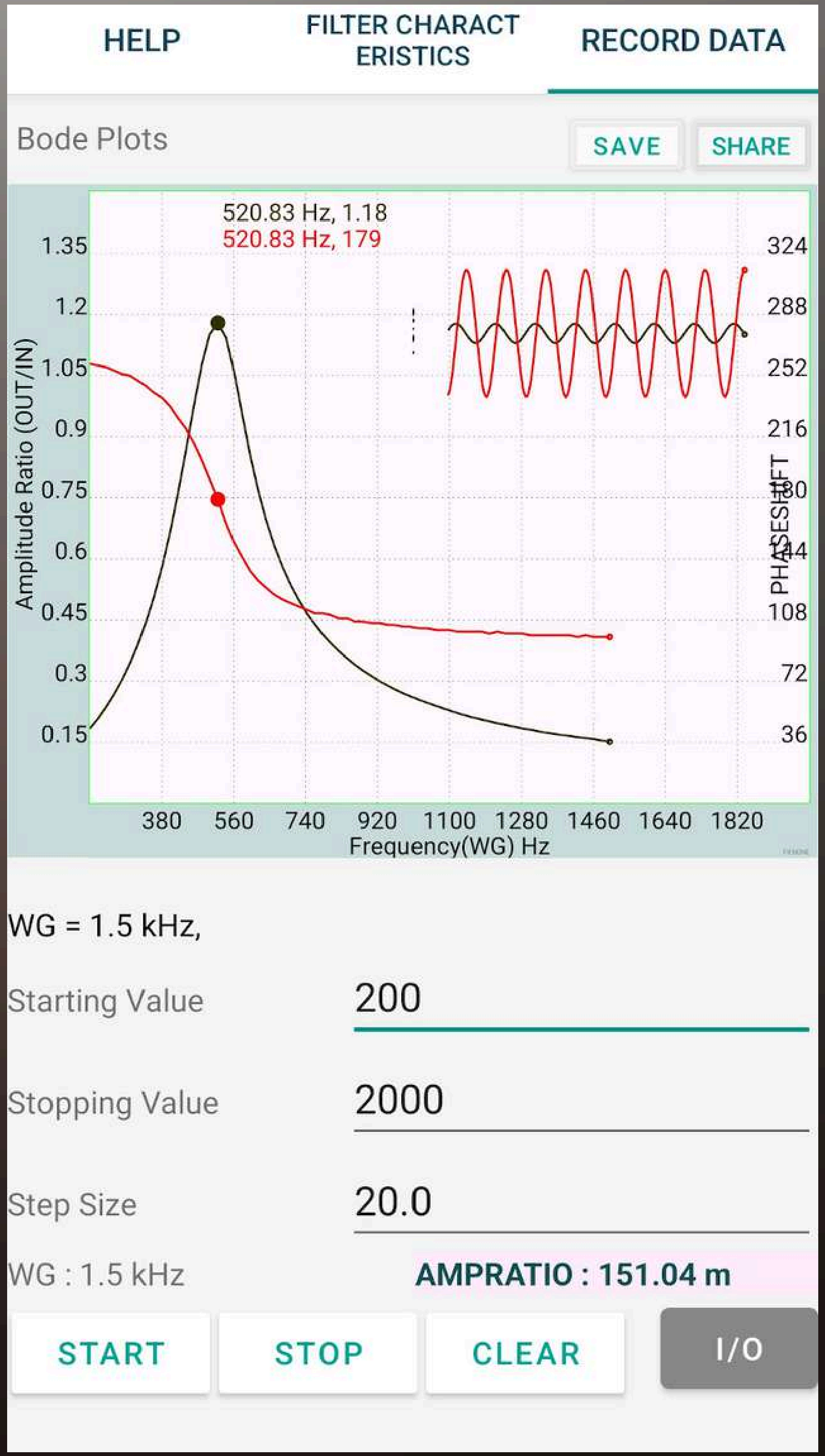


Diode IV Characteristics for various diodes and LEDs

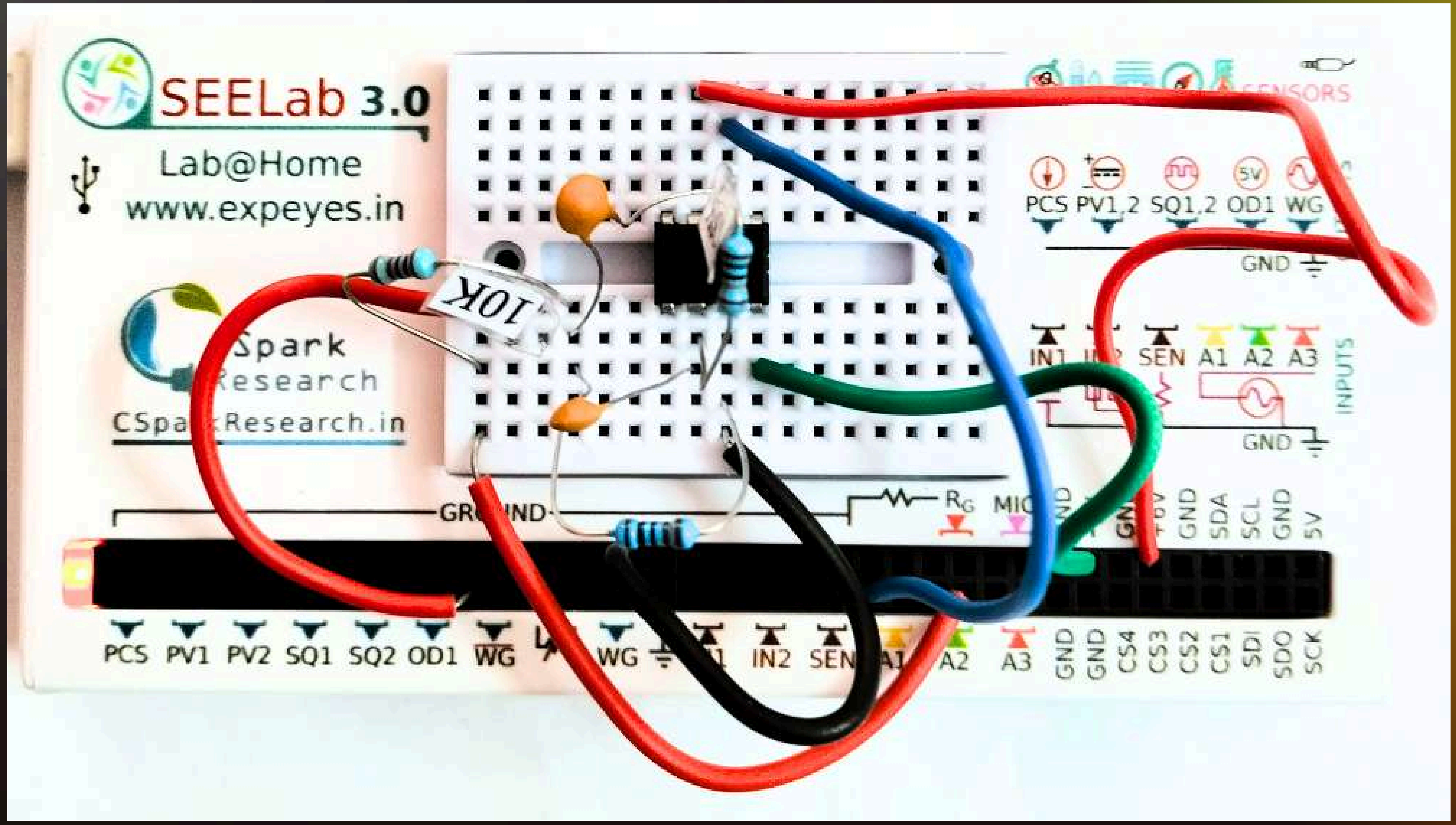
Transistor Output Characteristics

50 Hz NOISE





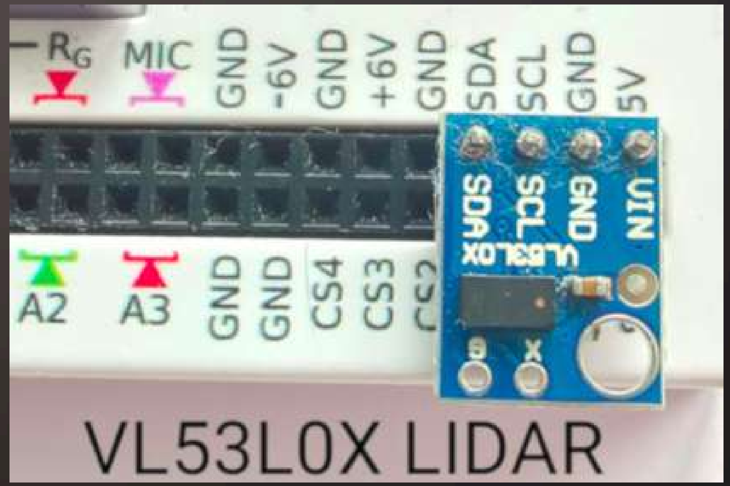
Advanced Electronics: Characteristics of a band pass filter

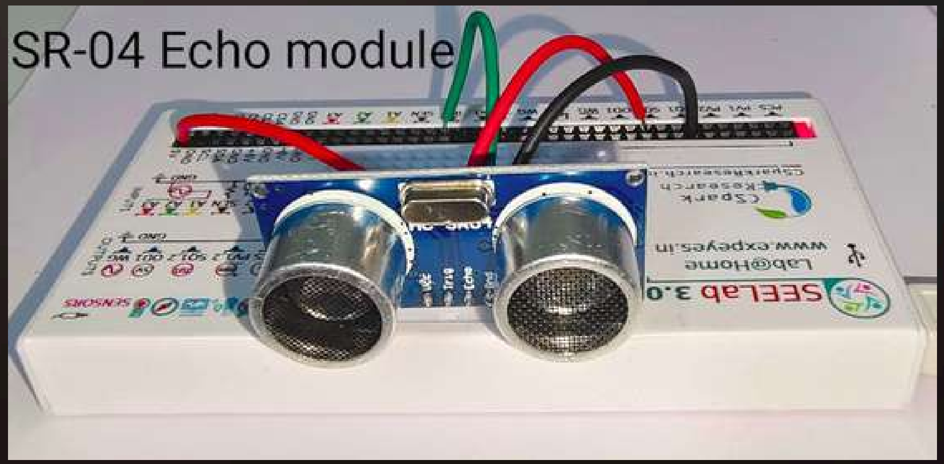


Low cost add-ons : Simply plug 'n play

I2C/SPI communication interfaces, and software support for several common sensors

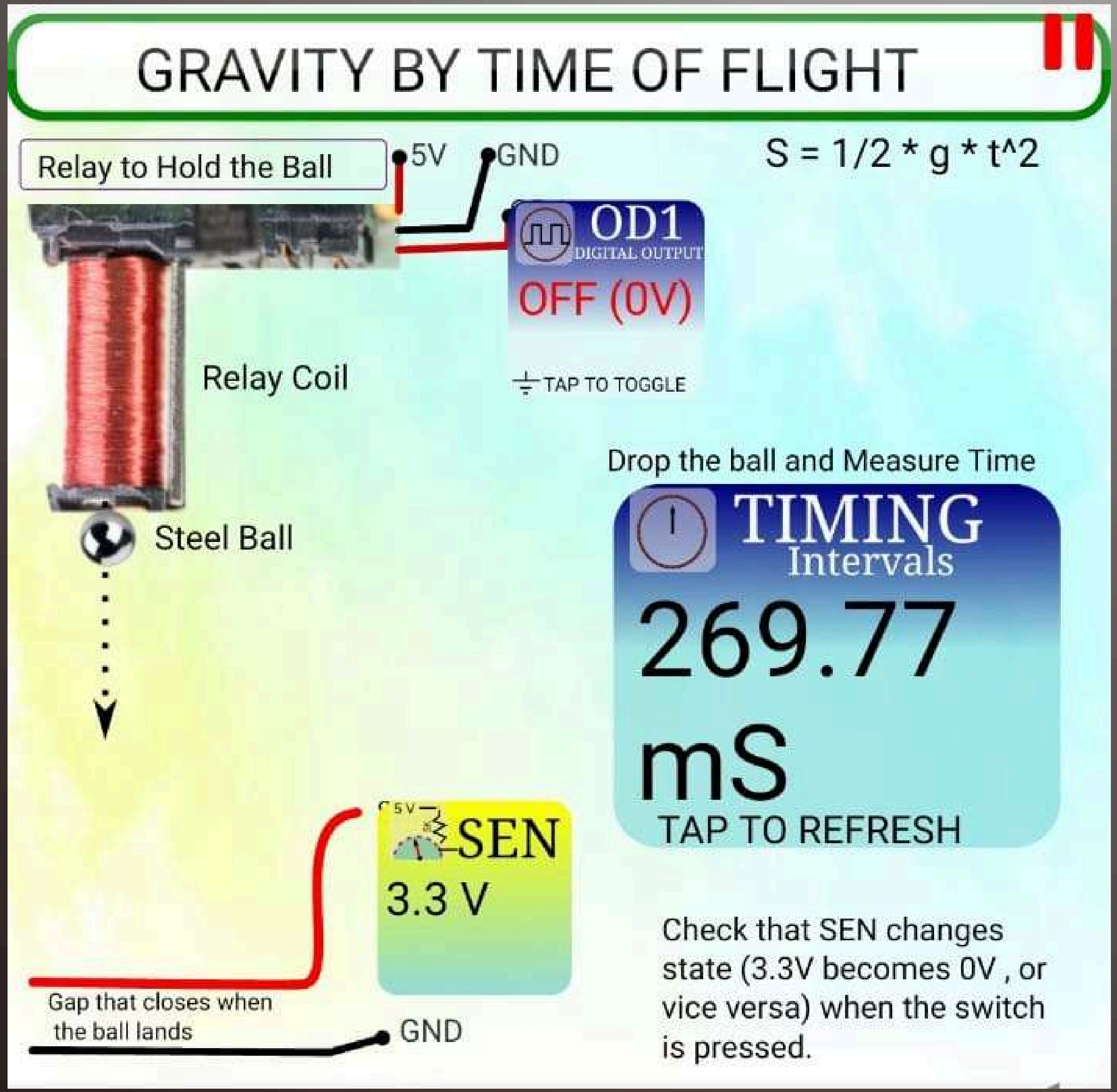
- BMP280 : Pressure and temperature Sensor
- BME280: Humidity measurement
- TSL2561/BH1750: Light intensity sensor
- MPU6050: Gyroscope, accelerometer
- MPU9250 : Accel/Gyro/Magnetic Fields
- VL53L0X : Distance measurement (LIDAR)
- MLX90614: Passive IR temperature sensor
- AD8232 : ECG instrumentation amplifier
- AD9833: Precision Sine Wave generator
- Servo Motors via SQ1, SQ2, or PCA9685
- AHT10, AHT21: Humidity Sensor
- MAX44009; Visible Spectrum Luminosity sensor
- QMC5883L/HMC5883L : 3 Axis Magnetometer
- ML8511 : UV sensor
- MAX30100: Heart rate and pulse oximetry
- INA219 : High Side Current Sensing
- ADS1115 : 16 bit , 4 channel voltmeter
- TCS34725 : RGB Color sensor
- ADXL345: 3 axis accelerometer
- SR04 : Distance sensor (Sound based)

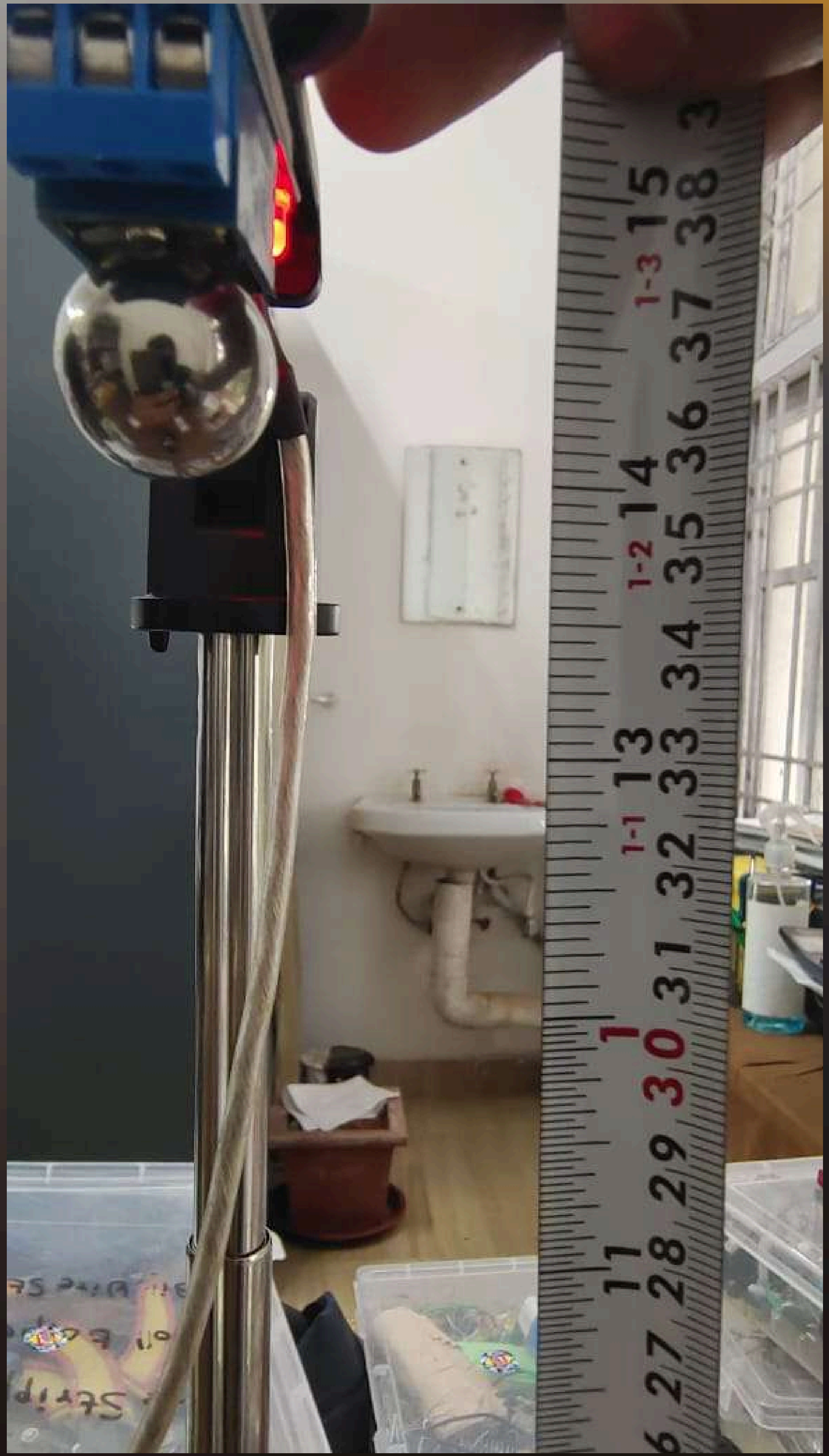




Add on accessories

TIMING MEASUREMENT OF PROJECTILES





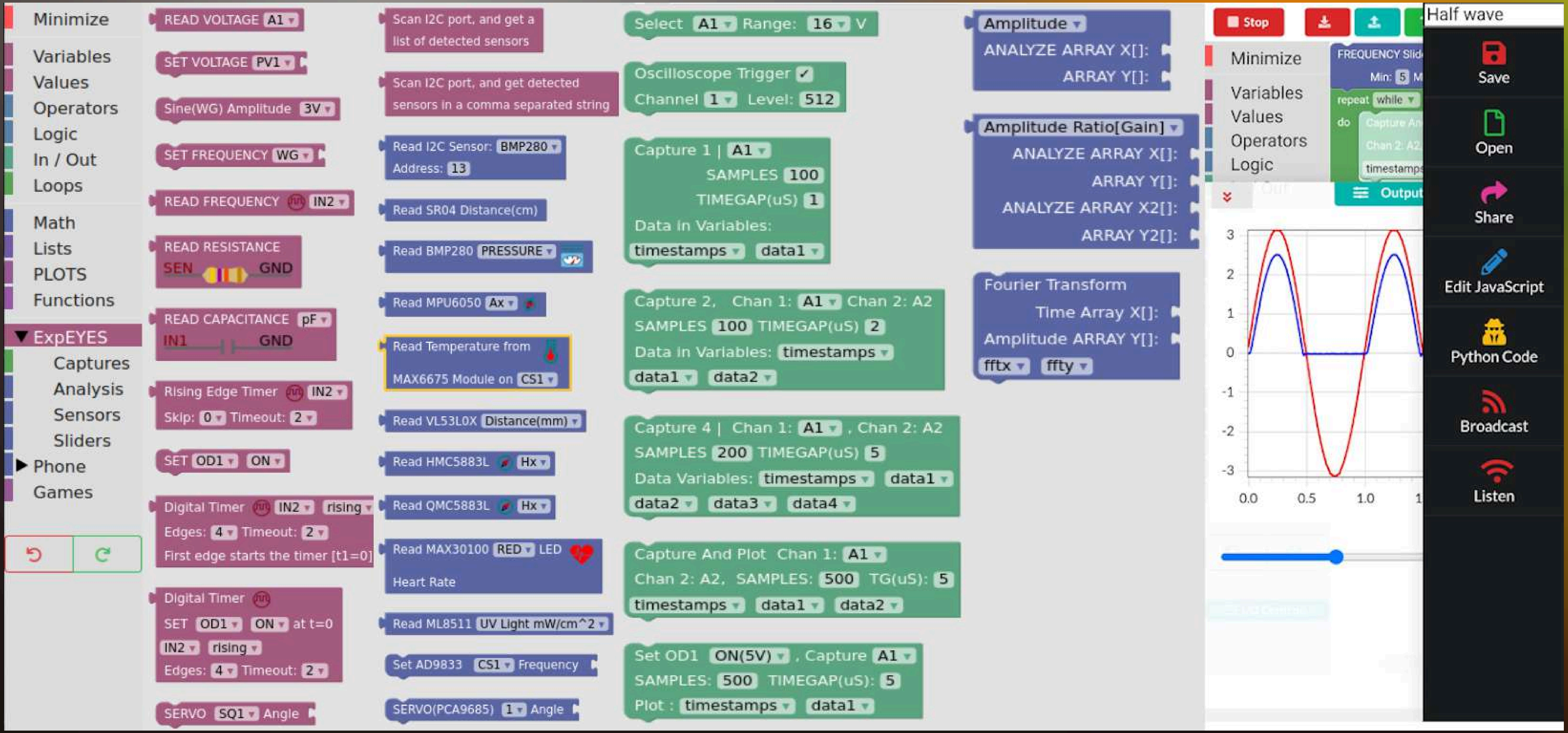
Get precise results!

CALCULATIONS:

0.5 * 9.8 * .26977 * .26977 =

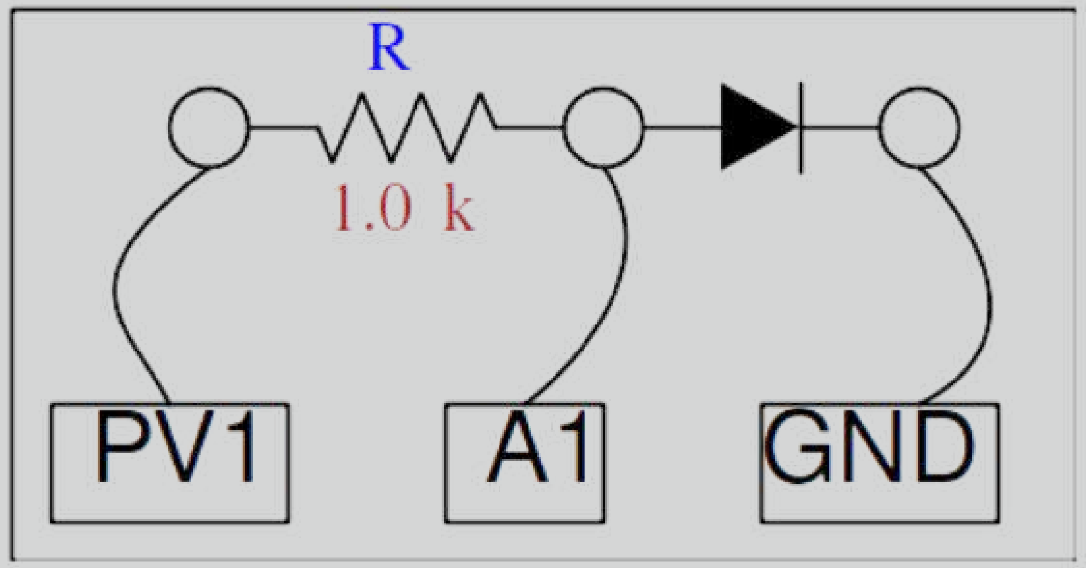
0.35660167921

Visual programming interface : Simple blocks for making all sort of measurements.

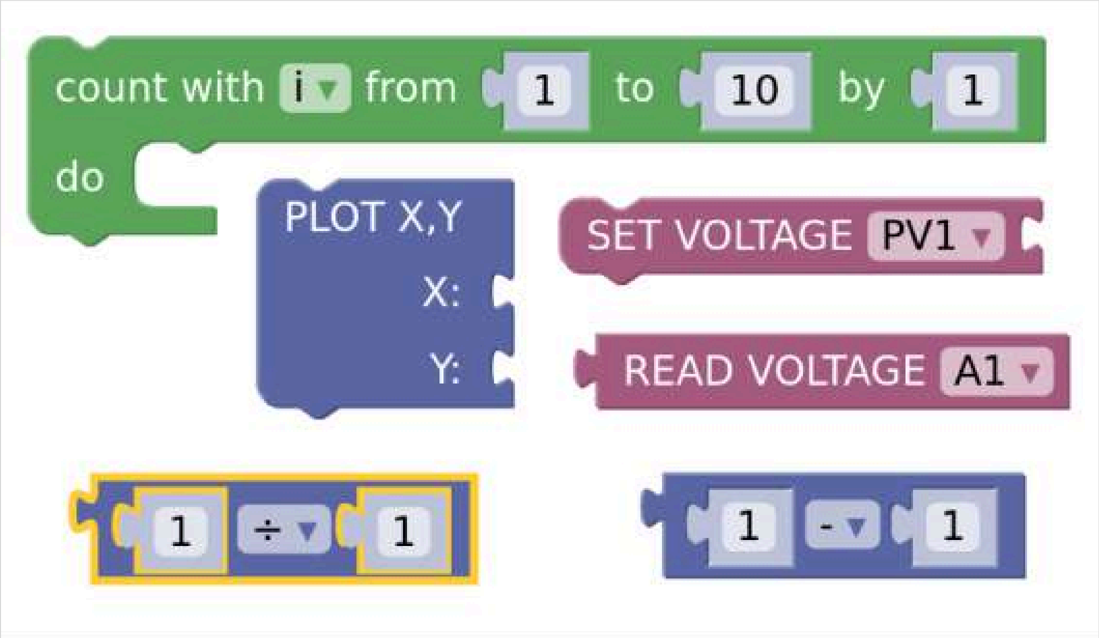


Diode IV Characteristics : The voltage across PV1 is incremented, and the voltage drop across the diode is measured. Current is calculated as (PV1-A1)/R using Ohm's law.

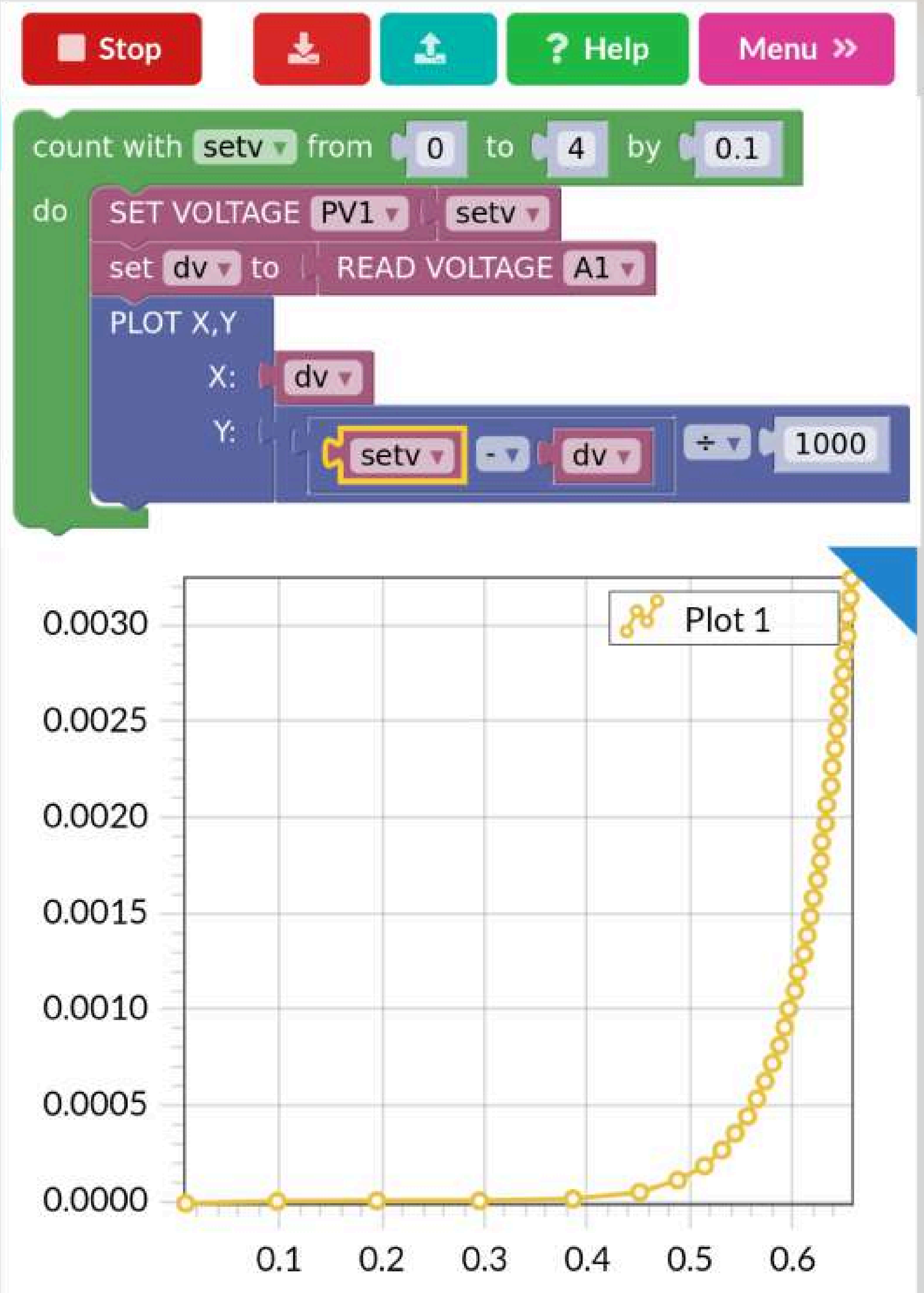
Schematic Diagram



Components required

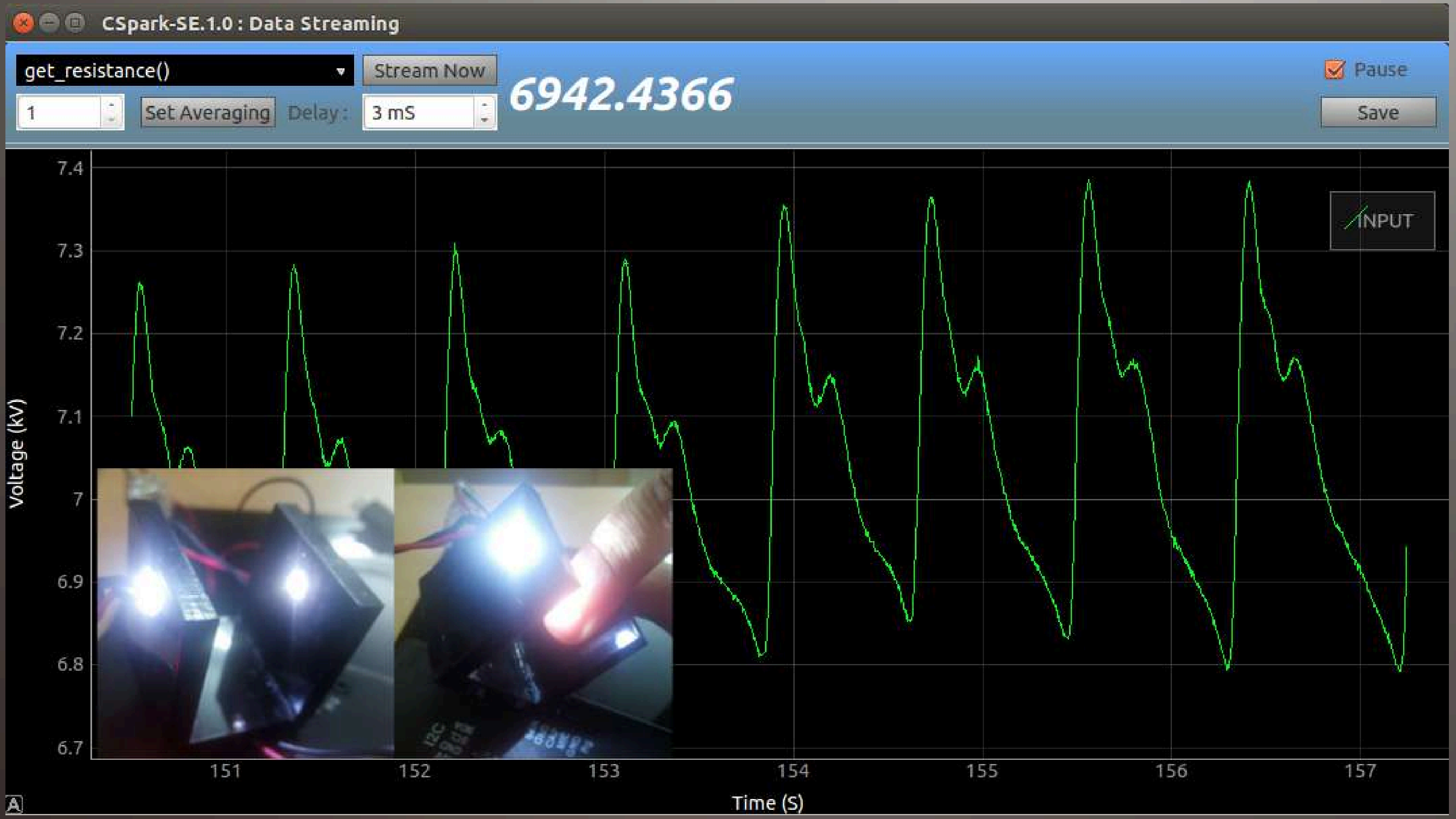


Program and Results

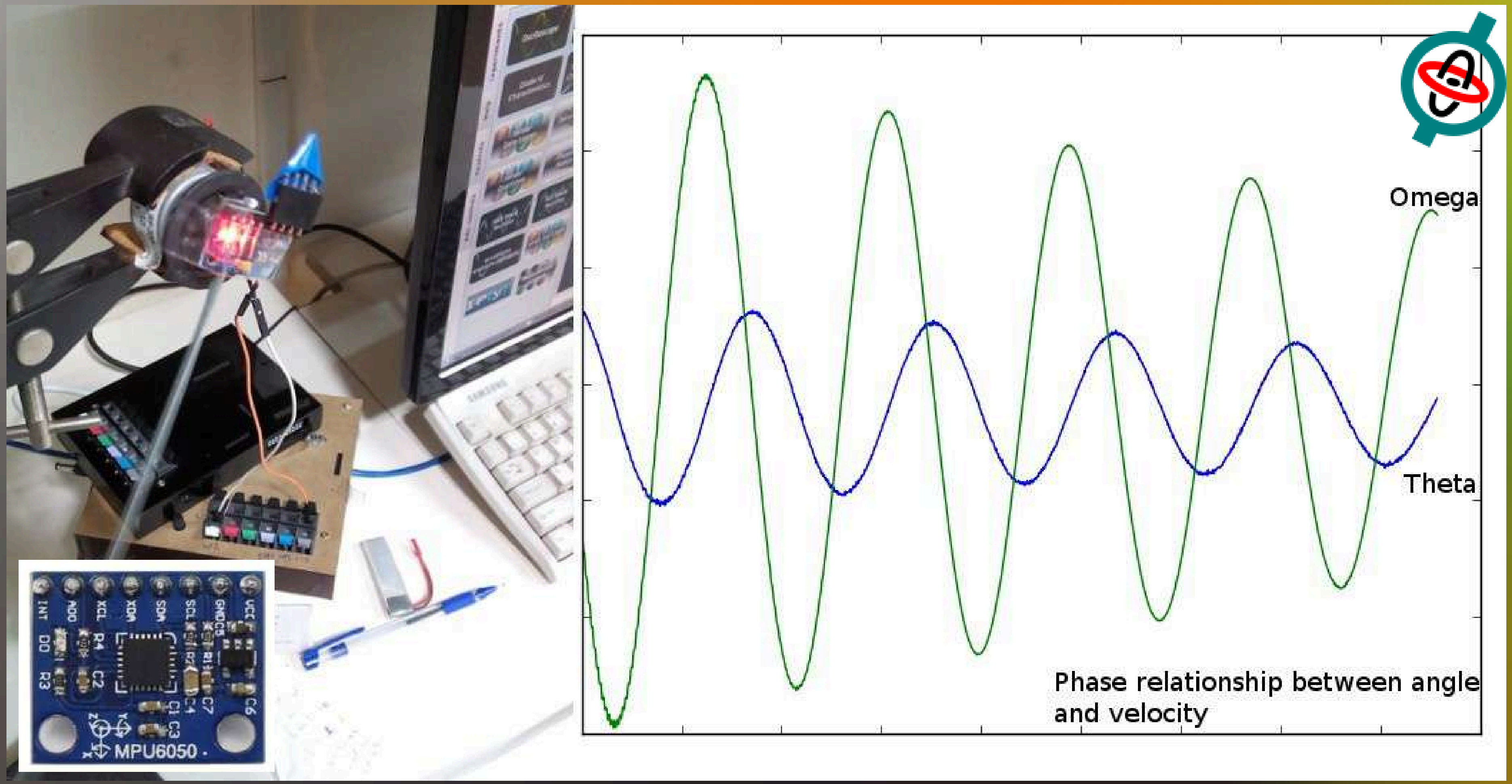



```
//Equivalent JavaScript Code
var setv, dv;

for (setv = 0; setv <= 4; setv += 0.1) {
  set_voltage('PV1',setv);
  dv = (get_voltage('A1'));
  sleep(0.001); #Settling delay
  plot_xy(dv,(setv - dv) / 1000)
}
```

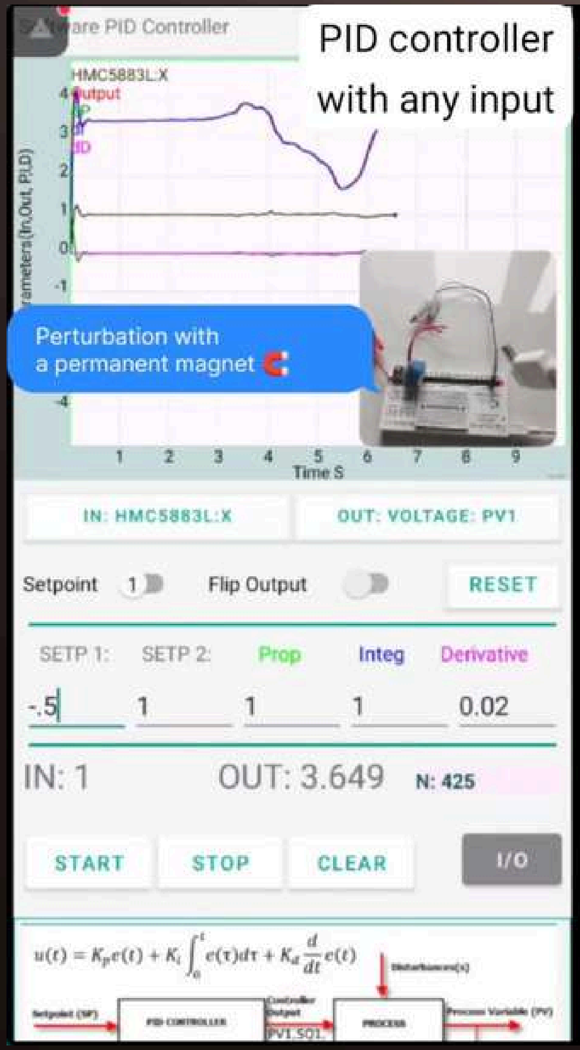
```
#Generated Python Code
setv = None
dv = None

def upRange(start, stop, step):
  while start <= stop:
    yield start
    start += abs(step)

for setv in upRange(0, 4, 0.1):
  set_voltage('PV1',setv)
  dv = get_voltage('A1')
  plot_xy(dv,(setv - dv) / 1000)
```

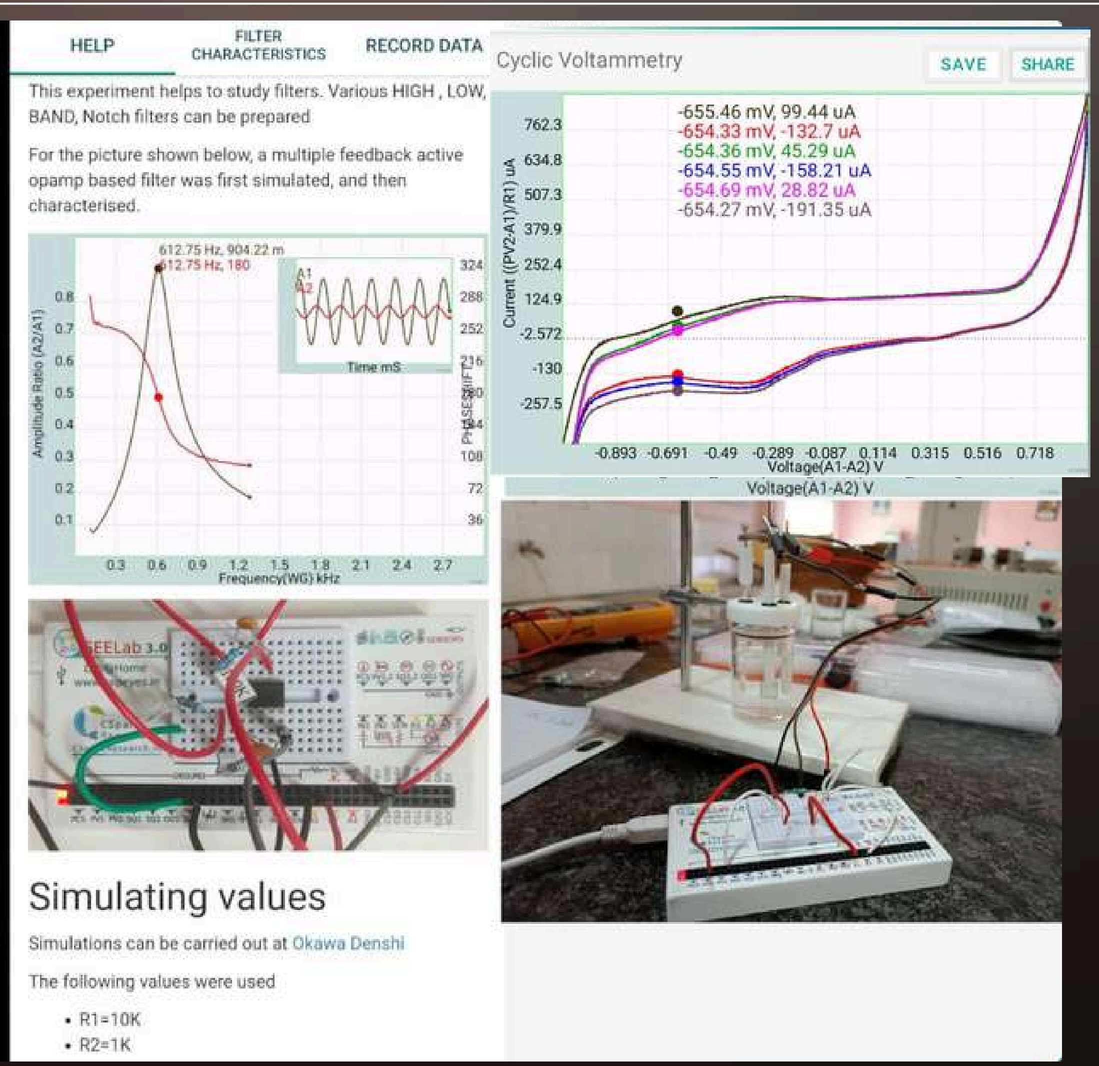


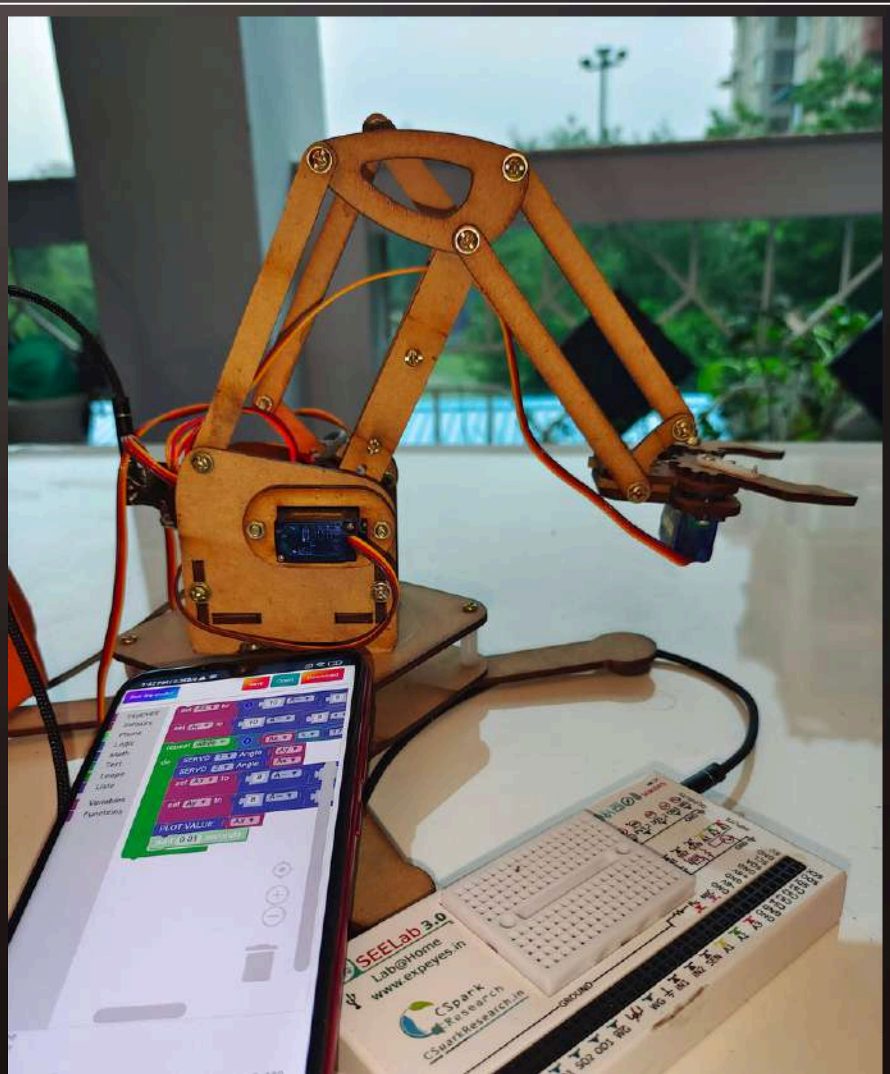
Heart rate detector with the Data logger, an LED, and a phototransistor

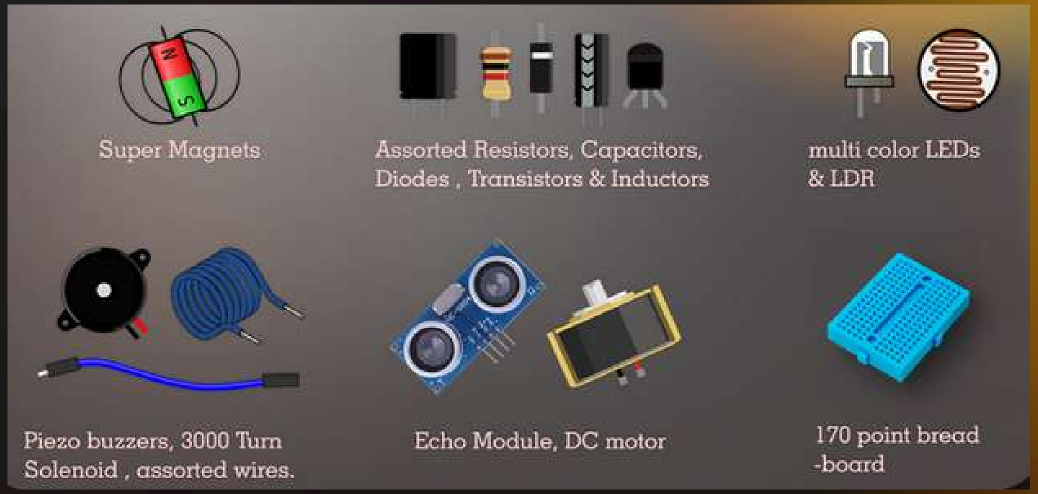


Pendulum oscillations studied with an MPU6050 Accelerometer+Gyroscope



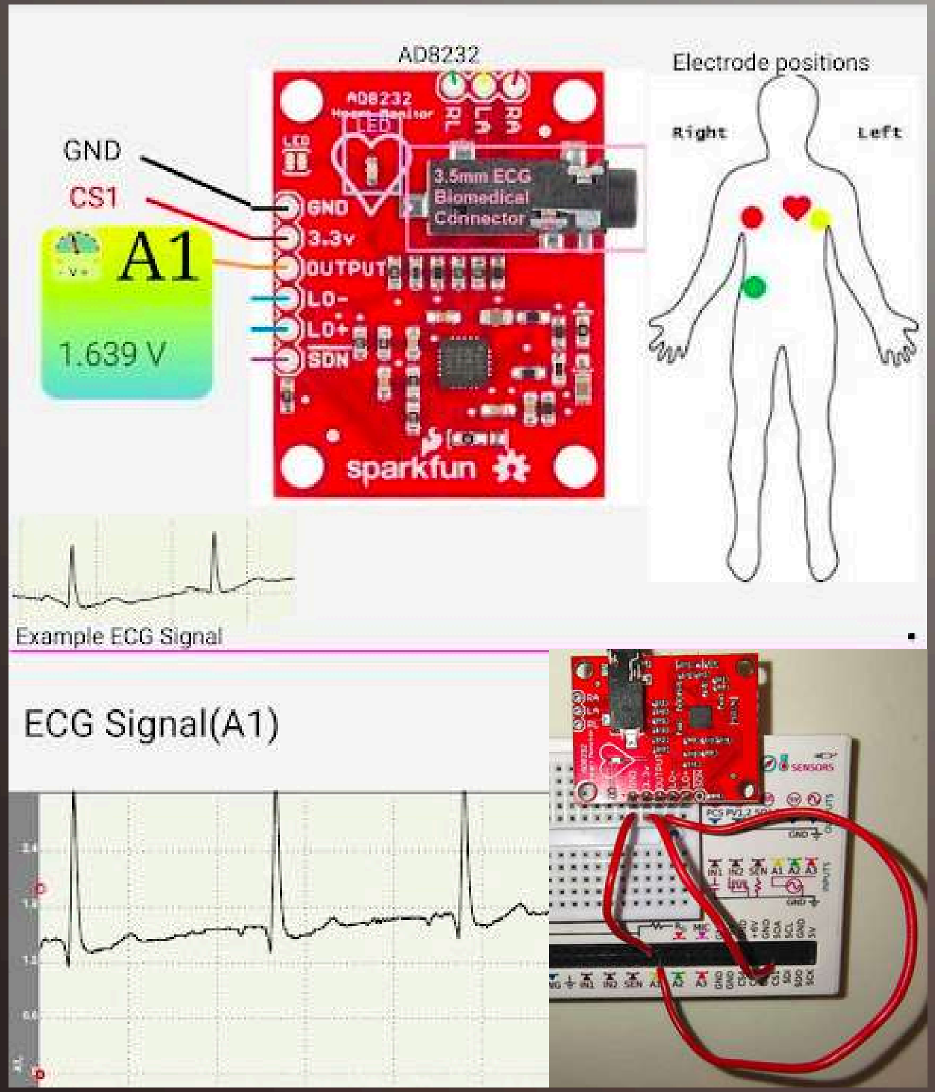




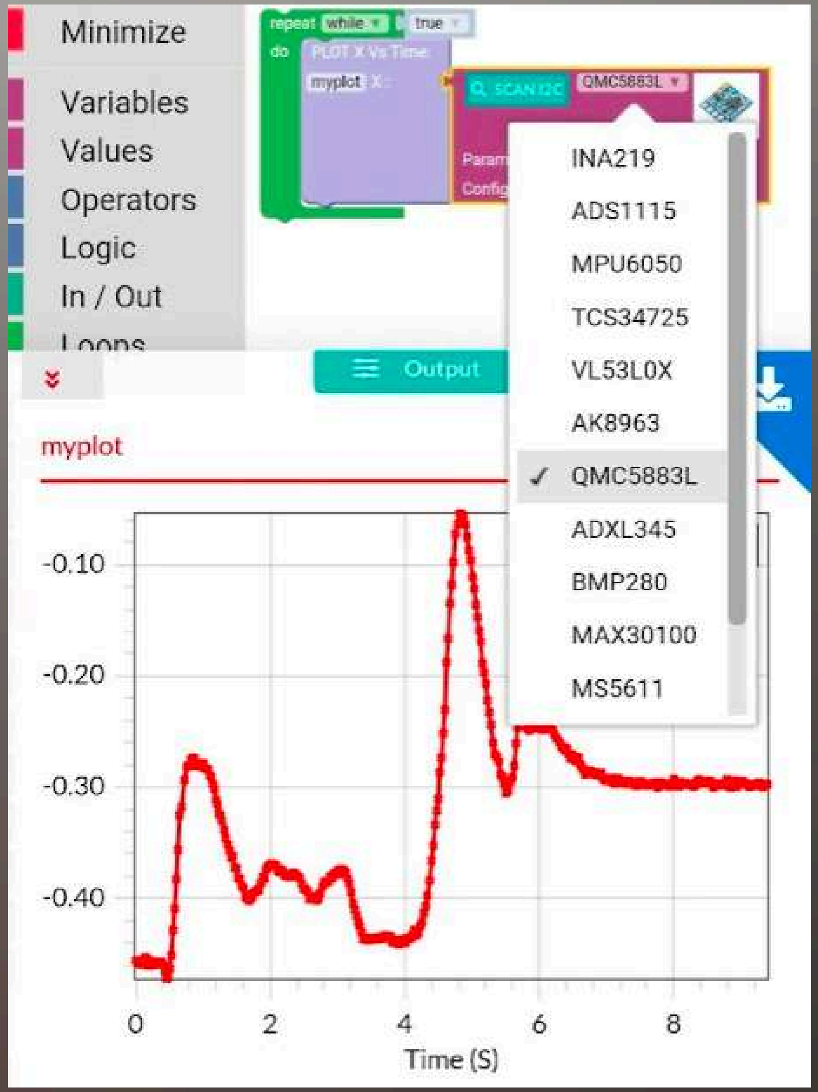


STANDARD ACCESSORIES
Included with the kit

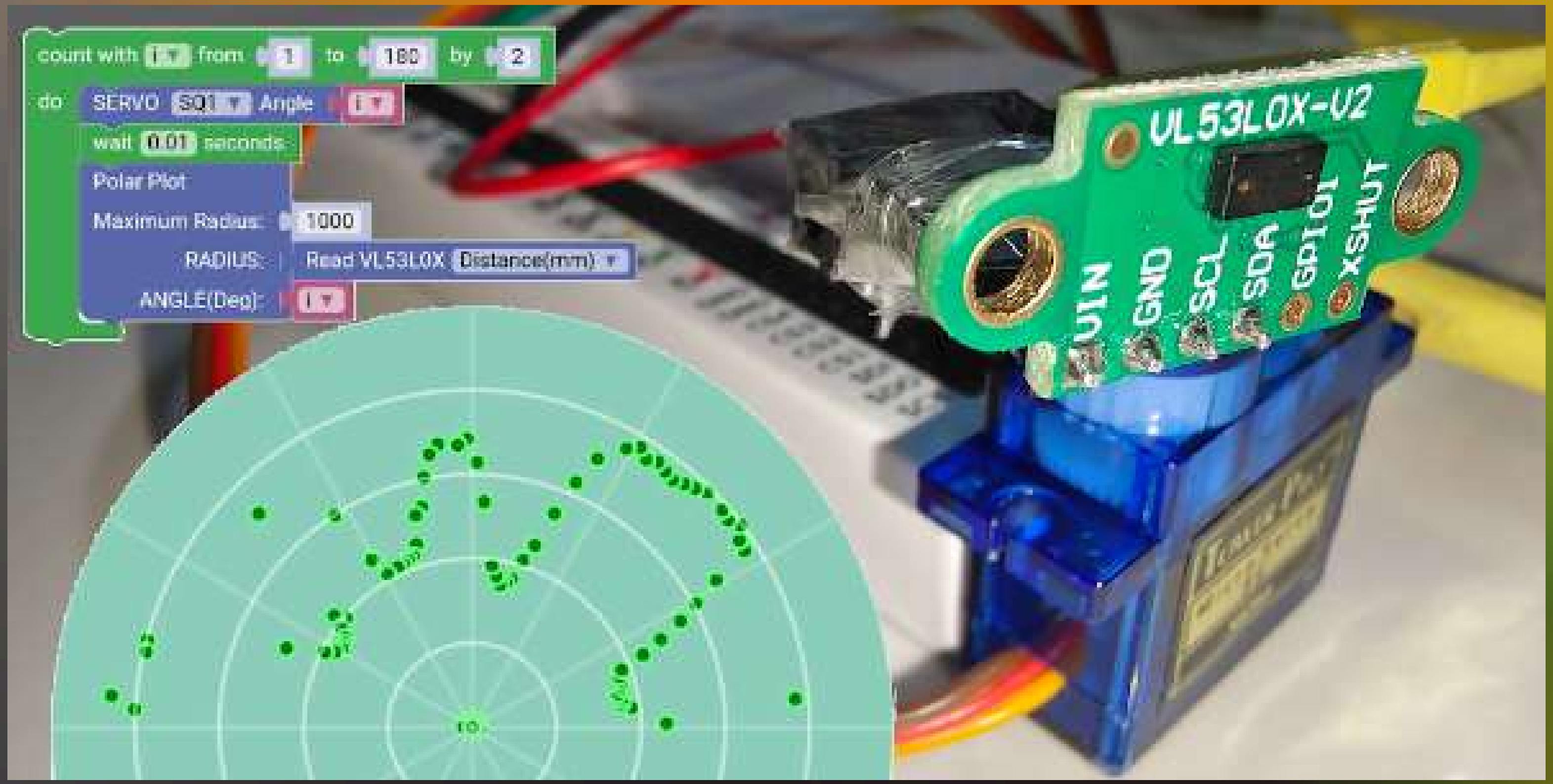
And Many More Activities ...



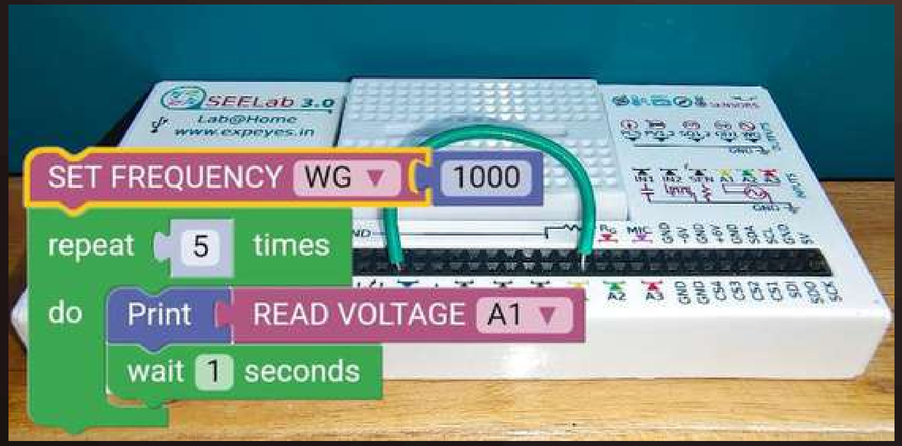
USE THE DATALOGGER TO RECORD ECG SIGNALS AT HOME !



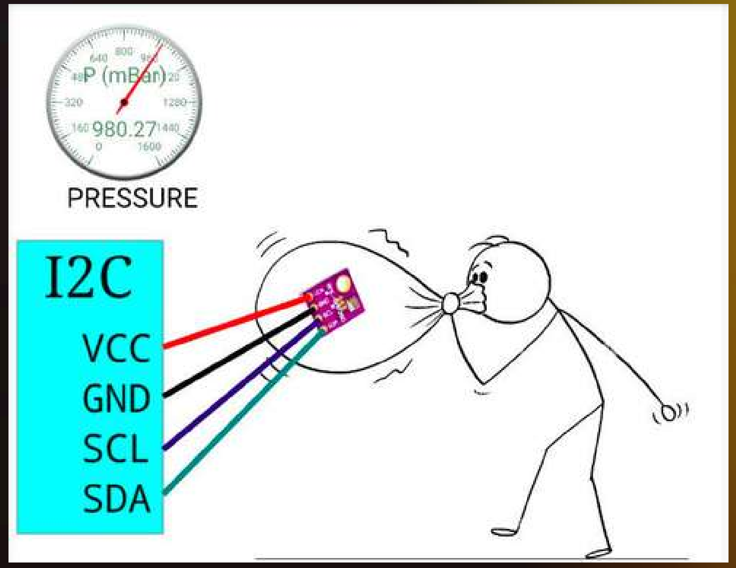
MAGNETIC FIELD READINGS FROM A 3 AXIS MAGNETOMETER



SCANNING RADAR WITH A DISTANCE SENSOR AND A SERVO MOTOR

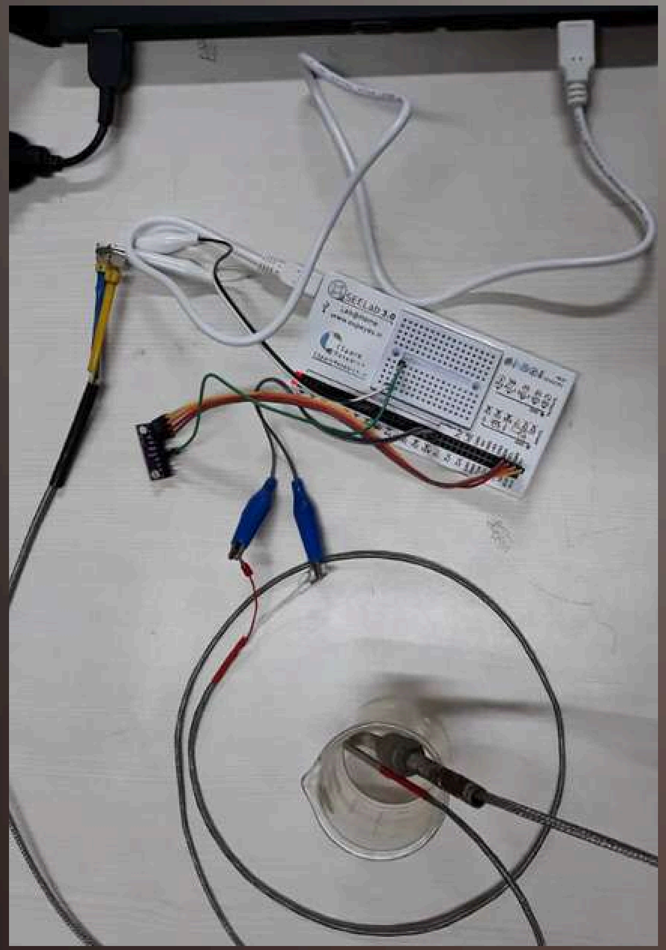


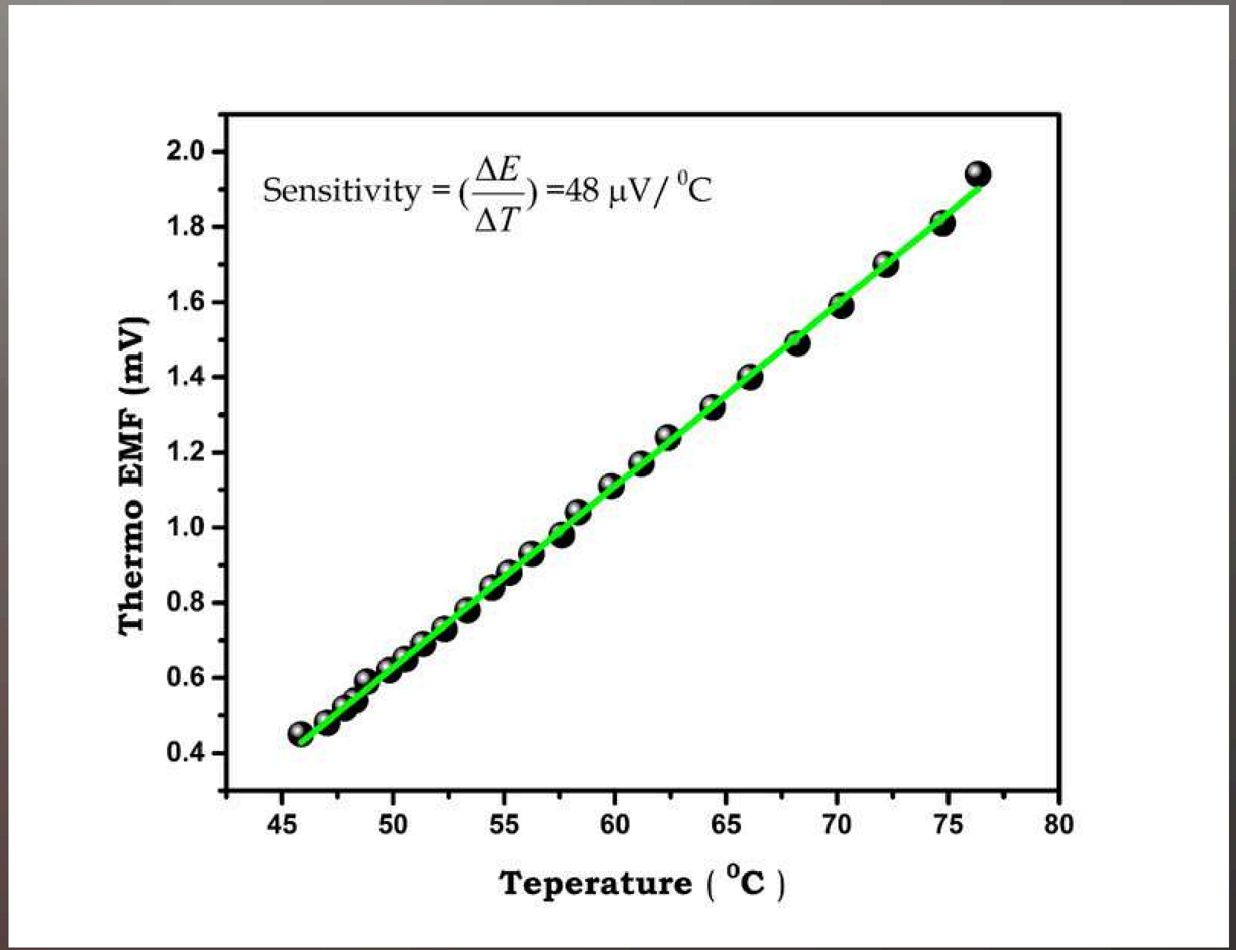
PLUG AND PLAY I2C SENSORS

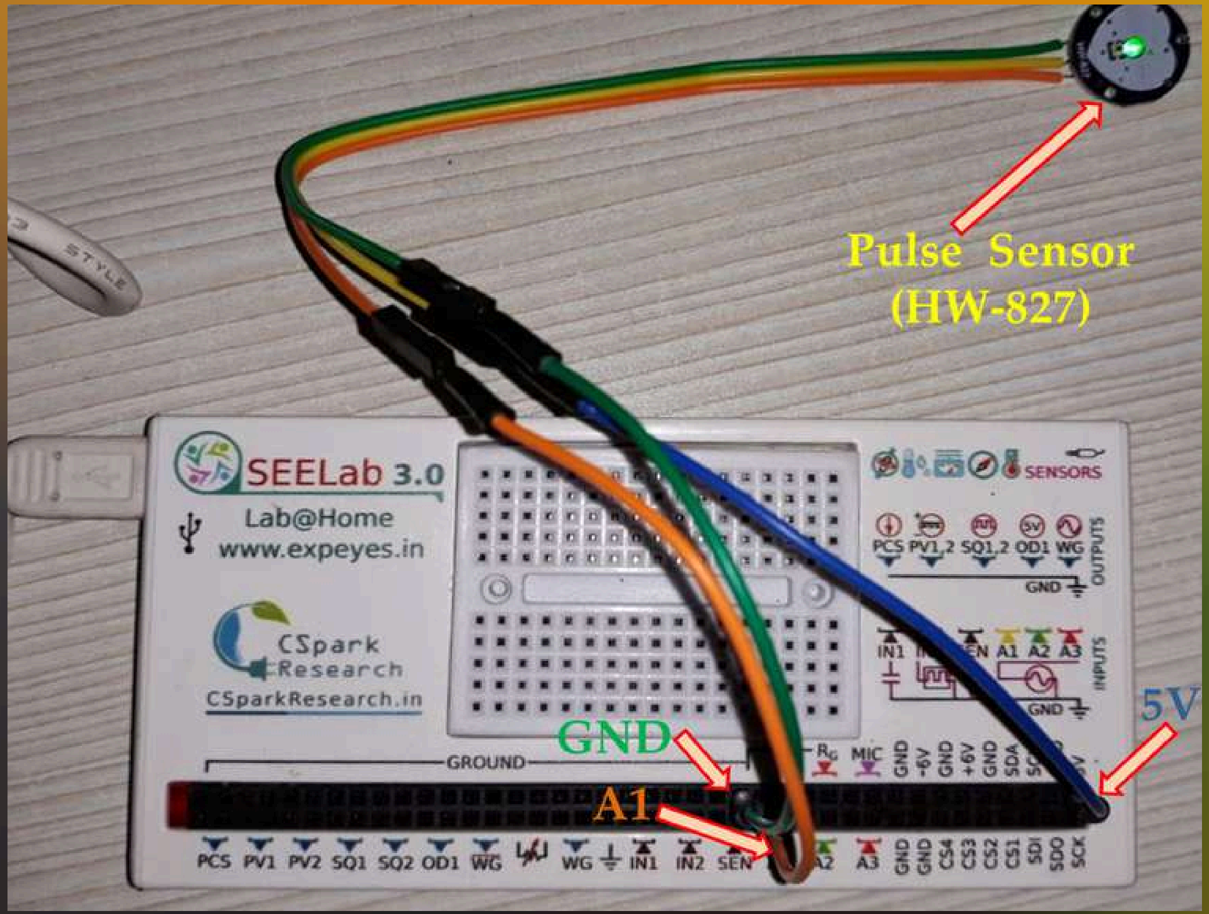


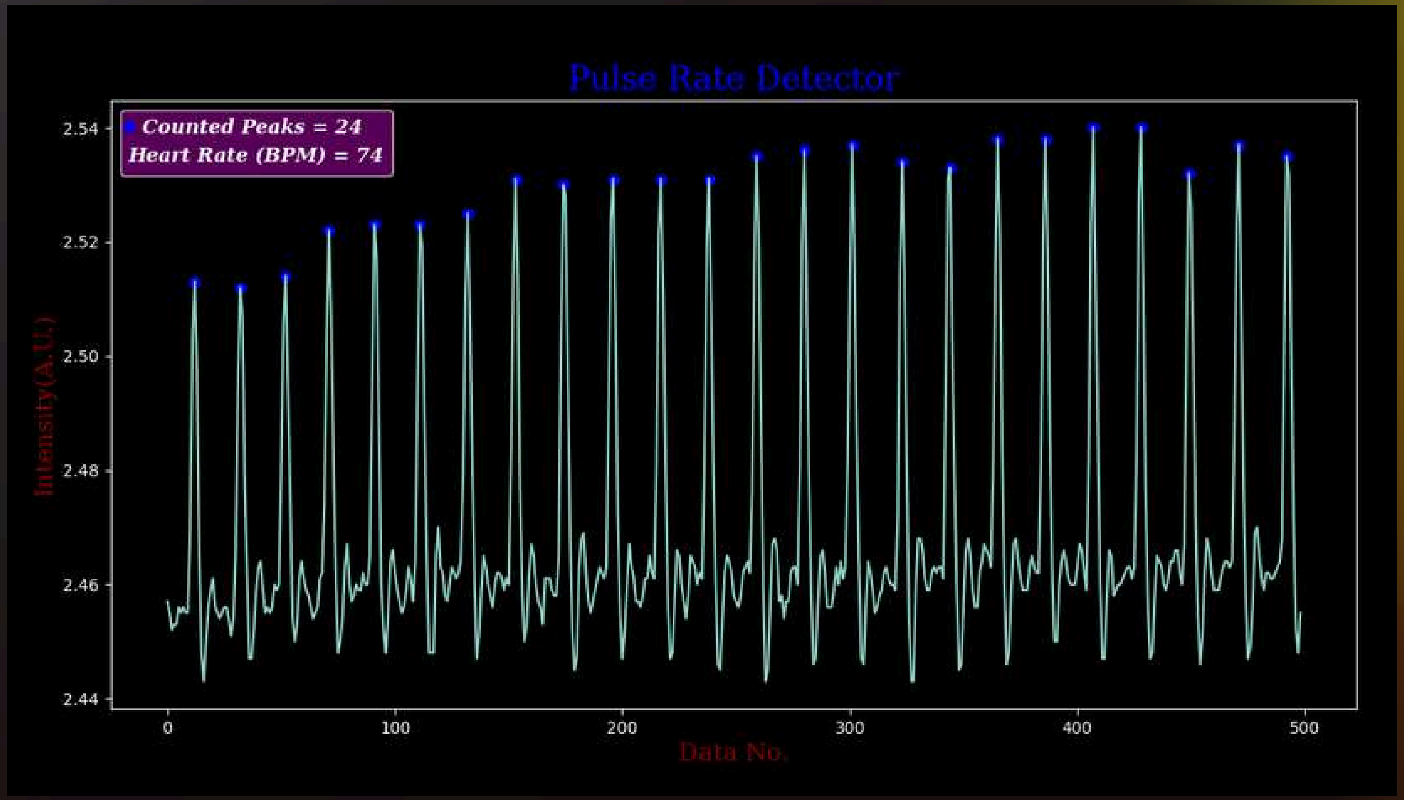
PRESSURE SENSOR

Thermoelectric measurements by Dr Ujjwal, NSHM Academy

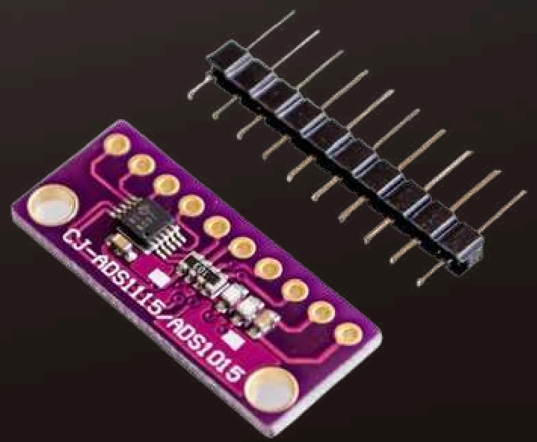








Add-Ons :
ADS1115 16-bit ADC , PT1000 temperature sensor.

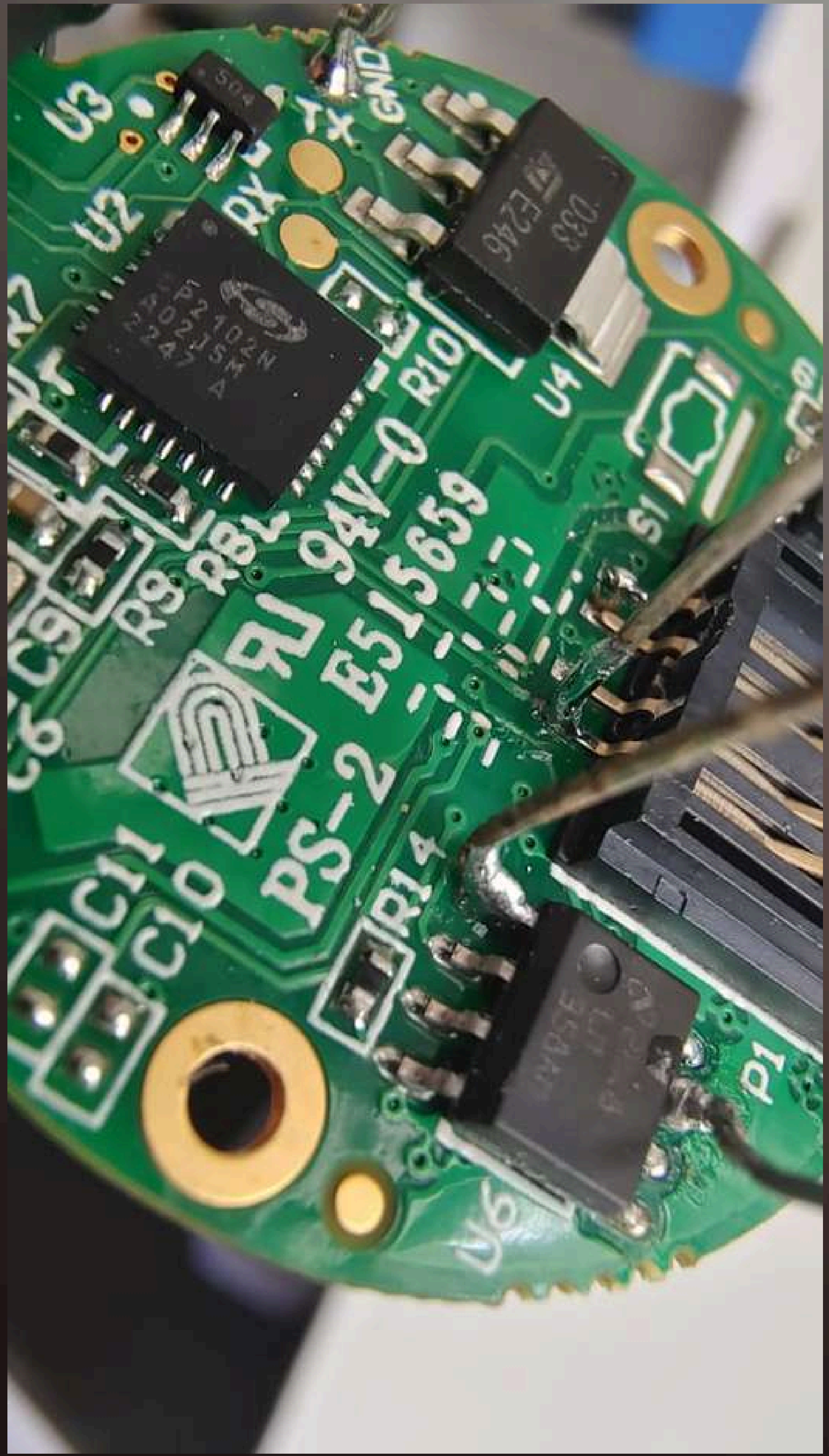


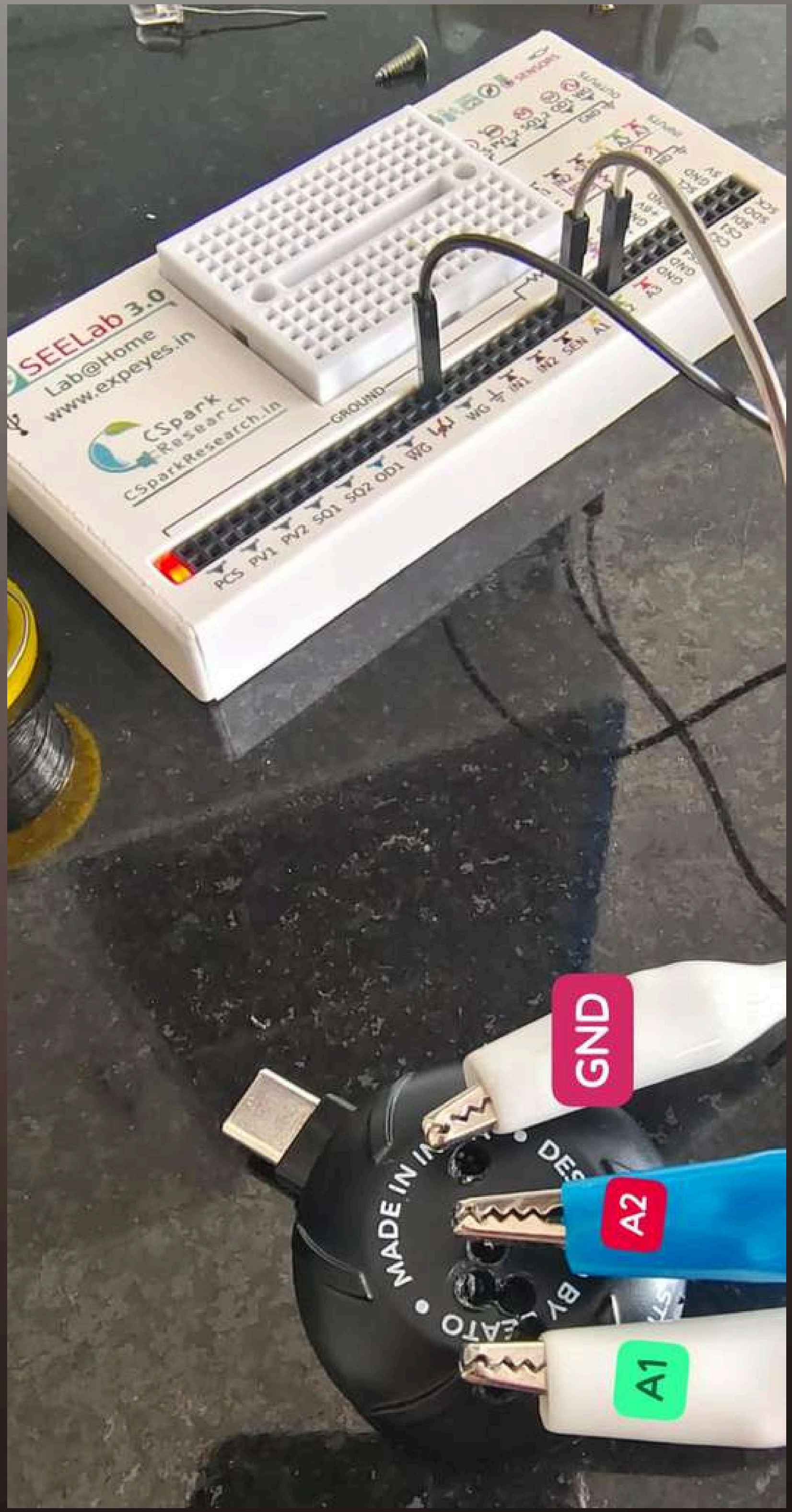
https://github.com/myphysicslabathome/

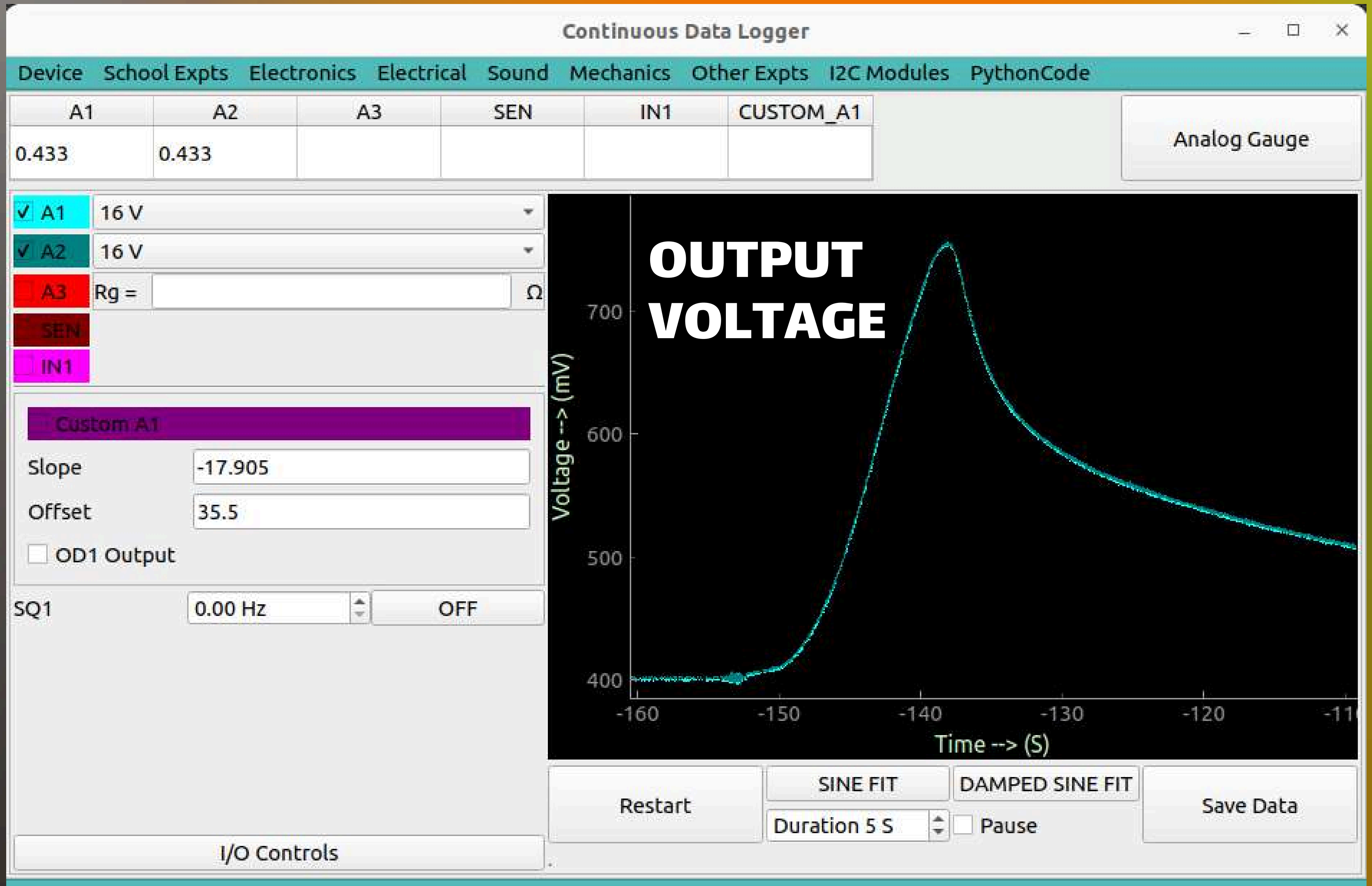
Community Contributions: Publications

Title	Journal	Author(s)
EXPLORING THE TRANSIENT PHENOMENA OF ELECTROMAGNETIC INDUCTION	HBCSE - TIFR	Amit Dhakulkar and Nagarjuna G
Evaluation of Boltzmann's Constant : Revisit using interfaced data analysis	Physics Education 32(3):1-5 · September 2016	Vandana Luthra et al
Analysis of Transient Response of First & Second Order System using ExpEYES	International Journal of Electrical Electronics and Computer Systems (IJEECS)	Omkar S. Vaidya et al.
Optical Sensor Using ExpEyes Junior Kit	International Journal of Innovations in Engineering and Technology (IJIET)	Trilochan Patra
AUDIO FREQUENCY ANALYZER USING EXPEYES AND RASPBERRY PI	3rd international conference on recent innovations in science engineering and management	Haldankar et al.
A Low Cost Open Source Hardware Tool for Integrated Learning Experience in Laboratories	Journal of engineering education transformations DOI: 10.16920/jeet/2015/v0i0/59677	A. B. Raju et al.
INNOVATIVE APPROACH FOR SOLAR RADIATION MEASUREMENT AND DATA ACQUISITION USING expEYES	http://dx.doi.org/10.29369/ijrbat.2015.03.II.0053	V S Rahangadale and A K Mittra
Determination of the band gap of germanium and silicon using ExpEYES-17 kit	Physics Education Phys. Educ. 57 025026	Subhrajyoti Biswas
Study of Fourier series of user defined waveforms using ExpEYES−17 kit	Phys. Educ. 57 035008	Subhrajyoti Biswas
Study of magnet fall through conducting pipes using a data logger	SN Applied Sciences(https://doi.org/10.1007/s42452-019-1086-z)	Abdul Kareem Thottoli et al.
Construction and remote demonstration of an inexpensive but efficient linear differential variable transformer (LVDT) for physics or electronics teaching during COVID-19 pandemic	Physics Education, Volume 58, Number 1(10.1088/1361-6552/ac93de)	Arijit Roy et al 2023 Phys. Educ. 58 015007
Microcontroller based study of diode thermometers for online demonstration of undergraduate laboratory classes in COVID-19 lockdown	Physics Education, Volume 57, Number 4 (10.1088/1361-6552/ac563f)	Subhrajyoti Biswas and Durjoy Roy 2022

Studying a low-cost glucometer (Amperometry)





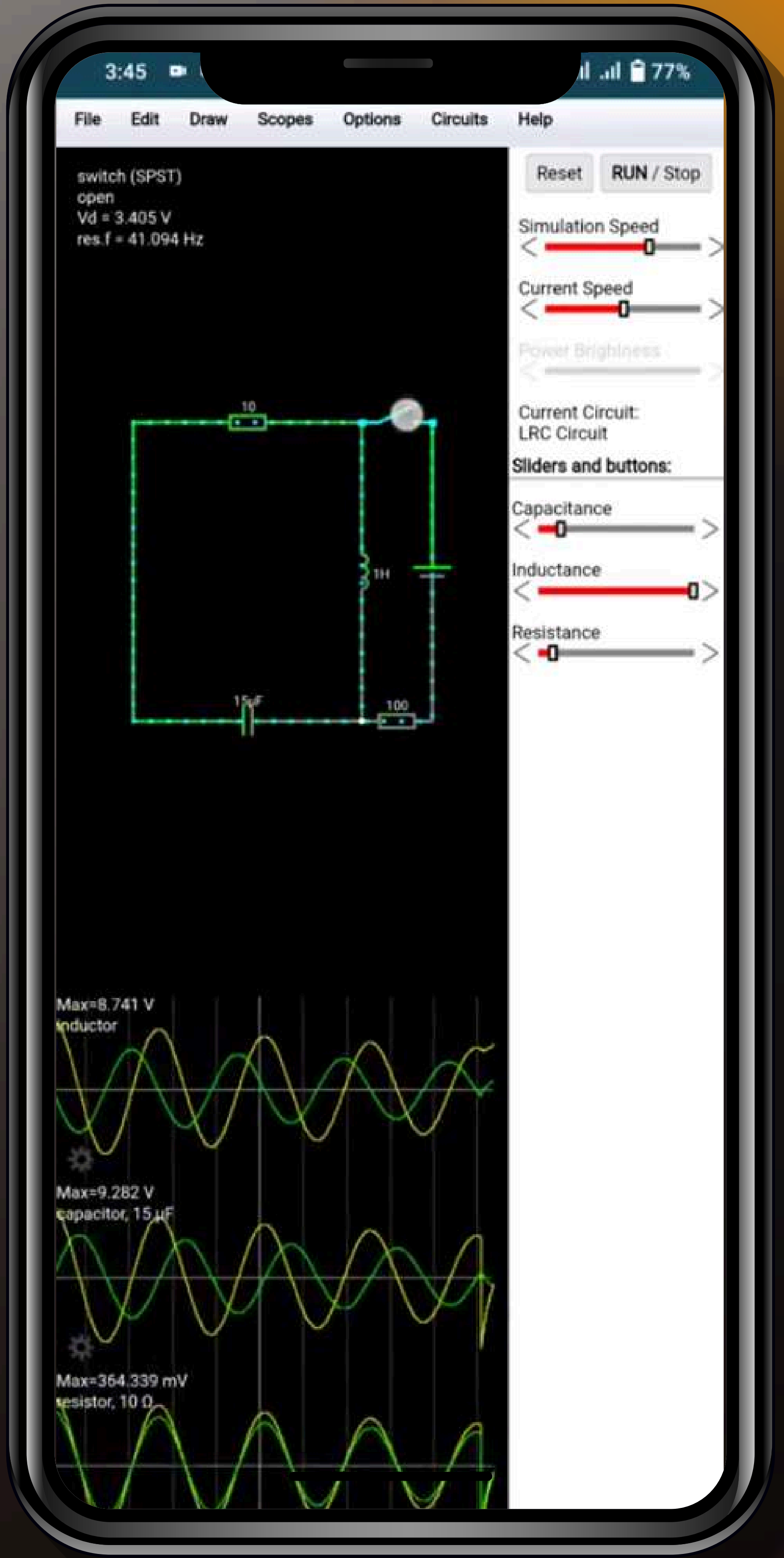


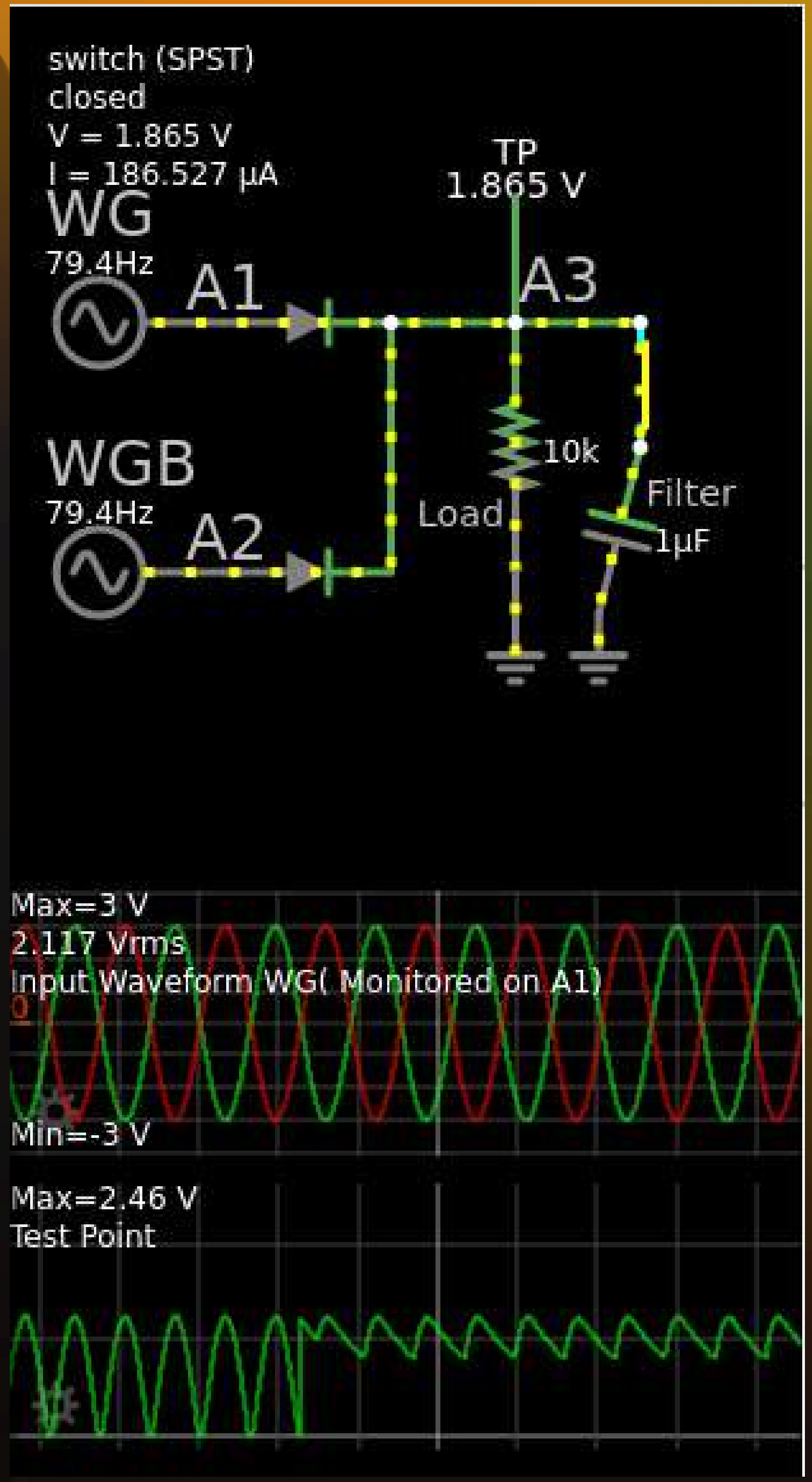
Op-Amp outputs are monitored with A1, A2 voltmeters and plotted to study what the meter sees!

This device can be reprogrammed! Make your own enzymatic sensors!

Circuit Simulator: Create and visualize circuits. Over a hundred examples

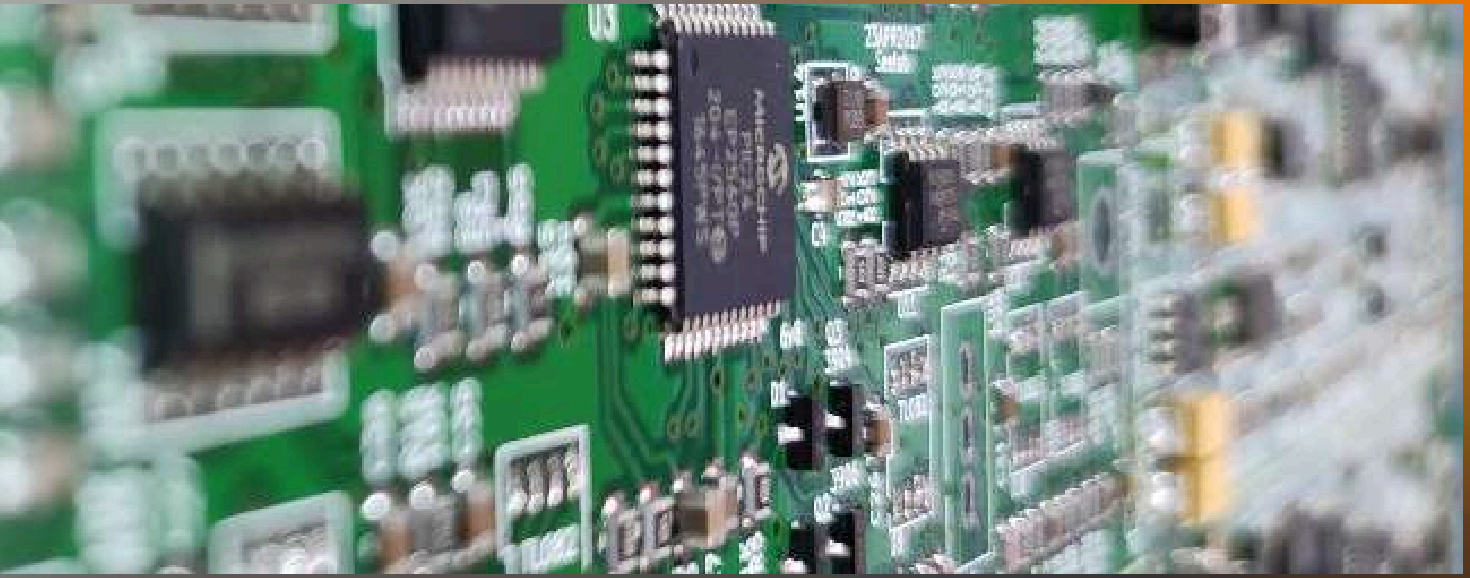
- Built into the desktop application
- Create circuits with a range of predefined components, and visualize current flows, phase differences, and even reflectance
- Also integrated into the mobile app with several extra examples specific to SEELab3.
- Most common circuits are readily available as reference for wiring up for physical studies.

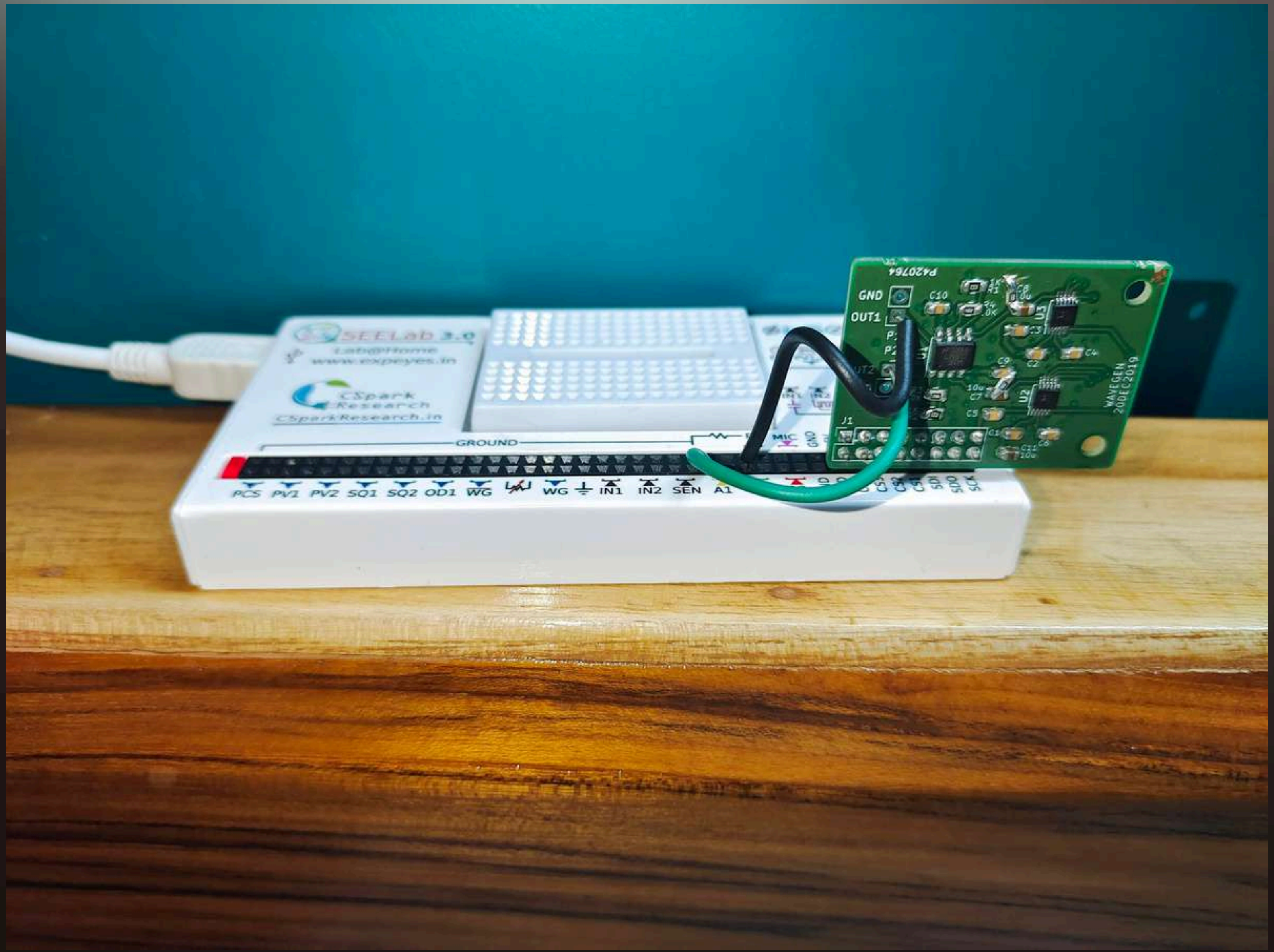




Manufacturing, Testing, and Calibration

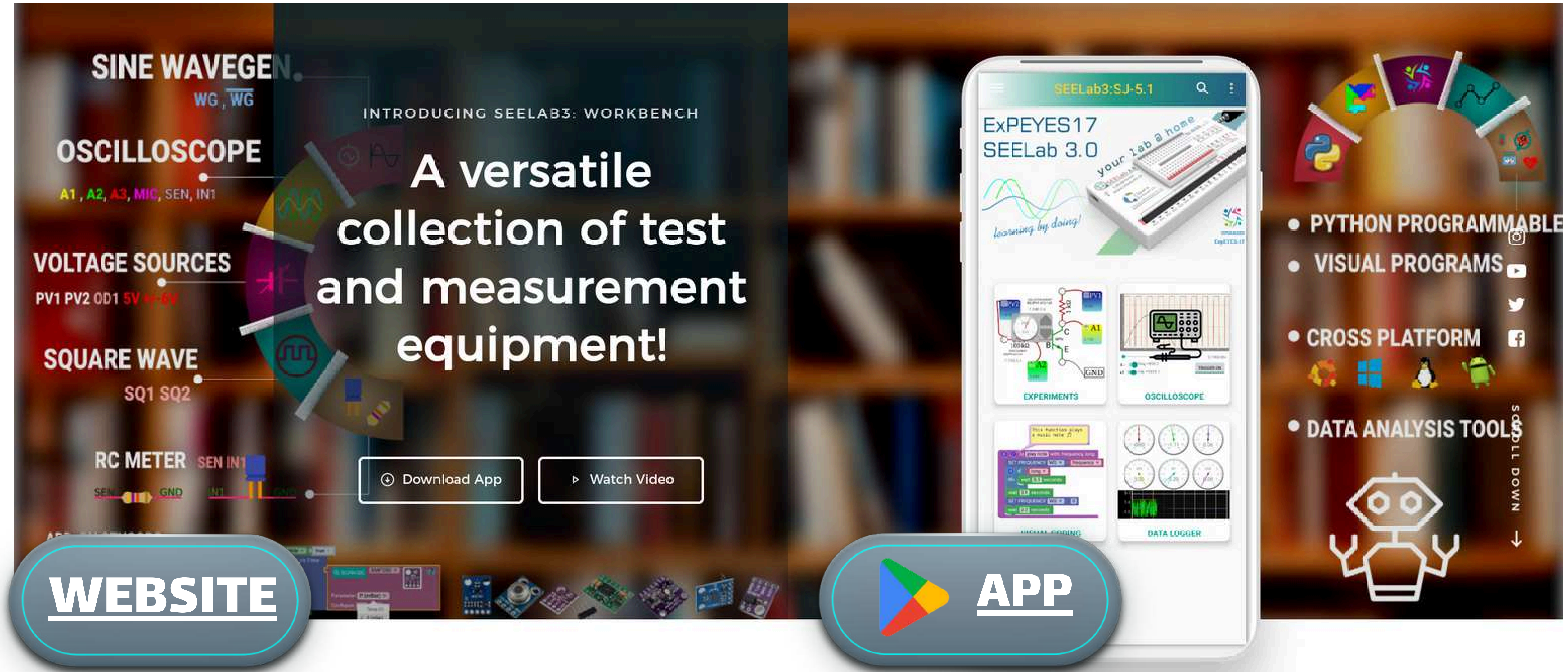
- State of the art Electronics Pick and Place Assembly
- Automatic optical inspection for soldering perfection
- Calibrated and tested for accuracy



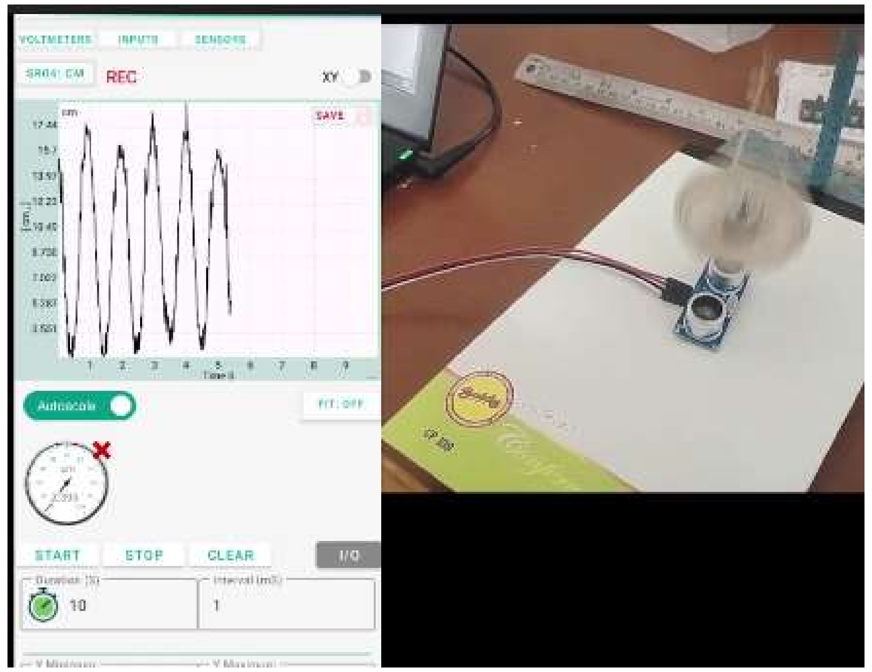


Designed and manufactured in India by

CSpark Research



https://csparkresearch.in/seelab3



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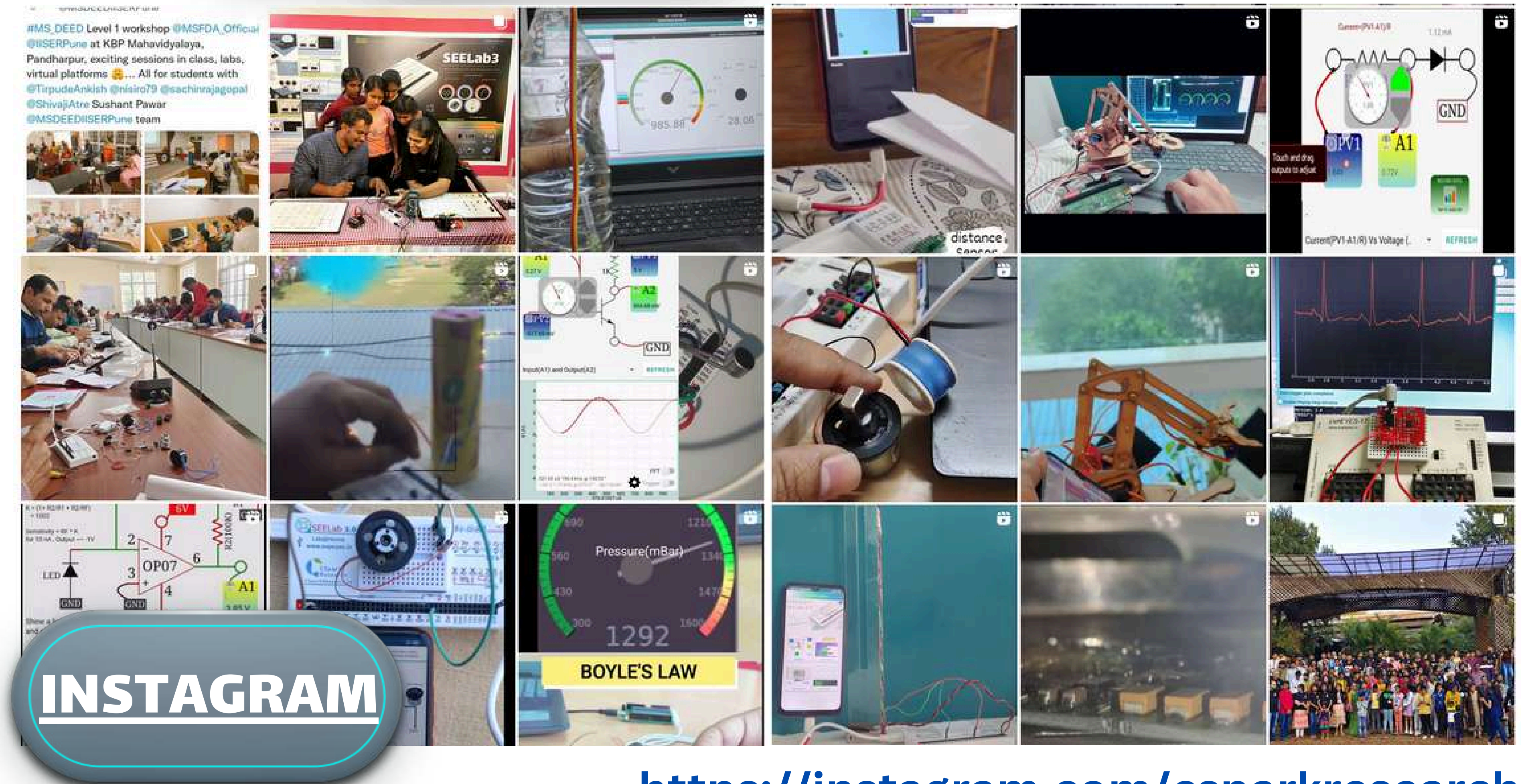

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