Report on the Training Program on

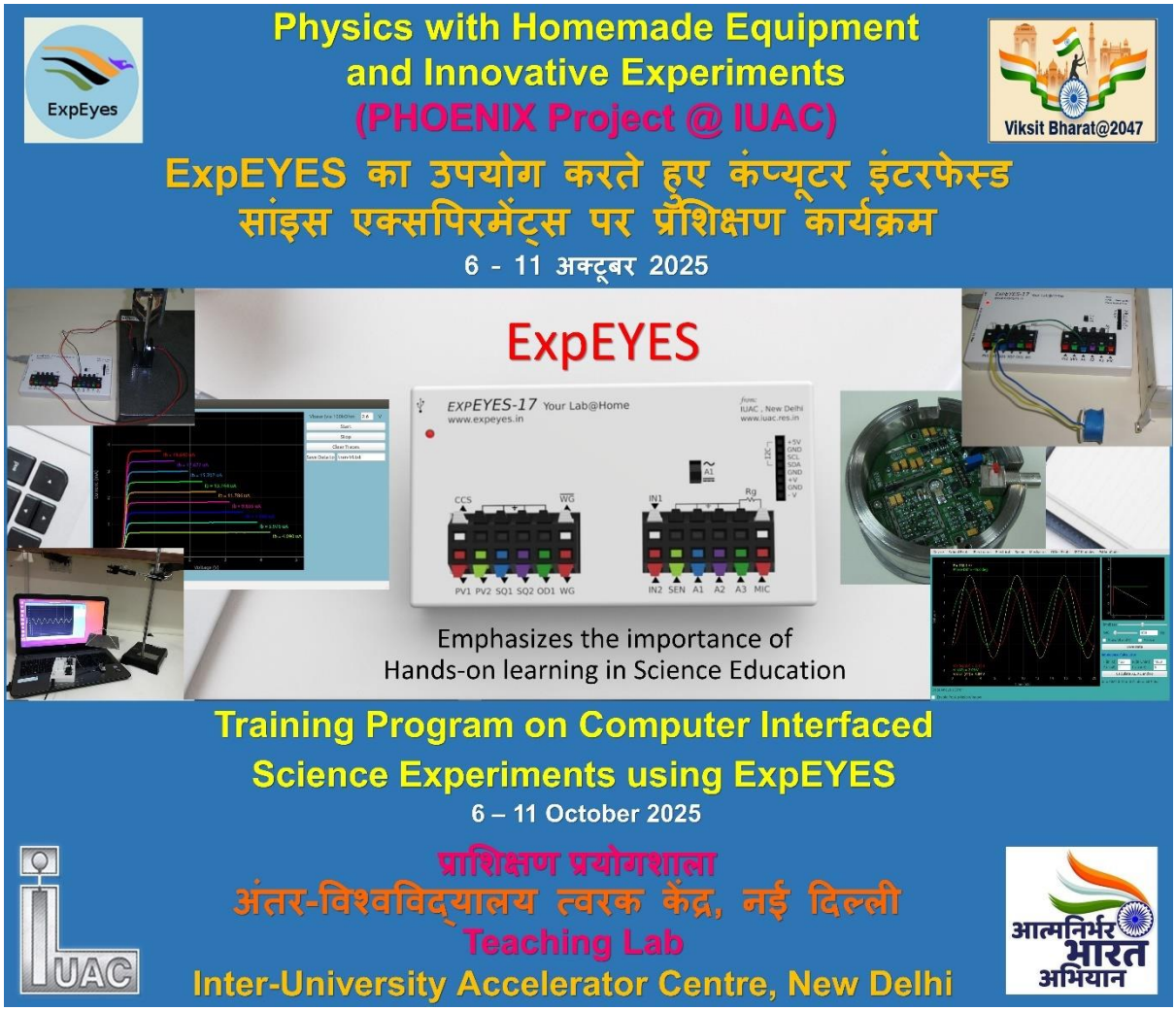
Computer Interfaced Science Experiments Using ExpEYES

(October 6 – 11, 2025)

Inter-University Accelerator Centre

Aruna Asaf Ali Marg,
New Delhi-110067

Training Program on Computer Interfaced Science Experiments using ExpEYES



Venue: Ph. D. Classroom

अंतर विश्वविद्यालय त्वरक केंद्र
Inter-University
Accelerator Centre - (IUAC)

Aruna Asaf Ali Marg, Near Vasant Kunj,
New Delhi, 110067, INDIA

Training Program on Computer-Interfaced Science Experiments using ExpEYES

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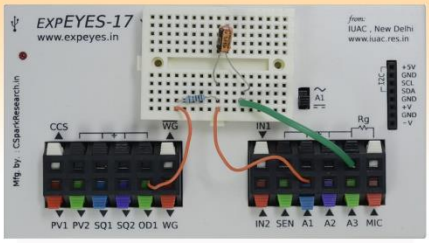

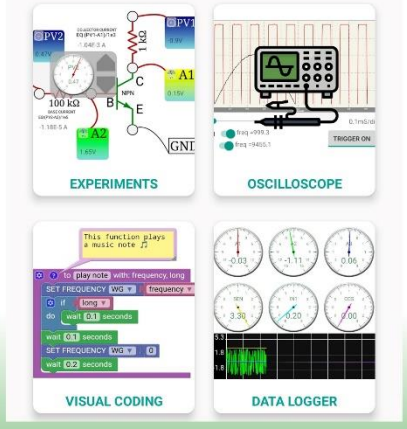

ExpEYES Features

- For Hands-on Learning in Science Education.
- Converts a PC into a Science Laboratory.
- Effective tool for Science Classroom Teaching.
- Implemented in 50 Universities/Institutions.

Topics Covered

- Design of Sensor based Experiments.
- Teaching Science through Experiments.
- Tracker for Video and Image analysis.
- Python Programming Language.
- Visual Programming.
- Alpha Spectrometer.

प्राशिक्षण प्रयोगशाला
अंतर-विश्वविद्यालय त्वरक केंद्र, नई दिल्ली
Teaching Lab
Inter-University Accelerator Centre, New Delhi

Program Schedule

Day 1: Monday 6th October, 2025

9:30 – 10:00	**Registration**	
10:00-10:30	**Inaugural Program** **Keynote Address by** **Shri. Rajeev Mehta, Scientist-H, IUAC, New Delhi**	
10:30-11:15	**Session-1** **Design of Experiments**	**Prof O.S.K.S.Sastri,** CUHP, Dharamshala.
11:15-11:30	**Tea Break**	
11:30-13:00	**Session-2** **Teaching Science through Experimentation and Exploration** **&** **Introduction to ExpEYES**	**Shri. V.V.V.Satyanarayana** IUAC, New Delhi
13:00-14:00	**Lunch Break**	
14:00-15:30	**Session-3** **Hands-on Experiments using ExpEYES** (Demonstration & Hands-on)	**Shri. V.V.V.Satyanarayana** IUAC, New Delhi
15:30-16:00	**Tea Break**	
16:00-16:45	**Hands-On Experiments**	
16:45-17:30	**Session-4** **Introduction to Tracker for Video and Image Analysis**	**Prof O. S. K. S. Sastri** CUHP, Dharamshala

Day 2: Tuesday 7h October, 2025

09:30-11:00	**Session-5** **Classical Mechanics Experiments** **Demonstration & Hands-On**	**Prof O.S.K.S.Sastri** **Shri. V.V.V.Satyanarayana**
11:00-11:30	**Tea Break**	
11:30-12:15	**Session-6** **Forced Damped Oscillator Demonstration using ExpEYES and a Physical Pendulum** (Online)	**Dr. Rajanikanth A** University of Hyderabad
12:15-13:00	**Hands-On Experiments**	
13:00-14:00	**Lunch Break**	
14:00-15:30	**Hands-On Experiments**	
15:30-16:00	**Tea Break**	
16:00-16:45	**Session-7** **Quantum Physics Simulation using Gnumeric Worksheets**	**Prof O. S. K. S. Sastri** CUHP, Dharamshala
16:45-17:30	**Hands-On Experiments**	

Day 3: Wednesday 8th October, 2025

09:30–11:00	**Session-8** **Introduction to** **Python Programming Language** (Online)	**Dr. Manoj Kumar G** University of Hyderabad
11:00-11:30	**Tea Break**	
11:30-12:00	**Discussions and Hands-On Python Basics**	
12:00-13:00	**Session-9** **Android Mobile version of ExpEYES and Visual Programming** (Online)	**Dr Ajith Kumar B. P.** Ex IUAC, New Delhi
13:00-14:00	**Lunch Break**	
14:00-15:30	**Hands-On Experiments** **Using Android Mobile**	
15:30-16:00	**Tea Break**	
16:00-16:45	**Session-10** **Interfacing ExpEYES with Python**	**Prof Vandna Luthra** Gargi College, New Delhi **Shri. V.V.V.Satyanarayana** IUAC, New Delhi
16:45-17:30	**Hands-On Experiments**	

Day 4: Thursday 9th October, 2025

09:30-10:15	**Session-11** **Accelerators at IUAC**	**Shri. Sunil Ojha** IUAC, New Delhi
10:15-11:00	**Hands-On Experiments**	
11:00-11:30	**Tea Break**	
11:30-12:15	**Session-12** **-: ExpEYES :-** **A Lab for your School bag, Classroom, and Research Bench**	**Dr. Praveen Patil** G S S College, Belgaum
12:15-13:00	**Hands-On Experiments**	
	Lunch Break	
14:00-15:00	**Hands-On Experiments**	
15:00-15:30	**Session-13** **Alpha Spectrometer Developed at IUAC**	**Shri. V.V.V.Satyanarayana** IUAC, New Delhi
15:30-16:00	**Tea Break**	
16:00-16:45	**Session-14** **Quantum Computing**	**Prof Vandna Luthra** Gargi College, New Delhi
16:45-17:30	**Project Preparations**	

Day 5: Friday 10th October, 2025

09:30-10:15	**Session-15** **High Performance Computer facility at IUAC**	**Dr. B.K.Sahu** IUAC, New Delhi
10:15-11:00	**IUAC Facility Visit**	**Shri. V.V.V.Satyanarayana** IUAC, New Delhi
11:00-11:30	**Tea Break**	
11:30-12:15	**Session-16** **Outreach Activities with ExpEYES**	**Dr. Govinda Lakhotiya** Dharampeth M.P. Deo Memorial Science College, Nagpur
12:15-13:00	**Project Preparations**	
13:00-14:00	**Lunch Break**	
14:00-15:30	**Project Presentations by Participants**	
15:30-16:00	**Tea Break**	
16:00-17:30	**Project Presentations by Participants**	

Day 6: Saturday 11th October, 2025

09:30-11:00	**Project Presentations by Participants**
11:00-11:30	**Tea Break**
11:30-12:30	**Distribution of Participation Certificates**
12:30-13:00	**Concluding Session**
13:00-14:00	**Lunch**

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Twenty-four participants from various parts of the country were attended this training program. This program included two resource persons: Prof. O. S. K. S. Sastri from the Central University of Himachal Pradesh, and Prof. Vandna Luthra from Gargi College, Delhi University, New Delhi. The main criteria to shortlist the participants followed were to give them the opportunity to cover more regions of the country and other factors to prepare the area-wise waiting lists. Participation with booked travel plans was ensured by the participants to avoid last-minute cancellations and to give the opportunity to the wait-listed candidates.

It was informed to the shortlisted participants to bring their laptops with pre-installed ExpEYES software, if they have any. Otherwise, they can be accommodated by others who already have them. The ExpEYES-17 user manual, tentative list of experiments, and program schedule were shared with the participants prior to the beginning of the program through both email groups and WhatsApp groups created for the purpose. Groups with two participants were formed at the beginning of the program, with one ExpEYES kit given to them to encourage teamwork rather than individual work.

The program schedule was prepared by making sure that the experiments were divided according to topics and that there would be an introduction, a demonstration, and then hands-on time for the participants each day. The experiments were primarily demonstrated after more hands-on sessions, which we tried to incorporate. Both offline and online methods were used to host invited speakers from IUAC and outside sources.

List of the invited talks during the program in online and or offline modes:

1. **Teaching Science through Experimentation and Exploration**
   Shri. V.V.V.Satyanarayana, IUAC, New Delhi.
2. **Introduction to Tracker for Video and Image Analysis**
   Prof. O.S.K.S.Sastri, CUHP, Dharamshala.
3. **Forced Damped Oscillator Demonstration using ExpEYES and a Physical Pendulum (Online)**
   Dr. A.Rajani Kanth, University of Hyderabad, Hyderabad.
4. **Introduction to Python Programming language (Online)**
   Dr. Manoj Kumar, University of Hyderabad, Hyderabad.
5. **Android mobile version of ExpEYES and Visual Programming (Online)**
   Dr. Ajith Kumar B.P., Ex IUAC, New Delhi.
6. **Accelerators at IUAC**
   Shri. Sunil Ojha, IUAC, New Delhi.
7. **A lab for your School bag, Classroom, and Research Bench (Online).**
   Dr. Praveen Patil, G.S.S.College, Belgaum.
8. **Quantum Computing**
   Prof. Vandna Luthra, Gargi College, New Delhi.
9. **Alpha Spectrometer Development at IUAC**
   Shri V.V.V.Satyanarayana, IUAC, New Delhi.
10. **High performance Computer Facility at IUAC.**
    Dr. B.K.Sahu, IUAC, New Delhi.
11. **Outreach Activities with ExpEYES (Online).**
    Dr. Govinda Lakhotiya, Dharampet M.P.Deo Memorial Science College, Nagpur.

Day 1: Monday 6th October 2025

Shri V. V. V. Satyanarayana, Convener of the program, welcomed the participants, and the inaugural session began with the lighting of the lamp by the dignitaries. Shri Rajeev Mehta, Scientist-H, IUAC, delivered the keynote address, highlighting the objectives of the program and emphasizing the participants' responsibility to carry forward the spirit of scientific learning by organizing similar programs, training students, and developing new experimental ideas at their respective institutions. Prof. O. S. K. S. Sastri from the Central University of Himachal Pradesh, Dharamshala, who has been associated with this initiative for more than a decade, appreciated IUAC for conducting such a significant training program for the teaching community across the country. Dr. B. K. Sahu, Scientist-H, IUAC, expressed gratitude to the dignitaries and congratulated all the participants on their successful involvement in the program.

Meanwhile, the Convener, Shri V. V. V. Satyanarayana, shared the good news with the participants, that Dr. Ajith Kumar B. P., retired Scientist-H, IUAC, and co-founder of the PHOENIX project at IUAC, has been honored by the Indian Association of Physics Teachers (IAPT) with the Professor Babulal Saraf Birth Centenary Medal 2025 during the 39th IAPT Convention held during 4-7 October 2025 in Goa. This recognition was awarded for his outstanding contribution to science education through the creation of an indigenous set of computer-interfaced science experiments in the form of a low-cost experimental kit, ExpEYES, developed for Physics and Engineering students as part of a national initiative of the Inter-University Accelerator Centre, New Delhi.

Dr. Ajith Kumar B.P. receiving Professor Babulal Saraf Birth Centenary Medal – 2025

The first **technical session** commenced with an introductory talk titled *"Teaching Science through Experimentation and Exploration"* by Shri V. V. V. Satyanarayana. During the session, he introduced ExpEYES to the participants and demonstrated its use as an effective classroom tool for teaching science through hands-on experimentation. He explained how ExpEYES can serve as a multimeter capable of measuring resistance, capacitance, and voltage; a programmable power supply; a waveform generator; and a four-channel oscilloscope.

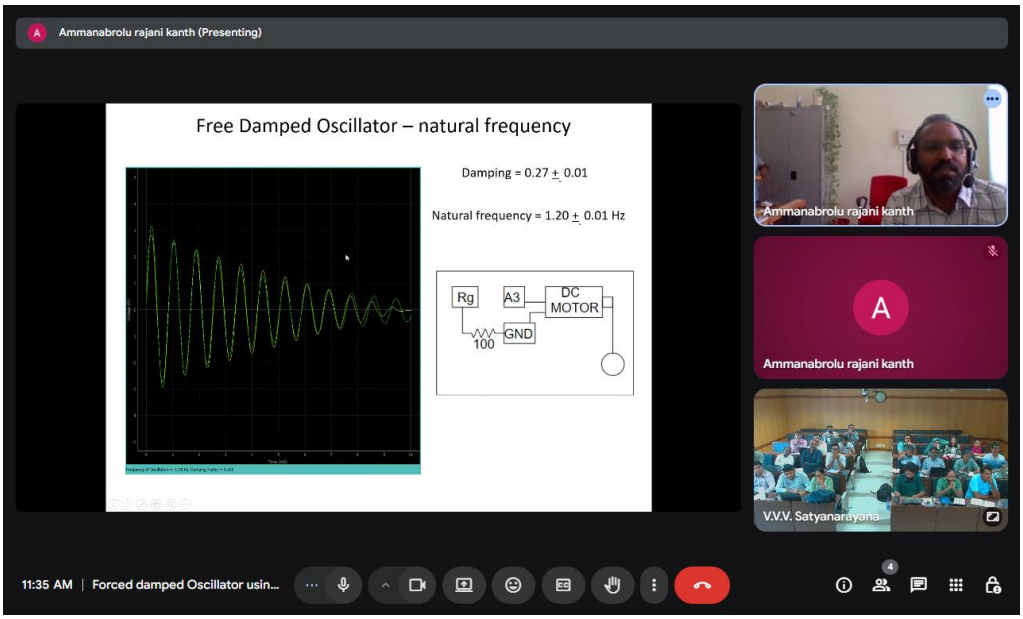
Shri Satyanarayana also explained the experiment for obtaining the I–V characteristics of a diode, illustrating how it can be performed both using ExpEYES and through the conventional laboratory setup.

In the **post-lunch session**, participants engaged in **hands-on electronics experiments** from the ExpEYES experiment menu. By the end of the day, all participants had become familiar with using ExpEYES, and most of the experiments were successfully performed by individual groups consisting of two participants each. The beginning-day training program was ended by a talk on Introduction to Tracker for Video and Image Analysis was given by Prof. O.S.K.S. Sastri, CUHP, Dharamsala.

Day 2: Tuesday 7th October 2025

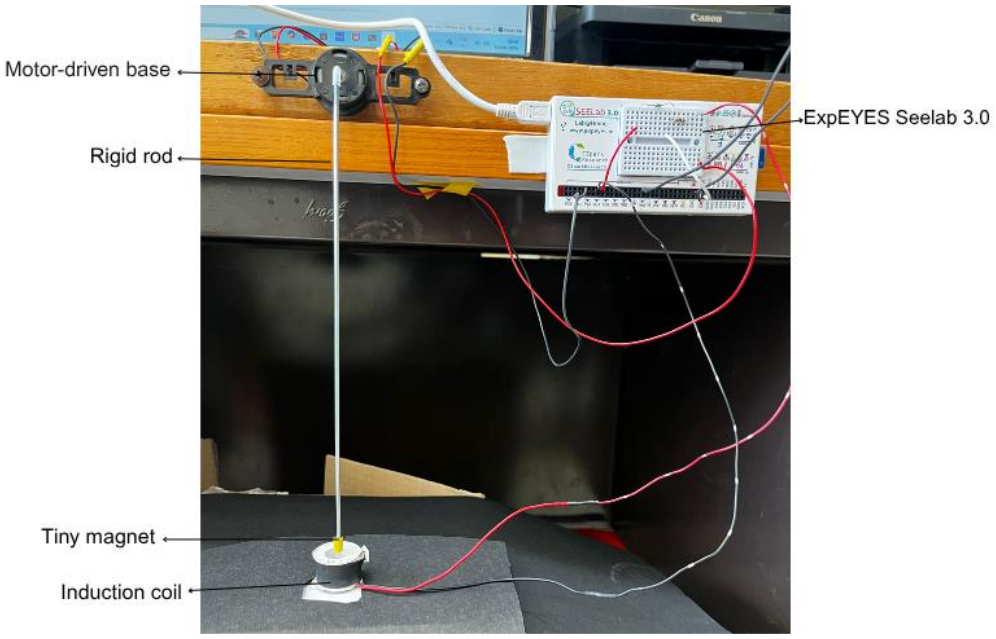
In the first session, Prof. O. S. K. S. Sastri, and V. V. V. Satyanarayana presented several classical mechanical experiments by demonstrating how to use various sensors, such as an ultrasonic echo sensor module for distance measurements, a photo-gate sensor for timing measurement, a DC motor as an angular position sensor, etc., with ExpEYES. Participants were practiced the Classical Mechanics experiments during the hands-on sessions.

In the post-tea session, a demonstration titled *"Forced Oscillator Demonstration Using ExpEYES and a Physical Pendulum"* was conducted online by Dr. A. Rajanikanth from the University of Hyderabad. Dr. Rajanikanth had participated in the May 2025 ExpEYES Training Program at IUAC, and since then, he has been actively involved in customizing classical mechanics experiments using ExpEYES. He also regularly uses ExpEYES for demonstrations and hands-on experiments during Teacher Training Programs conducted at the Malaviya Mission Teacher Training Centre, University of Hyderabad.

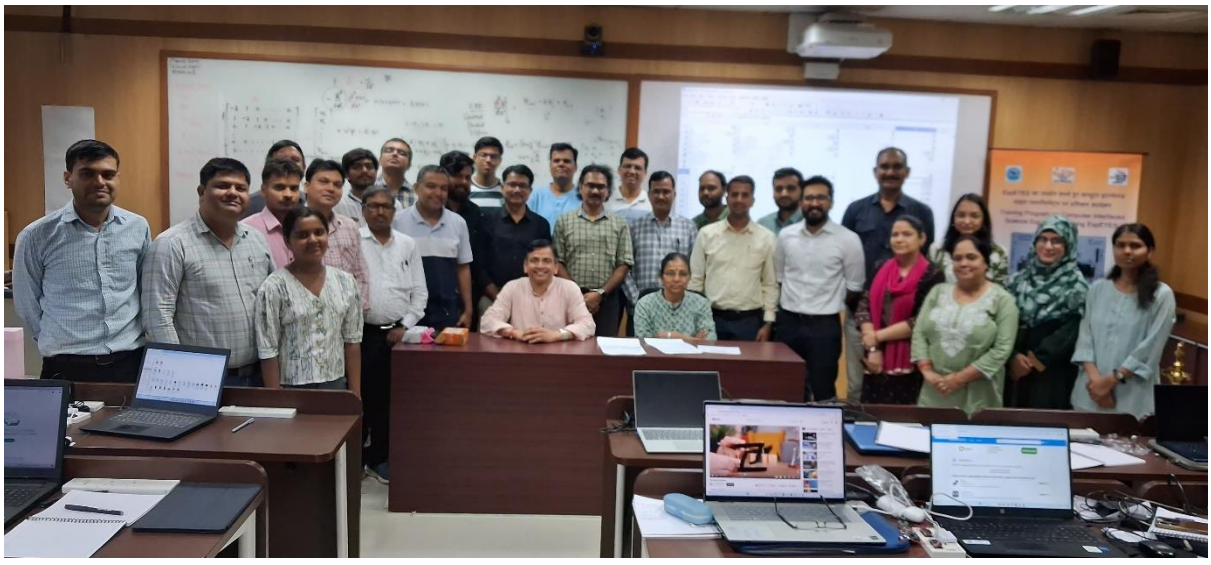


The apparatus consists of a small mass (magnet) attached to a rigid rod, which is connected to a motor-driven base. The motor can oscillate the rod at different frequencies, which are displayed in Hertz on the ExpEYES interface. A coil is placed just below the magnet. As the magnet oscillates, it induces an electromotive force (EMF) in the coil due to the changing magnetic flux. This induced EMF is recorded using ExpEYES to analyze the amplitude and

frequency of oscillations. The system can be studied under both free and damped conditions in air.

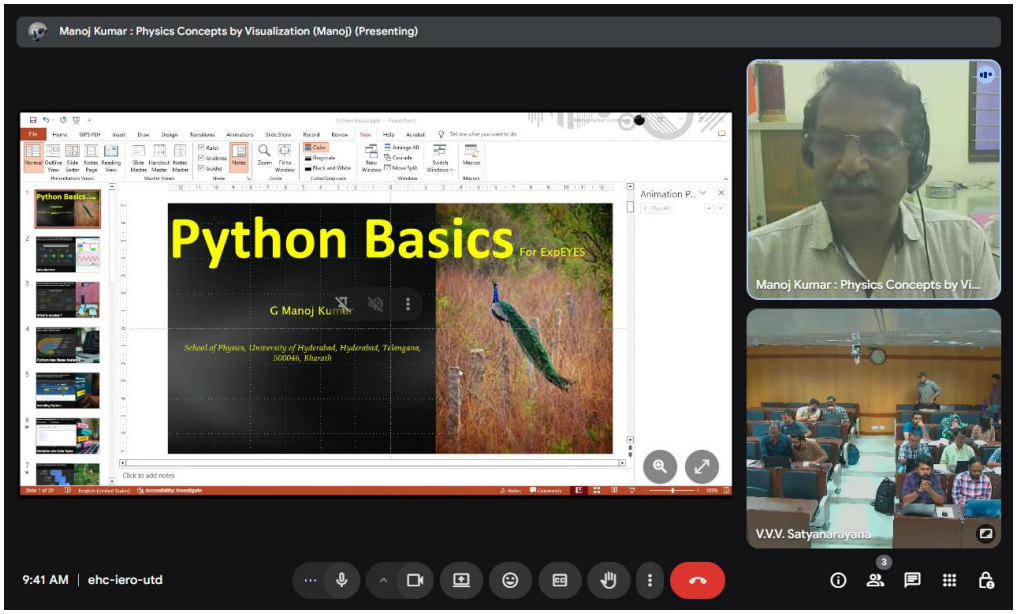


Later, the participants practiced the experiments provided in the GUI menus under Mechanics, Electronics, and Electrical sections. They were divided into two-member groups, and all participants explored the experiments actively. In the post-lunch session, Prof. Sastri delivered a talk on *"Quantum Physics simulation using Gnumeric worksheets,"* followed by a hands-on session.

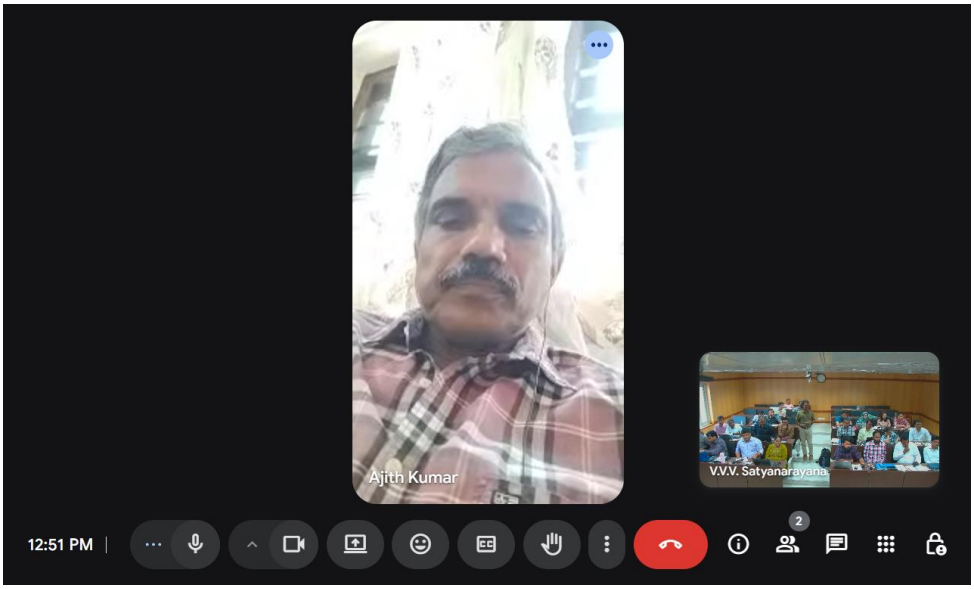


Day 3: Wednesday 8th October 2025

The morning session began with a talk on *"Introduction to the Basics of Python Programming Language"* by Dr. Manoj Kumar from the University of Hyderabad, conducted in online mode. Basic Python codes were introduced along with fundamental concepts such as variables, data types, and loops. By the end of the talk, participants were asked to write a small Python program for a given task. In the subsequent session, participants practiced the basics of Python programming, during which those with prior knowledge of Python assisted others.



The post-tea session began with an online talk titled *"Android Mobile Version of ExpEYES and Visual Programming"* by Dr. Ajith Kumar B.P., Ex-IUAC and co-founder of the PHOENIX project at IUAC. He demonstrated how to use ExpEYES with mobile devices and explained its applications in classroom teaching. The concept of visual programming was also introduced, illustrating how small code blocks can be combined to build a complete program for performing experiments.



After Dr. Ajith Kumar's talk, the participants practiced the experiments once again using Android mobile phones. A few participants were particularly eager to explore the experiments with visual coding, and they individually experimented with the basic code blocks. Through this exercise, the participants realized how easy it is to use ExpEYES in classroom teaching — even while explaining theoretical concepts.

The post-tea session after lunch was scheduled for communicating with ExpEYES through Python programming. Prof. Vandna Luthra and Shri. Satyanarayana ensured that the participants were ready with the required software installed on their laptops. For this purpose, the following were installed: PyCharm, *eyes17lib* (using pip), SciPy, and Matplotlib. Dr. Chandrashekhar Mahajan and Dr. Mamta Pandey assisted the participants during this activity. Initially, communication between the laptop and ExpEYES through Python was established. Later, the participants practiced basic operations such as reading A1 and A2 inputs, setting DC voltages at PV1 and PV2, and generating and plotting waveforms using the waveform generator. Prof. Vandna Luthra then explained the example of Diode I–V characteristics step by step, and all participants practiced it accordingly. Later, there was a discussion on the projects to be taken up by the participants. Most of the projects and groups were finalized. A total of eleven groups were formed, and accordingly, eleven projects were assigned.

Day 4: Thursday 9th October 2025

In the morning session, a talk on *"Accelerators at IUAC"* was delivered by Shri. Sunil Ojha, Scientist-G, IUAC. The purpose of including this talk in the training program was to acquaint the participants with the research facilities available at IUAC. This session aimed to help the participants, and their associated students, explore the possibility of utilizing these facilities for their research work. The talk covered the various accelerator facilities available at IUAC, along with the corresponding energy levels of each accelerator.

In the later session, the participants practiced hands-on experiments and simultaneously began working on their projects. The materials required to carry out these projects were arranged with the help of Shri. Om Mishra and Shri. Ajay, who provided technical support throughout the training program. The post-tea session began with an online talk titled *"A Lab for Your School Bag, Classroom, and Research Bench"* by Dr. Praveen Patil from G.S.S. College, Belgaum. He shared his journey with ExpEYES and described how he presented it at various national and international forums. Dr. Patil also demonstrated how he established a science laboratory at his institution featuring several innovative experiments, most of which were designed using ExpEYES. He further showcased projects associated with forums such as SciPy India and PyCon India. The participants found his talk very interesting and inspiring, serving as a true pathfinder for exploring the vast possibilities of ExpEYES.

After two hands-on sessions, a talk and demonstration were given by Shri. V. V. V. Satyanarayana on the **Alpha Spectrometer developed at IUAC.** The reason to initiate this development at IUAC and the history of various prototypes developed in this regard were discussed. The various types of experiments designed with this equipment were discussed and demonstrated. Using non-enriched sources to perform alpha particle detection experiments was discussed. Measuring the foil thickness, the study of alpha particle energy with distance in air, etc. were discussed. The signal processing of the detector's signals before acquiring the data was explained. The basics and necessity of each and every block of signal processing like pre-amplifiers, shaping amplifiers, peak-sensing ADCs, and data acquisition systems were explained in detail. The alpha spectrometer was demonstrated with ^{241}Am alpha source with and without vacuum. Later, a talk titled *"Quantum Computing"* was delivered by Prof. Vandna Luthra, after which the participants were engaged in preparing their projects.

Day 5: Friday 10th October 2025

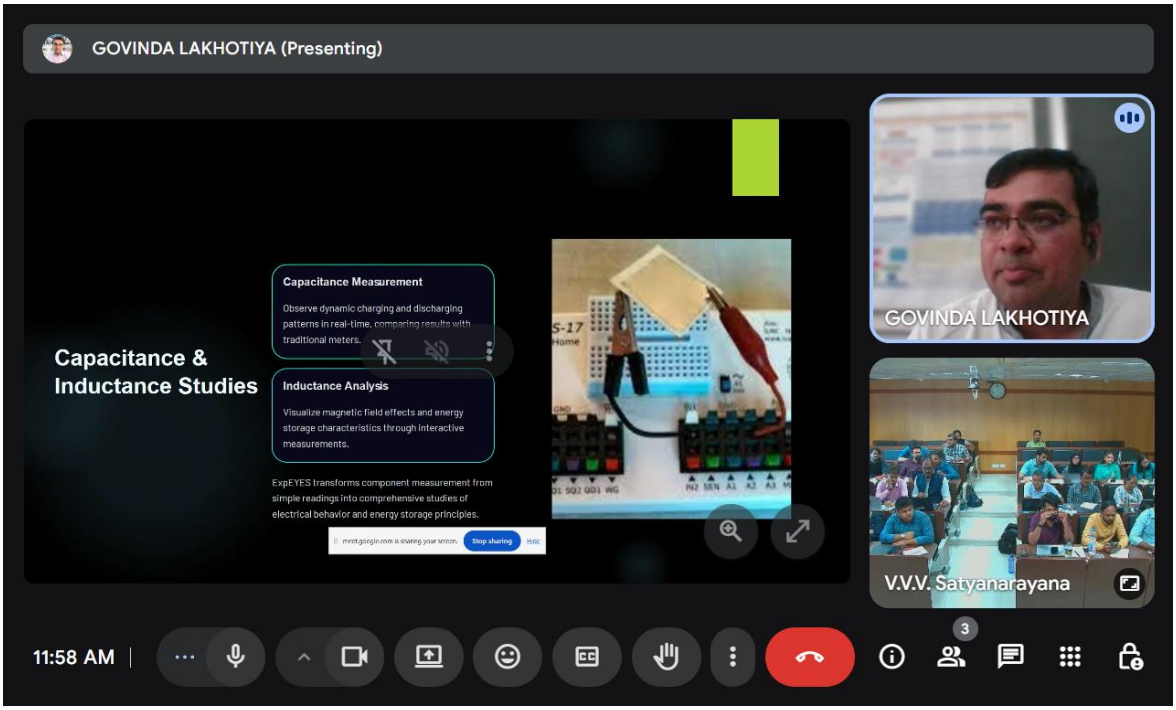
In the morning session, a talk on **'High Performance Computer Facility at IUAC'** was given by Dr. B.K.Sahu, Scientist-H, IUAC. The idea to include this talk during this training program was to use it as an acquaintance program to introduce the participants to the facilities available at IUAC for research applications. This may help the participants and associated students, if any, to utilize the facilities available at IUAC. The talk covered the various accelerator facilities available at IUAC, along with the energy levels of various accelerators.

IUAC Facility Visit

The purpose of the IUAC facility visit is to showcase the opportunities and resources available at IUAC to the Indian academic community so that they or their students can make use of them. The main control room and data room were among the accelerators, beam halls, and groups that participants visited during the visit.

The post-tea session began with an online talk titled *"Outreach Activities with ExpEYES"* by Dr. Govinda Lakhotiya from Dharam Peth M.P. Deo Memorial Science College, Nagpur.

He presented the outreach activities carried out using ExpEYES, particularly those conducted for school students in Nagpur and Wardha to help them understand basic concepts of physics.



The project presentations began during the post-lunch session and continued the following day as well. A total of eleven projects were presented by the participants, and most of them showcased new ideas implemented using ExpEYES.

The Tea-time discussions

List of the Projects taken up by the Participants

1. Measurement of Bioelectric Responses of Plant Leaves to Light using ExpEYES.
2. Generation and Analysis of Lissajous Figures using ExpEYES
3. Pulse Rate Measurement using ExpEYES and Python Programming.
4. Formation of Lissajous Figures using ExpEYES.
5. Exploring RC Circuits using ExpEYES.
6. Real-time measurement of I_C Vs I_B of a CE transistor using ExpEYES and Python Program.
7. Electromagnetic Induction (Extensive Observations) with the help of ExpEYES.
8. Smart Soil Moisture Analysis using ExpEYES.
9. Verification of Logic Gates using ExpEYES.
10. Graphing Motion using ExpEYES.

Projects Preparation, Presentations by the participants

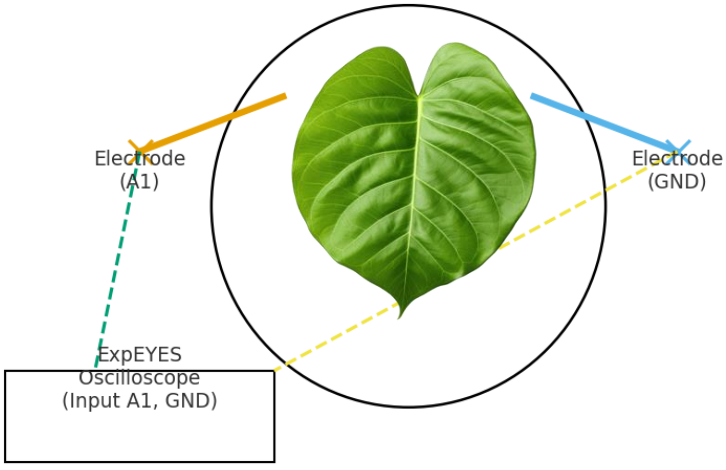
Measurement of Bioelectric Responses of Plant Leaves to Light using ExpEYES

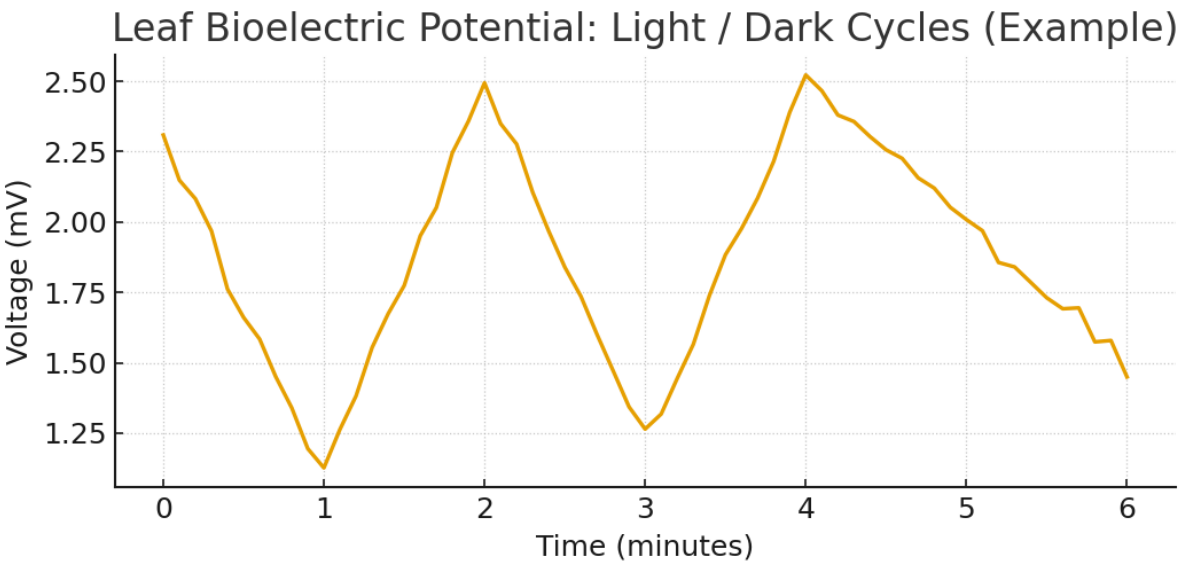
Sonika Sharma and Sugandhi Kapoor

The aim of this project is to study how the voltage (bioelectric potential) of a plant leaf changes when exposed to light and darkness using ExpEYES. To perform this activity, commonly available plant leaves such as money plant or spinach can be used. The connections from the leaf can be made using metal strips or electrodes wrapped with wet cloth. The other ends of the electrodes are connected between A1 and Ground of ExpEYES to measure the bioelectric voltage developed in the leaf. A torchlight or LED lamp can be used as the light source, and a mobile phone torch may also be used. This activity should be carried out in a dark area, and the leaf may be enclosed in a black box to obtain better results.

A small Python program has been written to continuously measure and plot the bioelectric voltage. The Data Logger application available in the ExpEYES GUI (under the Experiments menu) can also be used to plot the voltage variations.

Simple Circuit Diagram: Leaf connected to ExpEYES





Precautions:
The precautions taken while performing this activity were: not pressing the electrodes too hard, ensuring that the electrodes remain moist, avoiding contact with the electrodes during measurements, and carrying out the activity in a dark and electrically noise-free environment.

Observations:
Voltages measured were 1.1 – 1.2mV without light and 2.3 – 2.5 mV with light exposed on the leaf.

Conclusion:
Small but measurable changes in leaf bioelectric potential were observed between light and dark conditions. These variations arise from ionic and photosynthetic activity, and they can be detected using ExpEYES.

Generation and Analysis of Lissajous Figures using ExpEYES

Prof. Chandrashekhar Mahajan and Vedant Mahajan

The objective was to generate Lissajous figures using two sinusoidal inputs of the same frequency with varying phase differences; to analyze the shape and rotation of the Lissajous figure based on the phase difference; to understand the vectorial and analytical derivation of the resulting figure; and to visualize the direction of rotation using a live arrowhead on the Lissajous figure. A resistor–capacitor (RC) network acts as a frequency-dependent phase shifter. When a sinusoidal signal passes through an RC series circuit, the output voltage across the capacitor lags behind the input voltage by a phase angle that depends on the values of R, C, and the signal frequency. The phase shift (φ) introduced by a single RC network is:

$$\phi = \tan^{-1}\left(\frac{1}{\omega RC}\right)$$

where

- $\omega = 2\pi f$ is the angular frequency,
- R is the resistance,
- C is the capacitance.

By varying the resistance, the phase angle can be smoothly adjusted from near 0° (small R) to almost 90° (large R).

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Procedure:

The **Waveform Generator (WG)** terminal on ExpEYES provides a sine wave. This signal is split into two paths:

- **Direct Input (A1):** WG is connected directly to input channel A1. This is the reference signal plotted on the X-axis.
- **RC Path (A2):** The WG signal is fed into a series RC network:
- The resistor is connected in series with the capacitor.
- The **output is taken across the capacitor**, which provides a phase-shifted version of the input.
- This output is connected to input channel **A2**, which is plotted on the Y-axis.

Visualizing Lissajous Figures:

When the A1 (reference) and A2 (phase-shifted) voltages are plotted against each other, ExpEYES displays a Lissajous figure. The shape of the figure depends on the phase difference:

- **0° phase shift:** a straight line with positive slope
- **≈45° phase shift:** an ellipse
- **≈90° phase shift:** a circle
- **>90° phase shift:** ellipse tilting in the opposite direction

By **adjusting the resistor value**, the phase lag changes continuously, causing the Lissajous figure to smoothly transform from a line to an ellipse to a circle and beyond. This provides an intuitive and visual demonstration of phase shift in RC circuits.

Learning Outcome:

This simple experiment helps students:

- Understand how RC circuits create phase shifts
- Visualize phase difference between sinusoidal signals
- Explore the relationship between Lissajous figures and phase angle
- Gain hands-on experience with ExpEYES as an oscilloscope and data acquisition tool

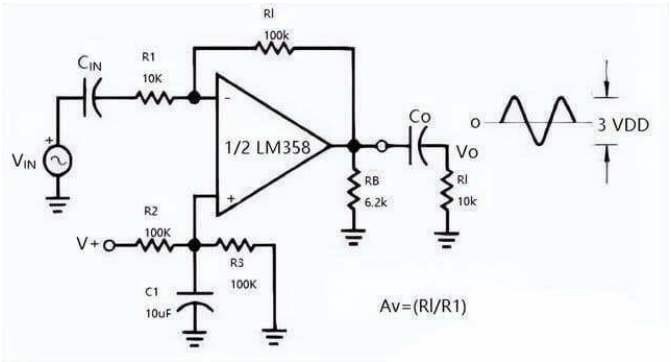
The setup requires minimal components but clearly demonstrates the fundamental principle behind phase-shift measurements and waveform analysis.

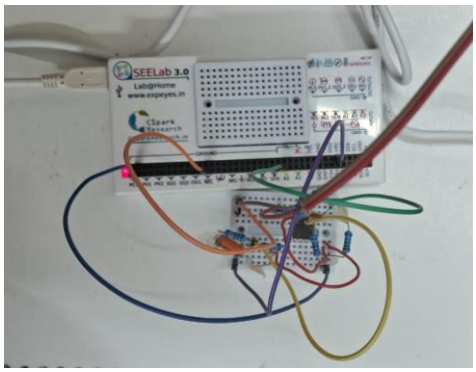
Pulse Rate Measurement
using ExpEYES and Python Programming Language

Mamta Pandey and Dr. Mukesh Mishra

Objective: This hands-on project demonstrates how open-source tools can be used to design and implement a functional system for measuring the human heartbeat using the ExpEYES SEELab kit and Python, with real-time pulse-rate visualization on the screen.

Introduction: The pulse rate, or heart rate, is the number of times the heart beats per minute (bpm). The normal resting pulse rate for adults ranges from 60 to 100 bpm. Factors such as age, fitness level, stress, and illness can cause changes in the pulse rate.





Experimenta Setup:

1. The ExpEYES: The core interface between our sensor and computer, providing analog input capabilities and USB connectivity.
2. Electronic Components: Resistors (100kΩ, 10kΩ), Capacitors, Op Amp, breadboard, and connecting wires to build the sensor circuit properly.

3. Software Environment: Computer with Python and ExpEYES libraries installed for data acquisition and real-time signal processing.

Python Program:

```
import eyes17.eyes as eyes
import time
import matplotlib.pyplot as plt
import numpy as np

# Import for robust peak detection needed for pulse calculation

from scipy.signal import find_peaks

# --- 1. CONFIGURATION CONSTANTS (Updated for LM358 Circuit) ---
# NOTE: The LM358 circuit output MUST be connected to A1 or A2.

CHANNEL_NUMBER = 'A1'
NUM_POINTS = 300
TIME_GAP_S = 0.05 # 50 milliseconds per sample. Total duration: 15 seconds
TOTAL_DURATION = NUM_POINTS * TIME_GAP_S

# --- 2. INITIALIZE ExpEYES ---

Print ("Initializing ExpEYES...")
try:
   p = eyes.open()
   if p is None:
      print (" ✕ Error: ExpEYES device not found. Check USB connection.")
```

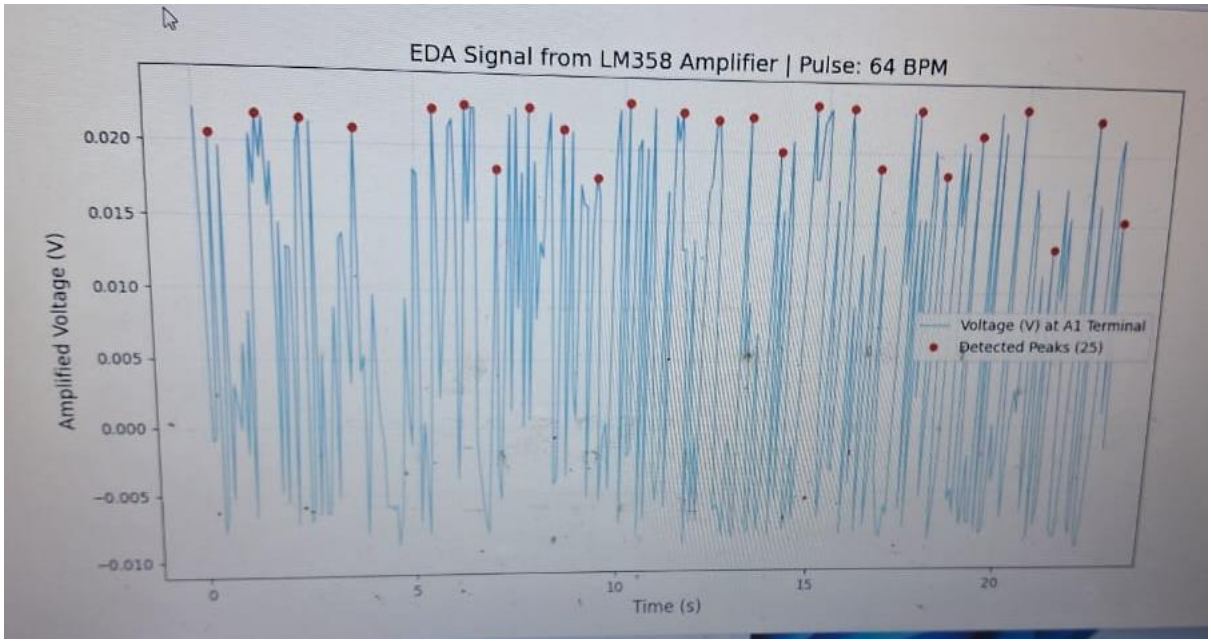
Core Function: Python script uses get voltage () to continuously sample the sensor signal at the A1 input.

Peak detection Algorithm: Apply data filtering to remove noise, then calculate time intervals between signal peaks. Each peak corresponds to one heartbeat. Convert intervals to beats per minute (bpm).

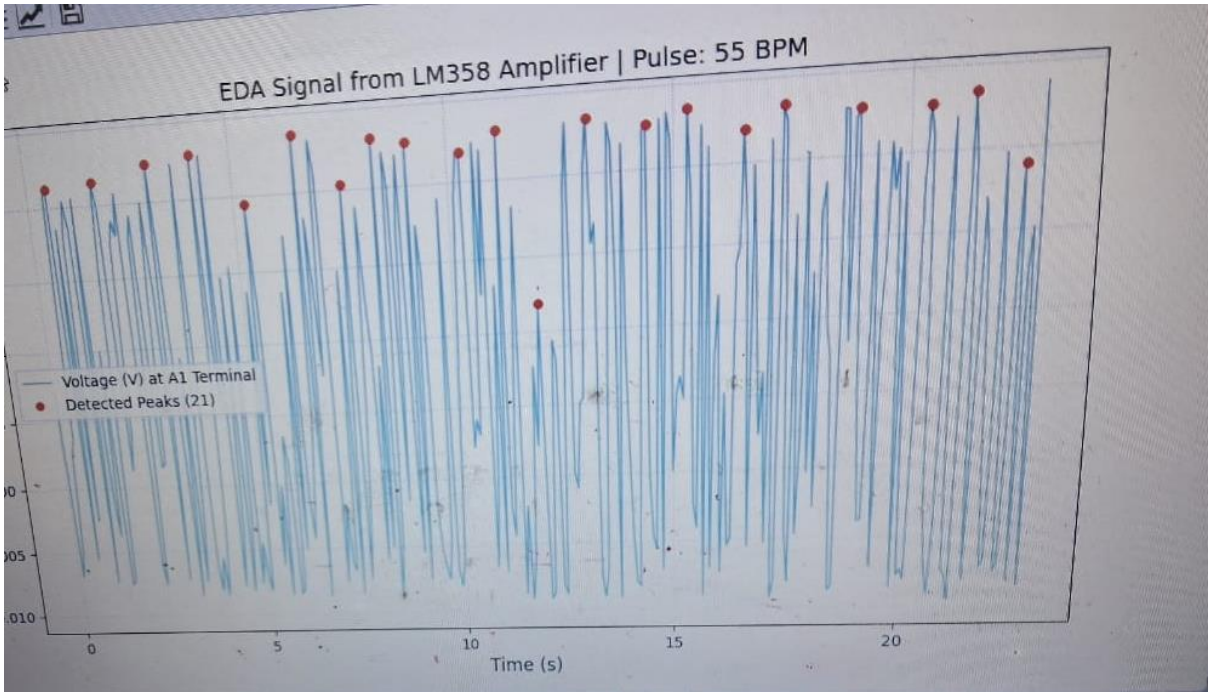
Real Time Display: Visualize the pulse waveform and calculated heart rate on screen as data streams in continuously.

Testing and Observations:
1) Finger Placement: Gently rest your fingertip on the sensor assembly, ensuring good contact between skin and sensor.
2) Execute Program: Run Python script and watch as the system begins acquiring and analyzing signal from your finger.
3) Real Time Monitoring: Observe the live pulse waveform and calculated BPM displayed on screen.

The system successfully detects your heartbeat in real time!



Signal-1



Signal-1

Results and Discussion: The measured pulse rate differed for different person, which shows that the circuit arrangement and corresponding python programmers response well to detect the pulse rate of humans.

Future Aspects:

1) Design Proper shape and size of sensing terminals.
2) Validation of data: Detail comparative analysis of measured data with the data observed with the standard measuring device.
3) Modification in circuit design for better result (if required).

Formation of Lissajous Figures using ExpEYES

Adarsh Sahu and Dr. Vijay V Warhate

Introduction: Superposition of two perpendicular oscillations for phase difference 0, π, π/2, Graphical and analytical methods, Lissajous figures with equal and unequal frequencies.

1) The first simple harmonic motion in the x- direction given by $x = A_1 \sin \omega t$----------(1)

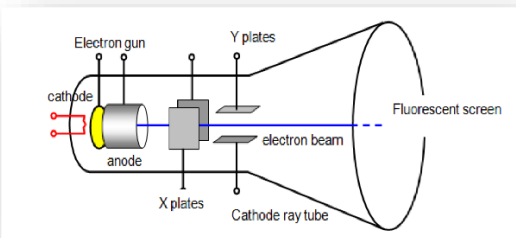
2) The second simple harmonic motion in the y- direction given $y = A_2 \sin(\omega t + \delta)$ ---(2)

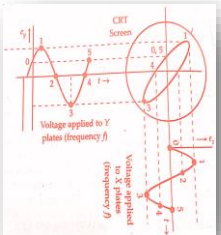
The **superposition** of two mutually perpendicular SHMs which have equal/different frequencies. The amplitudes are different and their phases differ by δ .

- The resultant motion of the particle is a combination of the two SHMs.
- $$\frac{y^2}{{A_2}^2} + \frac{x^2}{{A_1}^2} - \frac{2xy}{A_1.A_2}\cos\delta = \sin^2\delta$$ ----------(3)

Lissajous Figures

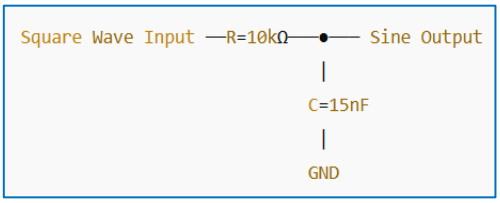
The pattern which is displayed on the screen, when sinusoidal signals are applied to both horizontal & vertical deflection plates of CRO. These patterns will vary based on the amplitudes, frequencies and phase differences of the sinusoidal signals, which are applied to both horizontal & vertical deflection plates of CRO.

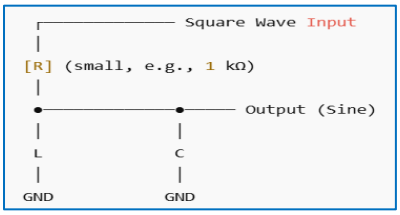




Experimental Requirement:

Two sinewaves are required to study the Lissajous patterns generated with two different frequencies. ExpEYES contains only one Sine wave generator, and to perform this experiment, SQ1, Squarewave generator is used with a RC low-pass or LC band-pass filter circuits.



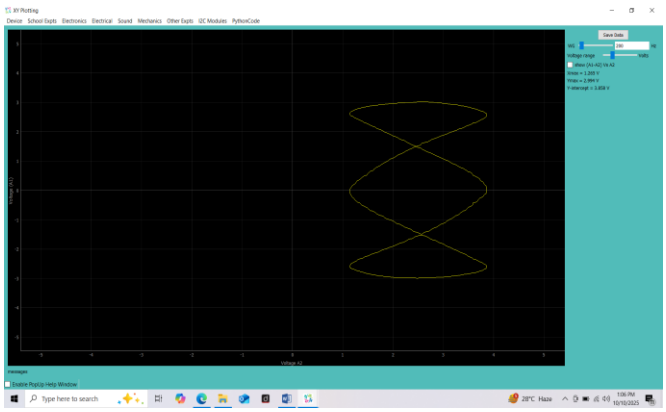


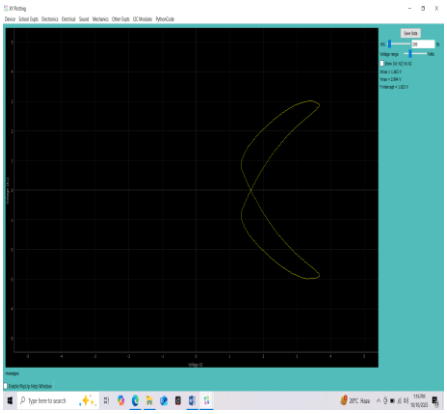
$$f_c = \frac{1}{2\pi RC}$$

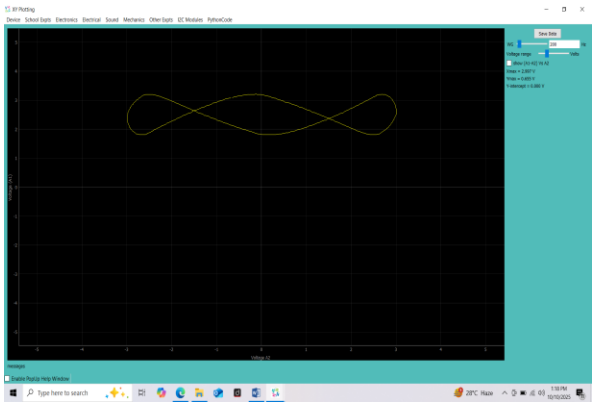
$$f_0 = \frac{1}{2\pi\sqrt{LC}}$$

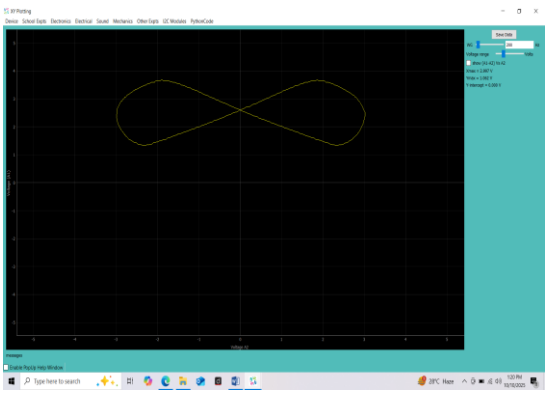
y The pattern which is displayed on the screen, when sinusoidal signals are applied to both horizontal & vertical deflection plates of CRO. These patterns will vary based on the amplitudes, frequencies and phase differences of the sinusoidal signals, which are applied to both horizontal & vertical deflection plates of CRO.

Results:









A logarithmic amplifier has constructed using op-amp, diode and ExpEYES kit. The working of the device has been studied by checking the values and plotting the graph connecting

output of the circuit and input voltage from the kit. Python programming language has been used for setting and reading the values of the ExpEYES kit.

Points to be considered

- Many of the available types of diodes exhibit irregular and considerable deviations from accurate logarithmic relationship.
- The thermal voltage *VT* of the diode depends on temperature, which affects the performance of the logarithmic amplifier. So, the circuit should be operated at constant temperature conditions.
- The ideality factor varies from diode to diode depending upon the material used for its construction.

Future works

- Design and study of Temperature-compensated log amp with ExpEYES.
- Characterization of the anti-logarithmic amplifier with ExpEYES.
- To study the methods to increase the dynamic range of the log-amp.
- Study of the dynamic range of the same logarithmic amplifier and its comparison with other types of logarithmic amplifiers.
- The same circuit can be studied at different temperatures to obtain the temperature dependent performance.
- The other types of logarithmic amplifiers - with transistor, pseudo and cascaded type logarithmic amplifiers etc. can be studied with ExpEYES.

Exploring RC Circuits using ExpEYES

Dr. Vinodkumar T and Shrisendu Sarkar

Aim:
An experimental study of RC circuits through Low-Pass and High-Pass Filters, Integrator and Differentiator configurations using ExpEYES.

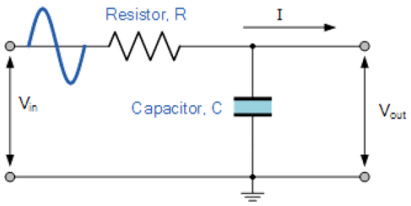
Apparatus :
ExpEYES kit, Resistor 1kΩ, Capacitor 1μF, Connecting wires, PC with ExpEYES software

Theory:
An RC circuit consists of a resistor (R) and a capacitor (C) connected in series or parallel.
• Low-Pass Filter: Allows low-frequency signals to pass while attenuating high frequencies.
• High-Pass Filter: Allows high-frequency signals to pass while attenuating low frequencies.
• Integrator: Produces output proportional to the integral of the input signal.
• Differentiator: Produces output proportional to the derivative of the input signal.

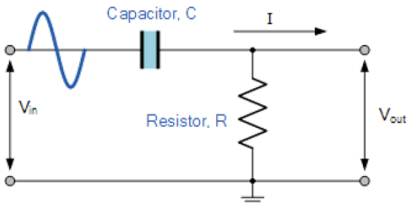
Experimental set up:
• Connect the resistor and capacitor in series for RC circuit.
• Use ExpEYES to provide input AC signal and observe output across R or C.
• For low-pass: Output is taken across capacitor.
• For high-pass: Output is taken across resistor.
• For integrator and differentiator: Use appropriate R and C values.

Procedure:
• Open ExpEYES software and connect the hardware.
• Construct RC circuit on the breadboard.
• Apply sinusoidal input from ExpEYES output terminal.
• Measure output using A1 and A2.
• Vary frequency and observe changes in amplitude and phase.

- Plot frequency response for low-pass and high-pass filters.
- Observe time-domain output for integrator and differentiator circuits.



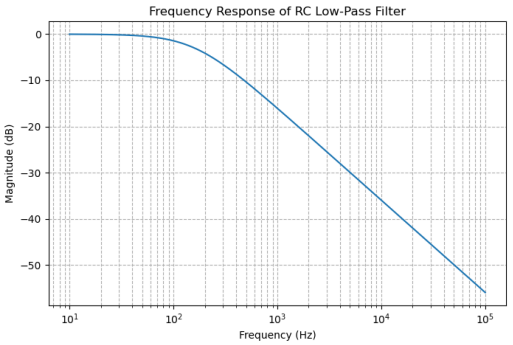
Low Pass Filter (Integrator)

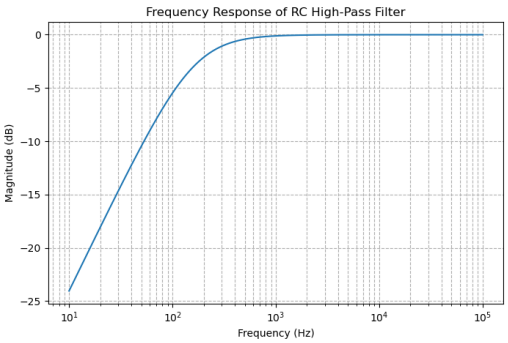


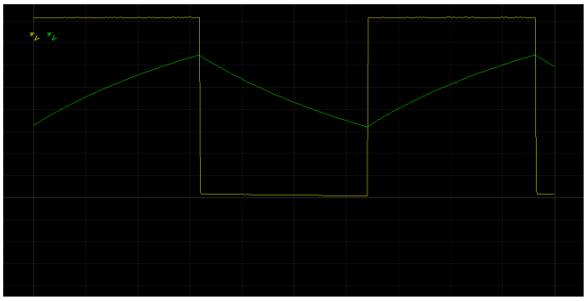
High Pass Filter (Differentiator)

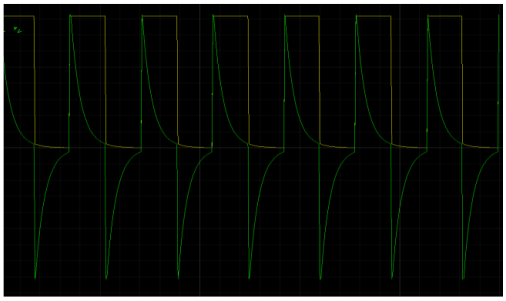
Observation & Results:

- Record output voltage at different frequencies.
- Plot gain (Vout/Vin) vs frequency.
- Determine cutoff frequency (fc = 1 / 2πRC).
- Observe waveform shapes for integrator and differentiator.









Conclusion

- The experiment successfully demonstrates the working of RC circuits as:
  Low-Pass and High-Pass Filters based on frequency response.
  Integrator and Differentiator based on time-domain behaviour.

- Using ExpEYES enables real-time observation and analysis of electronic circuits.

Real-Time Measurement of Common Emitter Transistor I_C Vs I_B using ExpEYES

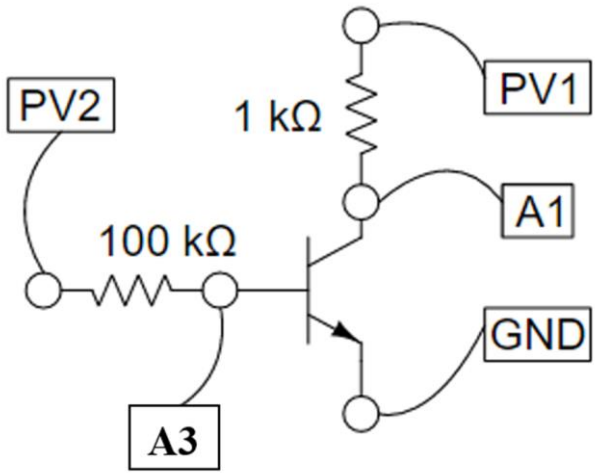
Dr. Prashant Chaudhary and Surendra A. Wani

Aim:

To measure the real-time variation of collector current (I_C) with base current (I_B) of a BJT in common emitter configuration using ExpEYES and Python Programming.

Experimental Setup:

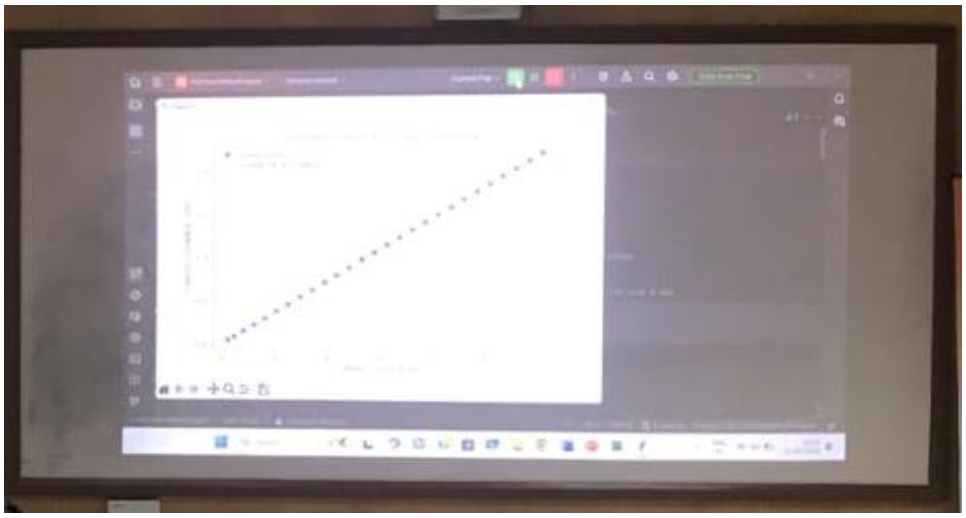
- ExpEYES is used as power supplies and measuring voltages/currents.
- PV_1 provides constant collector voltage (V_{CE} = 5V)
- PV_2 varies the base voltage from 0.6V to 2.5V in 0.05V steps.
- Collector voltage is measured at A_1 and base voltage at A_3.
- Currents are computed using known values of resistors.



$$I_B = \frac{V_{B(set)} - V_{B(actual)}}{R_B} \qquad I_C = \frac{V_{CE(const)} - V_C}{R_C}$$

Python Program Flow:

- Initialize ExpEYES interface.
- Collector voltage to 5V.
- Increment base voltage from 0.6V to 2.5V.
- At each step: Measure V_C (A_1) and V_B (A_3)
    - Calculate I_B and I_C.
    - Compute transistor current gain (β).
    - Update real-time plot of I_C vs I_B.
- Display linear fit and β in real-time.

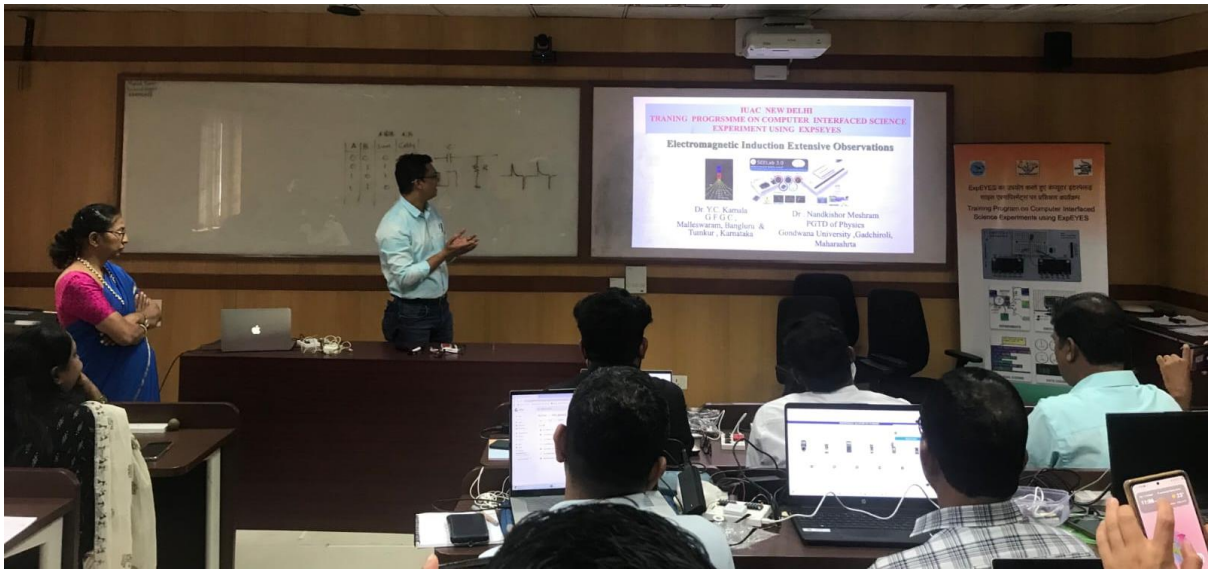


Conclution:

- The developed Python program effectively integrates ExpEYES hardware with real-time plotting capabilities to analyze transistor characteristics.
- This hands-on experiment helps students understand transistor action and data acquisition using Python.

Electromagnetic Induction (Extensive Observations) using ExpEYES

Dr. Y.C.Kamala and Dr. Nandkishor S Meshram



Aim

To study electromagnetic induction by measuring the induced voltage in a coil when a magnet is moved through it and to observe the variation of induced EMF with time and different magnetic shape using the ExpEYES system.

Apparatus / Equipment

- ExpEYES-17 experimental kit
- Solenoid/Induction coil
- Bar magnet
- Connecting wires
- Computer with Python & ExpEYES software installed
- CRO (optional, for comparative observation)

Theory

Electromagnetic induction is the phenomenon of generating an electromotive force (EMF) across a conductor when there is a change in magnetic flux through it.

Faraday's Law: $E = -d\Phi B/dt$
Where E = Induced EMF, ΦB = Magnetic flux

Lenz's Law: The induced EMF always acts in a direction to oppose the change in flux that produced it.

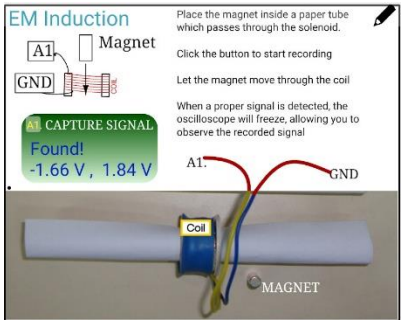
Key Points:

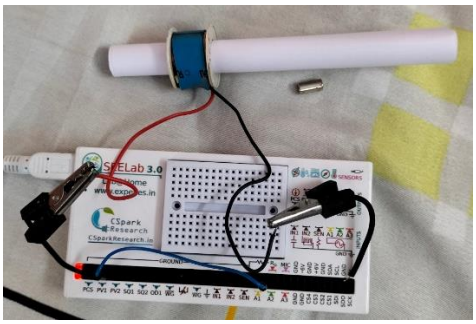
- Faster movement of the magnet → higher induced EMF.

- More coil turns → higher induced EMF.
- EMF changes sign when the direction of magnet motion reverses.

Experimental Setup

1. Connect the induction coil to CH0 of the ExpEYES kit.
2. Launch ExpEYES software on the computer.
3. Move the magnet through the coil in both directions.
4. Record the induced voltage using ExpEYES.





Procedure

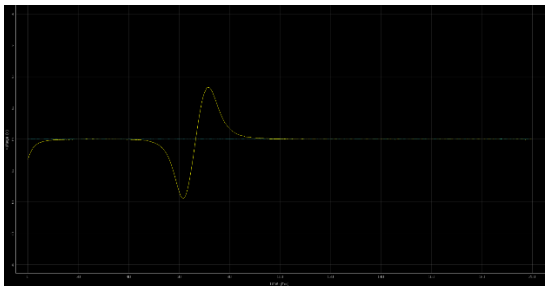
1. Set up the coil and connect it to ExpEYES CH0.
2. Launch the data acquisition program.
3. Keep the sampling frequency high (e.g., 500 Hz).
4. Move the magnet slowly through the coil and observe the voltage curve.
5. Repeat with different speeds.
6. Reverse magnet polarity and observe EMF change.
7. Save and plot voltage vs. time graph.

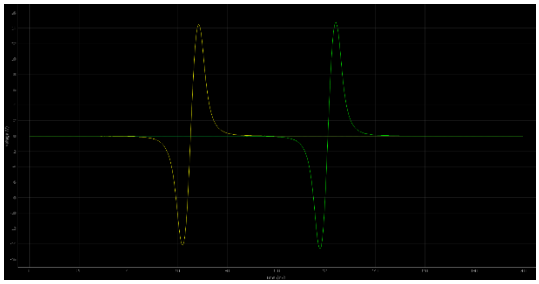
Observations

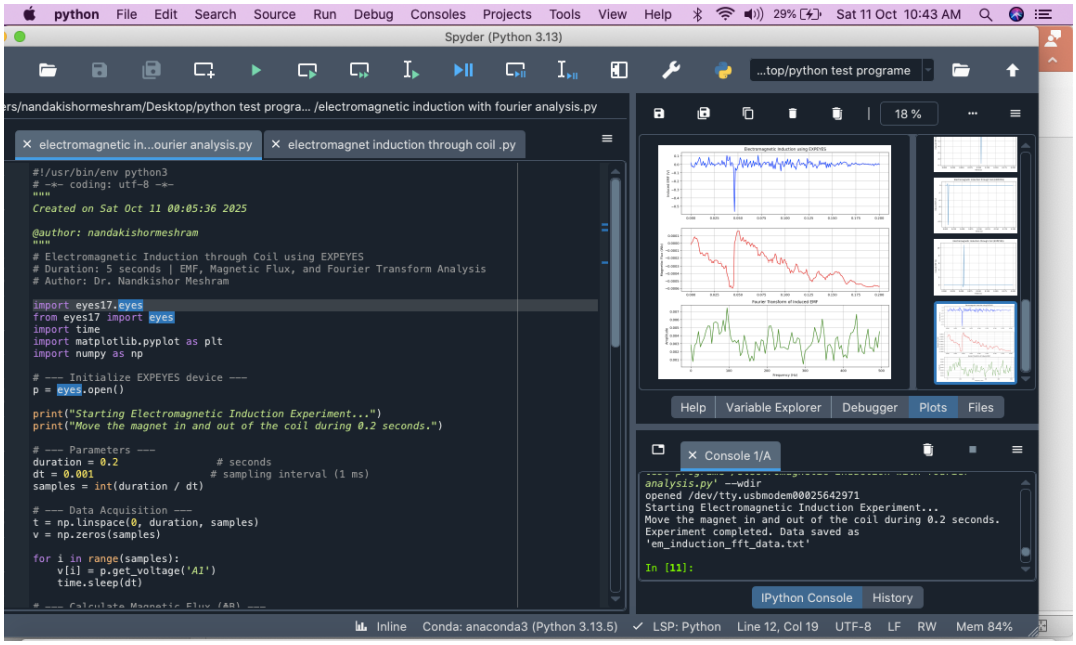
S.No	Motion of Magnet	Polarity	Induced Voltage (V)	Notes
1	Entering coil	N → S	0.45	Peak observed
2	Leaving coil	N → S	-0.43	Peak opposite
3	Fast motion	N → S	0.8	Higher EMF
4	Slow motion	N → S	0.25	Lower EMF

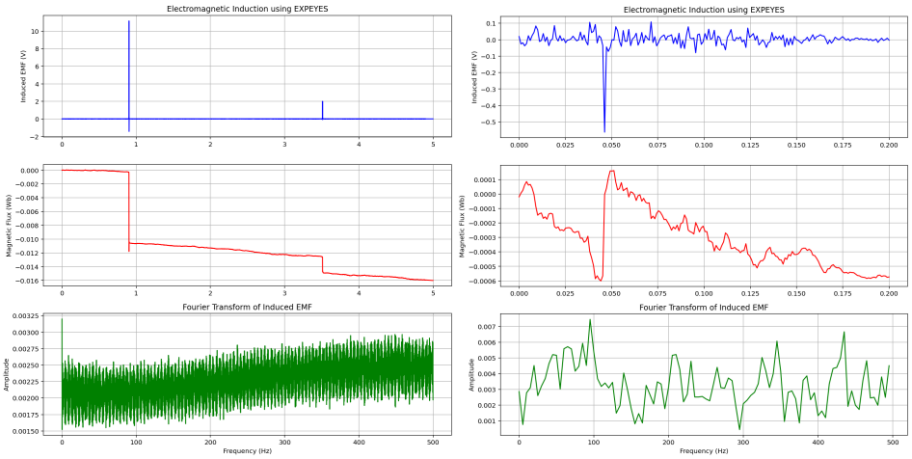
Results / Graphs

- Induced EMF increases with speed of magnet motion.
- EMF reverses polarity when magnet direction is reversed.
- Waveform is approximately symmetric for equal-speed motion in and out of the coil.
- take reading for different shape of magnet and speed of magnetic motion.







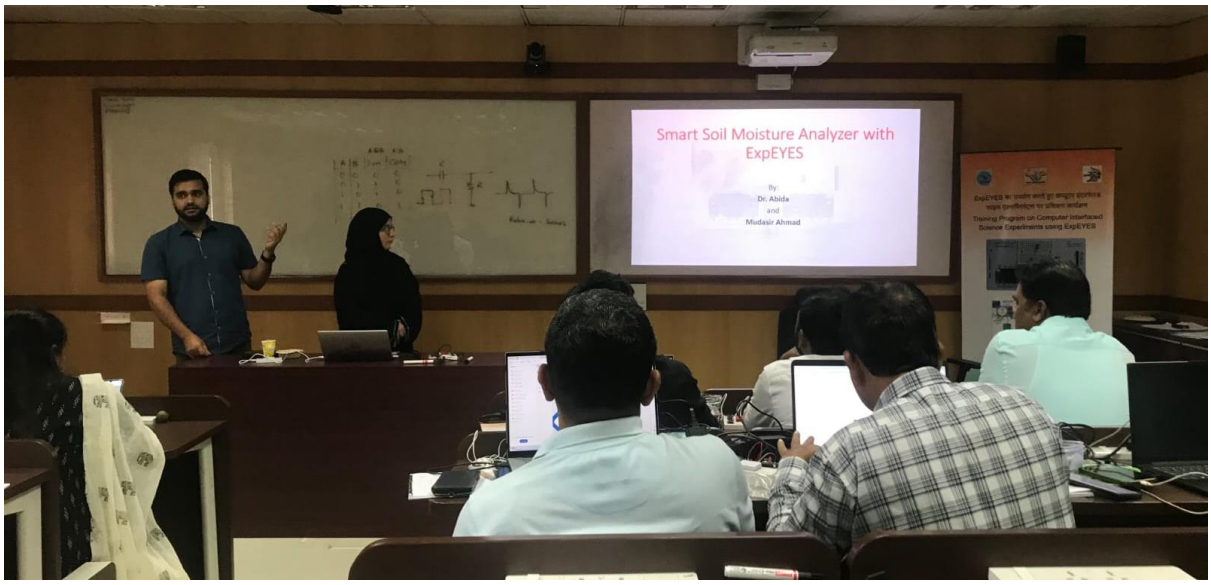


Conclusion

- Electromagnetic induction occurs when a magnet moves through a coil, producing a voltage proportional to the rate of change of magnetic flux.
  - Direction of induced EMF follows Lenz's law.
  - Faster motion or more coil turns produce greater EMF.
  - ExpEYES system effectively records real-time induced voltage for analysis.
- The experiment successfully demonstrates Faraday's Law of Induction.
- Shape, strength, and motion of magnets significantly affect EM induction.
- Dependence on velocity /dt is clear observation in varying voltages across peaks and area.
- EXPEYES proved to be an effective computer-interfaced educational tool.
- Understanding electromagnetic induction is vital for power generation, sensors, and modern technology.
- **Future work:** explore multi-coil arrangements and digital signal analysis. Quantification of experiment with photogates and long distances Corresponding changes to python code.

Smart Soil Moisture Analyzer using ExpEYES

Dr. Abida and Mudasir Ahmad



Aim

The conventional soil moisture measurement techniques are often expensive and require complex instrumentation. Therefore, a low-cost educational platform such as ExpEYES provide an effective alternative for demonstrating practical sensing applications.

Introduction

Traditional methods of soil moisture measurement involve sophisticated instruments and laboratory analysis, which may not be affordable or accessible in educational institutions and small-scale agricultural setups. With the advancement of low-cost electronics and sensor platforms, it has become possible to design economical and efficient soil monitoring systems.
In this project, a Smart Soil Moisture Analyzer is implemented using the ExpEYES experimental kit. The experiment demonstrates how changes in soil moisture alter the electrical resistance of soil, which can then be measured using analog sensing techniques. Python-based visualization tools are also used for experimental validation and analysis.

Objectives of the Experiment

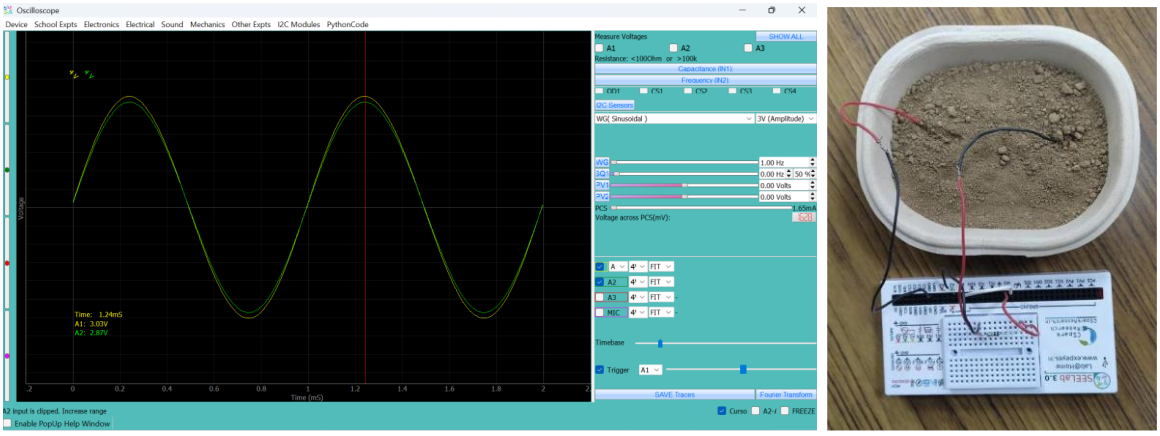
- To study the relationship between soil moisture and electrical resistance.
- To interface soil sensing probes with the ExpEYES platform.
- To observe voltage variations corresponding to different soil moisture conditions.
- To validate the experimental measurements using Python programming.
- To understand practical applications of smart sensing systems in agriculture.

Principle of Operation

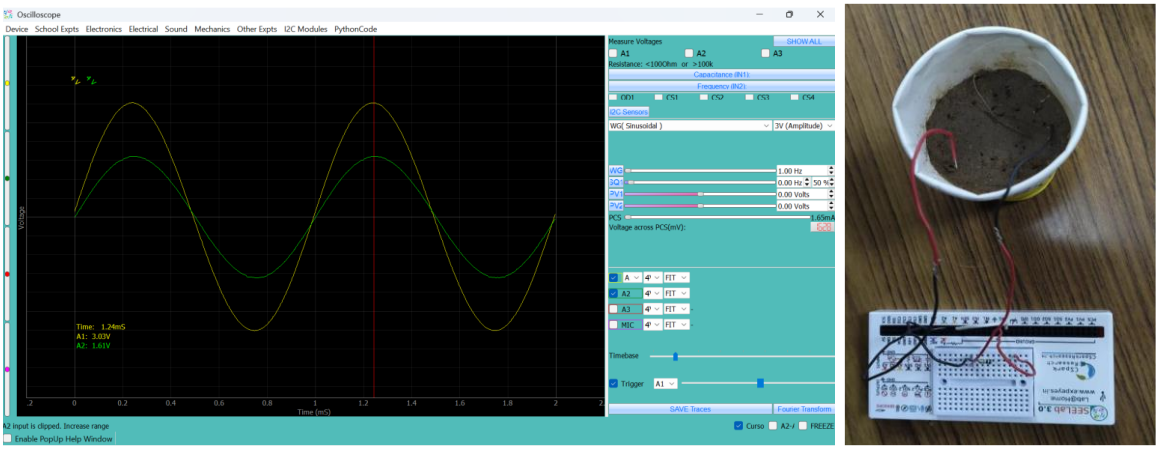
The working principle of the soil moisture analyzer is based on the variation of soil conductivity with moisture content. Dry soil contains very little water and therefore behaves as a poor conductor of electricity. As a result, dry soil exhibits high electrical resistance. In contrast, wet

soil contains water and dissolved ions that improve electrical conduction, thereby reducing resistance.
Two conducting probes are inserted into the soil sample. A voltage signal is applied across the probes through the ExpEYES circuit setup. The analog input channels of ExpEYES measure the voltage variation across the soil. Since the resistance of the soil changes with moisture content, the measured voltage also changes accordingly.

Experimental Setup
The experimental setup consists of the ExpEYES experimental kit, soil sensing probes, connecting wires, resistor network, dry and wet soil samples, and a computer system with Python interface.
The soil probes are inserted into the soil sample, and the analog voltage is measured using the A1 and A2 terminals of the ExpEYES kit. A resistor of 10 kΩ is connected in the circuit to form a voltage divider configuration. The voltage drop across the soil sample varies depending on the resistance offered by the soil.



Experimental Setups and Measurements for Dry and Wet soils



Experimental Validation using Python
Python programming was used to validate the measurements obtained from the ExpEYES platform. The Python interface allows real-time acquisition and analysis of analog signals from the experimental setup.

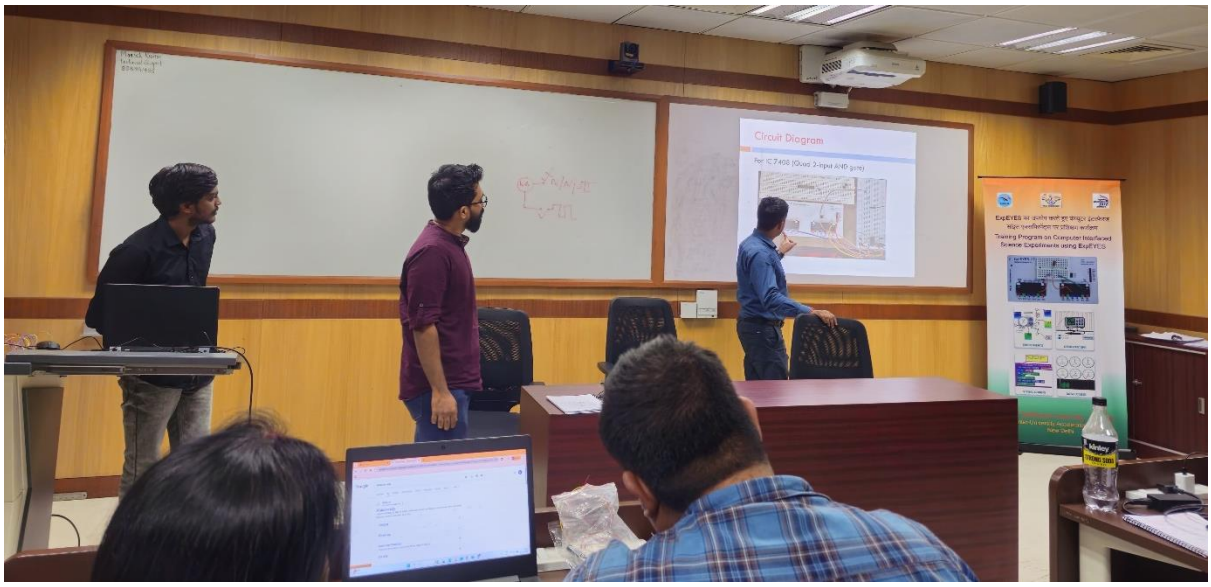
The measured voltage values corresponding to different soil moisture levels were plotted and analyzed. The experimental plots confirmed that voltage variations depend directly on soil conductivity and moisture content.

Conclusion

The Smart Soil Moisture Analyzer experiment successfully demonstrates the measurement of soil moisture using the ExpEYES experimental platform. The experiment validates that soil resistance changes significantly with moisture content and can be effectively monitored using analog voltage measurements. The integration of Python-based visualization enhances the analysis and validation
of experimental results. The developed system provides a simple, economical, and educationally effective approach for understanding sensor technology and smart agricultural monitoring systems.

Verification of Logic Gates and Realization of Half Adder using ExpEYES

Dr. Atul Chaudhary, Kamil K V, and Gagan Pal



Aim

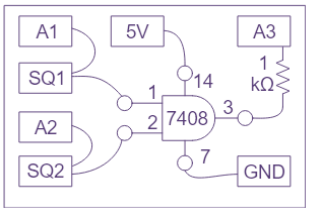
1. To verify the truth tables of basic logic gates AND & OR using IC 7408 and IC 7432 with the help of ExpEYES.
2. To realize half adder using IC 7408, IC 74283N (full adder IC), IC 741(operational amplifier) with the help of ExpEYES.

Apparatus Required

• ExpEYES
• Digital IC 7408 (Quad 2-input AND gate)
• Digital IC 7432 (Quad 2-input OR gate)
• Breadboard
• Connecting wires and jumpers

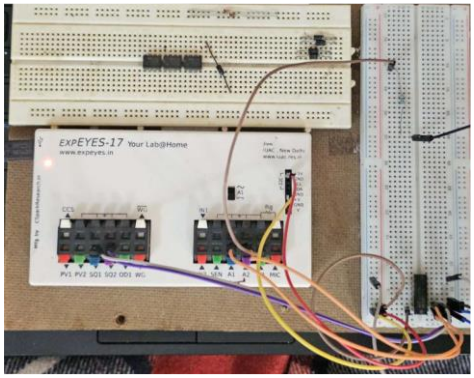
Methodology

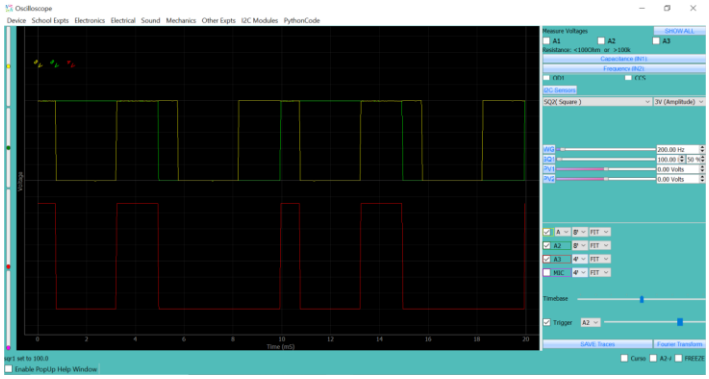
- The experiment is based on the use of ExpEYES (Experiments for Young Engineers and Scientists).
- It serves as both a signal source and a measurement tool for studying electronic circuits in real time.
- In this project, ExpEYES performs the following roles:
  Digital Signal Source: It provides logic-level voltage outputs (0 V and +5 V) through its digital output pins (SQ1, SQ2), which are used as the input variables (A and B) for the logic gate ICs.
  Power Supply: The onboard regulated +5 V supply powers the digital ICs (7408 and 7432).
  Oscillator and Timing Source: Optional waveform generators (SQ1, SQ2) can be used to apply time-varying logic pulses to test gate response.
  Measurement and Display Unit: The digital outputs of IC are fed into A1, A2, A3.
  Set input range on A1 and A2 to 8V and A3(4V max).
  The results are visualized on the ExpEYES software interface in real time.



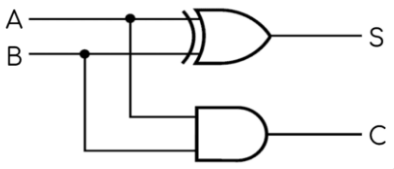
Procedure

1. Connect the ExpEYES with Laptop and open GUI interface.
2. Go to the Electronics section on the top and select Logic Gates
4. Connect the ExpEYES output pins (SQ1/SQ2) to serve as logic inputs A and B for the logic gate ICs.
5. Power the IC by connecting pin 14 to +5 V and pin 7 to GND.
6. Enable A1, A2, A3. Set input range on A1 and A2 to 8V and A3(4V max)
7. Select SQ2 from the WG wave shape.
8. Set SQ1 to 100 Hz and WG to 200 Hz.
9. Verify the output for all possible input combinations (00, 01, 10, 11).
10. Record observations for both AND (IC 7408) and OR (IC 7432) gates.
11. Compare the observed results with the theoretical truth tables.



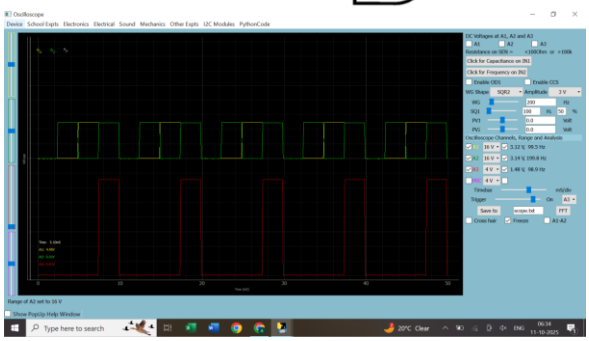


12. Wire Half-Adder circuit and verify its truth table also.



Input A	Input B	Output S	Output C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Half Adder Truth Table



Carry Output

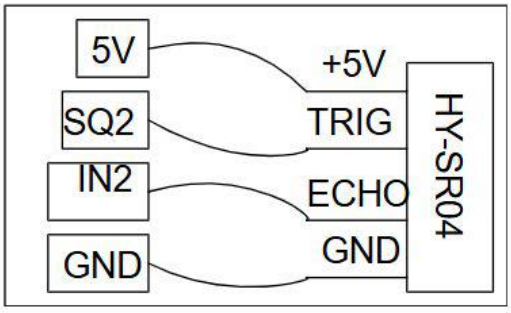
Sum Output

Graphing Motion using ExpEYES

Dr. Ravishankar C S and Dr. Gautam S Jaigaonkar

Aim

- To collect displacement-time data of a moving car using ExpEYES and Echo sensor.
- Export the data as a csv file into a Google Colab Jupyter Notebook.
- Run a Python code to calculate velocity and acceleration, tabulate and graph.

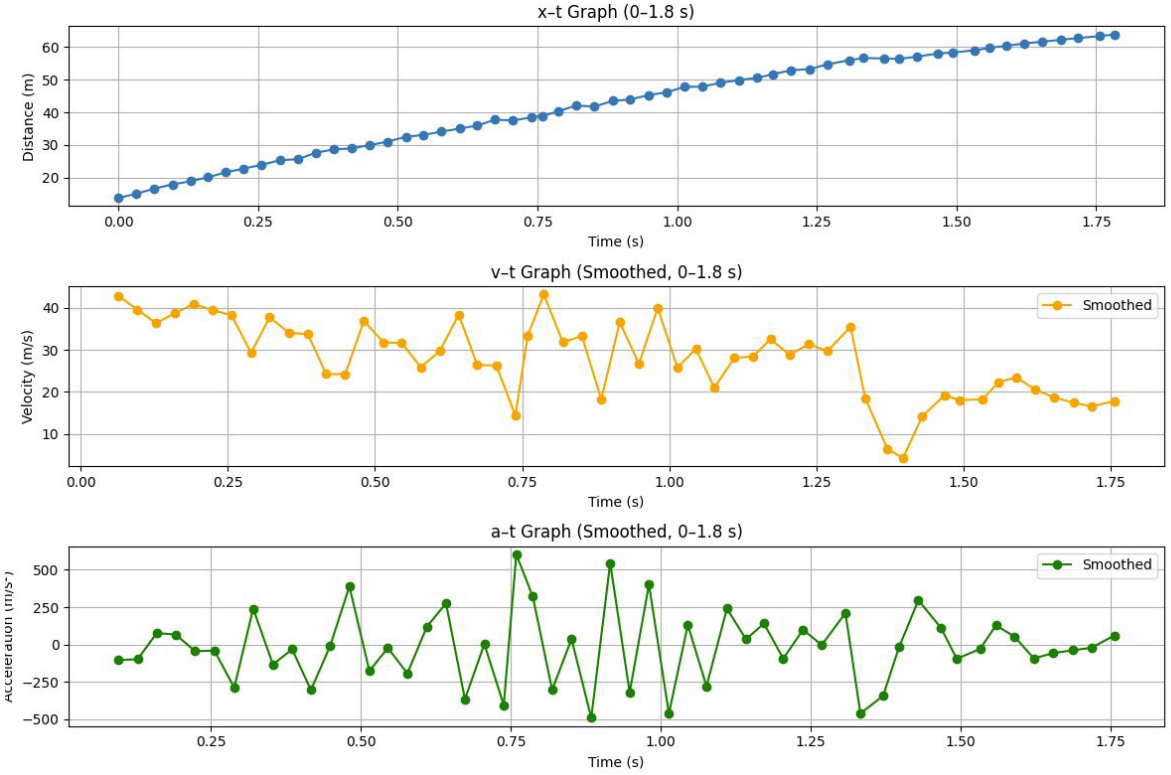


ExpEYES Connections and its Output

```
--- Final Table ---
    Time (s)  Distance (m)  Velocity (m/s)  Acceleration (m/s²)
0     0.0000       13.7658             NaN                  NaN
1     0.0323       15.0503         39.7378                  NaN
2     0.0644       16.6342         49.4106              301.7440
3     0.0966       17.9050         39.4566             -309.0702
4     0.1285       18.8543         29.7908             -303.3162
..       ...           ...             ...                  ...
91    2.8768       68.4014         -9.9909             2393.6805
92    2.9024       64.1963       -164.0134            -6007.3932
93    2.9347       59.6078       -142.3754              671.4125
94    2.9668       57.5081        -65.3236             2397.0781
95    2.9996       52.2413       -160.5516            -2902.8955

[96 rows x 4 columns]
```

Data output



Experimental Observations

Summary, Future work, and Conclusion

1. We were unable to run the Python code to directly interact with ExpEYES, this will be a future task.
2. We noted that the velocity to be almost constant but slightly reducing as may be seen from car's motion. The average acceleration did show a slight negative value.
3. This task can help students to appreciate notions of instantaneous and average velocity (and acceleration), thereby leading them to calculus.

$$\bar{v} = \frac{\Delta x}{\Delta t} \qquad \bar{a} = \frac{\Delta v}{\Delta t}$$

Distribution of Participation Certificates

The participation certificates were distributed by Dr. Vandna Luthra, Dr. B.K.Sahu and Shri. V V V Satyanarayana.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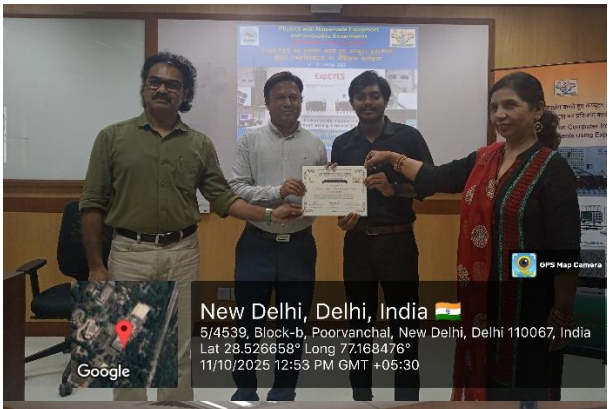
11/10/2025 12:47 PM GMT +05:30
Google
GPS Map Camera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Concluding Session

During the concluding session, Dr. B.K.Sahu has conveyed to the participants the efforts involved in this project by IUAC and congratulated Shri. V.V.V. Satyanarayana for continuing this program by involving the best teaching faculty across the country, like Prof. Sastri, Prof. Vandna, and others. It was conveyed to the participants to take forward the knowledge and aim of this program to their places in the form of classroom demonstrations, conducting small workshops by including the nearby institutions, involving the students in doing the conventional experiments using ExpEYES, etc. It was also conveyed to the participants to keep the WhatsApp group active by sharing information related to the training program and any new developments using the knowledge and experience gained with this program.

This time, participants presented six new experiments—a significant achievement for the training programme and a testament to the session's success.

List of the Participants and Resource Persons

#	Name of the Participant	Institute
1	Dr.Mukesh Chandra Bos Assistant Professor	Bihar National College, Ashok Rajpath, Patna.
2	Dr. Mukesh Mishra Assistant Professor	Shri R K Parikh Arts and Science, Sardar Patel University Vallabh Vidyanagar, Anand, Gujarat.
3	Ms. Mamta pandey PGT	J J international school Anand, Lambhvel, Gujarat
4	Ms. Sugandhi Kapoor TGT Science	Rainbow International School, Nagrota
5	Ms. Sonika Sharma TGT	Rainbow International School, Nagrota Bagwan
6	Dr.Atul Choudhary Assistant Professor	SCVB Govt. Degree College, Palampur, Kangra, H.P.
7	Dr.Abida Sr. Assistant Professor	Government Degree College, Anantnag, Kashmir
8	Dr. Mudasir Ahmad Khanday Assistant Professor	Department of Electronics, Govt. Degree College Anantnag, J&K.
9	Dr Y C Kamala Associate Professor	Govt First Grade College, Tumkur and Malleshwaram
10	Dr. Vinodkumar T Associate Professor	Payyanur College, Kannur District, Kerala
11	Mr. Kamil KV HSST Physics	Sullamussalam Oriental HSS Areekode, Malappuram Dt, Kerala.
12	Dr. Gautam Shrirangrao Jaigaonkar, Assistant professor	Bapuraoji Butle Arts Narayanrao Bhat Commerce and Bapusaheb Patil Science College, Digras District Yavatmal
13	Dr. Nandkishor Shamrao Meshram, Assistant Professor	Gondwana University Gadchiroli, Maharashtra.
14	Dr. Chandrashekhar M Mahajan, Professor	Vishwakarma Institute of Technology, Bibwewadi, Pune.
15	Dr. Prashant R Chaudhari Assistant professor	Dr.R.G.BhoyarbArts, Commerce and Science College, Seloo, Maharashtra.
16	Dr.Surendra Adinath Wani Assistant Professor	Rajarshee Shahu Science College, Chandur Railway, Amravati, M.H
17	Dr. Vijay Vitthalrao Warhate Associate Professor	S. N. Mor College of arts and Commerce and Smt. G. D. Saraf Science college, Tumsar, M.H.
18	Dr.P.Premchander Associate Professor	Kamarajar Government Arts College, Surandai, Tenkasi.
19	Dr. Manoj Kumar Srivastava, Assistant Professor	Department of Physics, D.A.V. P.G. College, Gorakhpur, UP.

20	Dr. Shirsendu Sarkar Assistant Professor	Bhairab Ganguly College, Feeder Road, Belghoria, Kolkata.
21	Dr. Ravishankar C S Physics Teacher	PhD (Physics), Purdue University - USA
22	Mr. Vedant Bhavan Mahajan Student	PVG's College of Engg, Tech & Management, Pune.
23	Mr. GAGAN PAL, M.Sc. Student	Dr. RML Avadh University, Ayodhya, Uttar Pradesh.
24	Mr. Adarsh Kumar Sahu M.Sc. Student	Dr. RML Avadh University, Ayodhya, Uttar Pradesh.
25	Prof O.S.K.S.Sastri Resource Person	Central University of Himachal Pradesh, Dharamshala
26	Prof Vandna Luthra Resource Person	Gargi College, New Delhi
27	Dr. Ajith Kumar B.P Speaker	Retired Scientist-H, IUAC, New Delhi
29	Dr. A. Rajani Kanth Speaker	School of Physics, University of Hyderabad
30	Dr. G.Manoj Kumar Speaker	School of Physics, University of Hyderabad
31	Shri. Sunil Ojha Speaker	Inter-University Accelerator Centre, New Delhi
32	Dr. Praveen Patil Speaker	G S S College, Belgaum, Karnataka
33	Dr. Govinda Lakhotiya Speaker	Dharampeth M.P. Deo Memorial Science College, Nagpur
34	Mr. Om Mishra Technician	Inter-University Accelerator Centre, New Delhi
35	Dr.B.K.Sahu Co-Convener	Inter-University Accelerator Centre, New Delhi
36	Shri. V.V.V.Satyanarayana Convener	Inter-University Accelerator Centre, New Delhi

Teacher Training Program on

Computer Interfaced Science Experiments using ExpEYES

October 6–11, 2025

Inter-University Accelerator Centre

Aruna Asaf Ali Marg, New Delhi

Experiments for Young Engineers and Scientists (ExpEYES)

Science is the study of the physical world through systematic observations and experiments. Proper science education is essential for cultivating a society where reasoning and logical thinking prevail, rather than superstition and irrational beliefs. Science education is also crucial for training enough technicians, engineers, and scientists to support the economy of the modern world. It is widely accepted that personal experience, in the form of experiments and observations—either carried out by students or performed as demonstrations by teachers—is essential to the pedagogy of science. The teaching lab at IUAC, New Delhi, was started with the objective of developing cost-effective equipment for teaching science. The basic technique followed is to provide analog and digital input/output capabilities to a computer through the input/output connectors on the interfacing equipment. Experiments are designed utilizing these I/O capabilities and suitable sensor elements to convert physical parameters into voltage signals. As part of its outreach program, the Inter-University Accelerator Centre conducts one-week teacher training programs twice a year.

Tentative Speakers

Dr. Ajith Kumar B.P., Ex IUAC
Prof. OSKS Sastri, CUHP, Dharamshala
Prof. Vandna Luthra, Gargi College, New Delhi
Dr. Praveen Patil, GSS College, Belgaum
Dr. Ashwini Kumar, Dr RML Avadh University, Ayodhya
Dr. Govinda Lakhotiya, Nagpur
Dr. Manoj Kumar, University of Hyderabad
Shri. Sunil Ojha, IUAC, New Delhi
Dr. B.K.Sahu, IUAC, New Delhi
Shri. V V V Satyanarayana, IUAC, New Delhi

Link for Registration

https://docs.google.com/forms/d/1SFSucfLqAxyR2xIQOgHk2sAZpQDVCZK3BHNeJBl7IOY/edit

Registration Fee Rs. 3000.00

Participants will be provided with the travel support, local hospitality, and accommodation by IUAC.

Contact Persons

Shri. V V V Satyanarayana
Dr. B.K.Sahu
Email: iuacteachinglab@gmail.com

प्राशिक्षण प्रयोगशाला
Teaching Lab

अंतर विश्वविद्यालय त्वरक केंद्र
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