Activity 1

S A Aravind Eswar and Eshan Sharma

1 Aim

1) At least 6 Lissajous figures should be plotted on the oscilloscope and justify the pattern you see on CRO with theory.
2) How do you capture one-time event on CRO - show with an example

2 Apparatus Required

1) Oscilloscope (Digital with two channels)
2) Function Generator (with two channels)
3) Two probes
4) Two connection wires

3 Theory

3.1 Lissajous figuers

Lissajous cures are defined as a parametric curve given by,

$$x = A\sin(at + \delta),\ y = B\sin(bt) \tag{1}$$

which describe the superposition of two perpendicular oscillations in x and y directions of different angular frequency.

We can use an oscilloscope to project a Lissajous curve. We can send signal 1 to the top-bottom plates of the oscilloscope and signal 2 to the left-right plates. This achieves the given parametric equation.

4 Procedure

4.1 Lissajous figures

1) Take a Function generator and an oscilloscope with 2 channels.
2) Connect channel 1 of function generator with channel 1 of the oscilloscope and channel 2 of function generator to channel 2 of oscilloscope.
3) Set channel 1 and channel 2 of the function generator to desired functions
4) Change the display mode of the oscilloscope to x-y mode
5) Observe the shapes produced by the oscilloscope

4.2 Capturing an event

1) Use the function generator to trigger a pulse signal on manual trigger
2) Set the trigger level in the CRO to an appropriate level (0.1V)
3) Set the Run control to single
4) Observe that it says `WAIT` on the top left of the CRO
5) Trigger the signal from the function generator
6) Observe the CRO output

5 Observarion

5.1 Lissajous curves

1)

$$x = 5\sin\left(\frac{2\pi}{3}t\right),\ y = 5\sin\left(\frac{2\pi}{3}t\right)$$

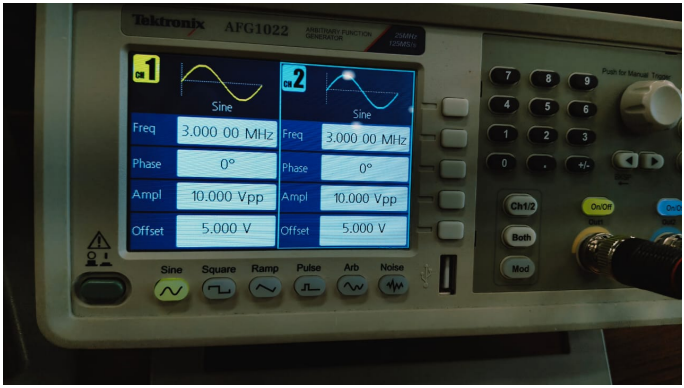


Fig. 1: Input from function generator

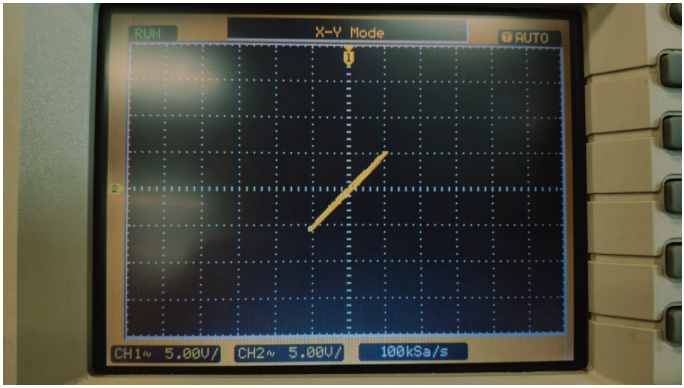


Fig. 2: Output on CRO

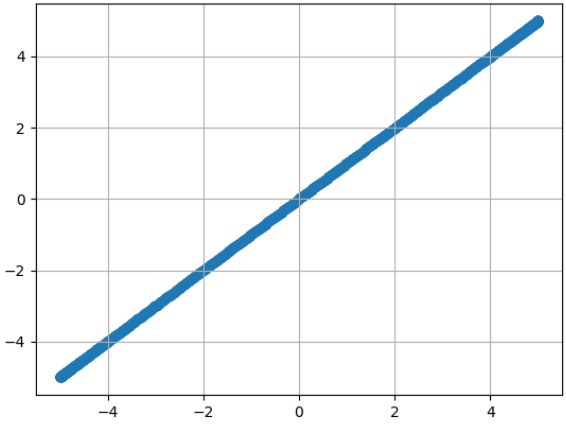


Fig. 3: Theoretical PLot

2)

$$x = 5\sin\left(\frac{2\pi}{3}t\right), y = 5\sin\left(\frac{2\pi}{3}t + \frac{\pi}{2}\right)$$

Fig. 4: Input from function generator

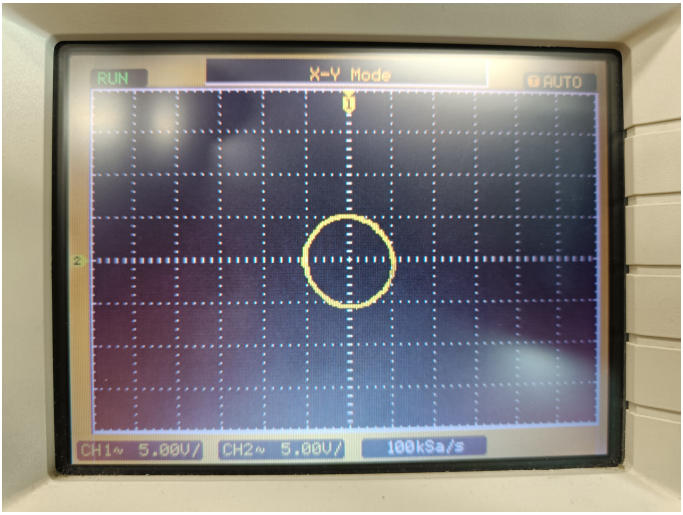


Fig. 5: Output on CRO

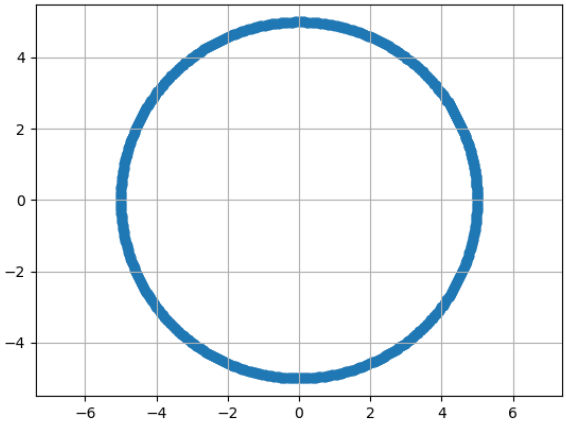
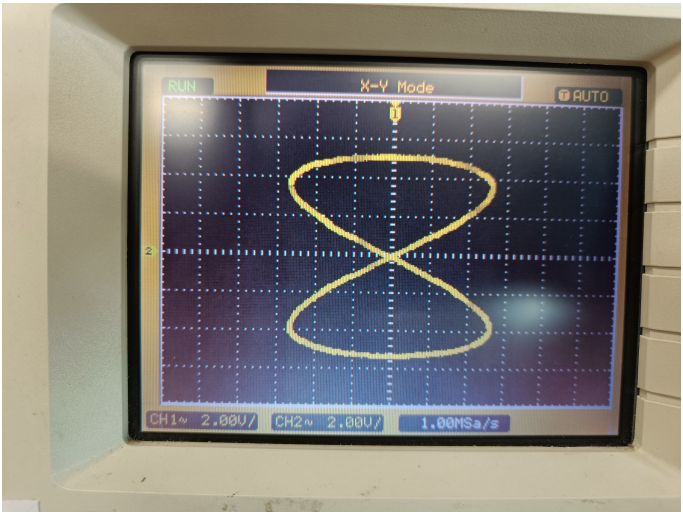


Fig. 6: Theoretical Plot

3)

$$x = 5\sin\left(\frac{2\pi}{3}t\right), y = 5\sin\left(\frac{2\pi}{3}t + \frac{\pi}{2}\right) \tag{2}$$



5.2 *Capturing an event*

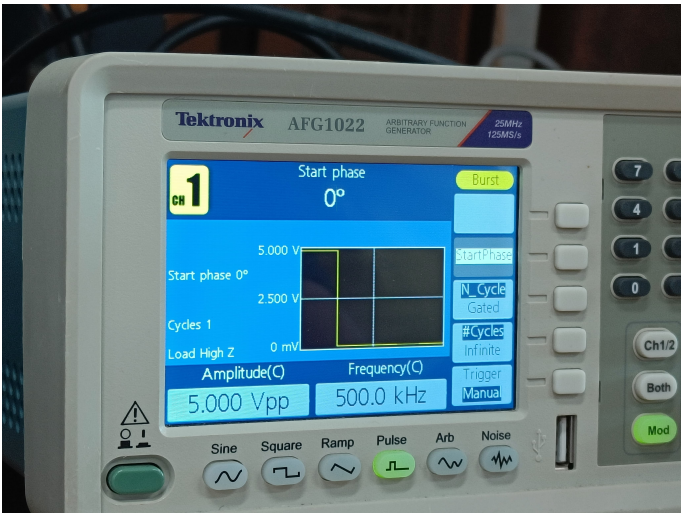


Fig. 7: Function Generator

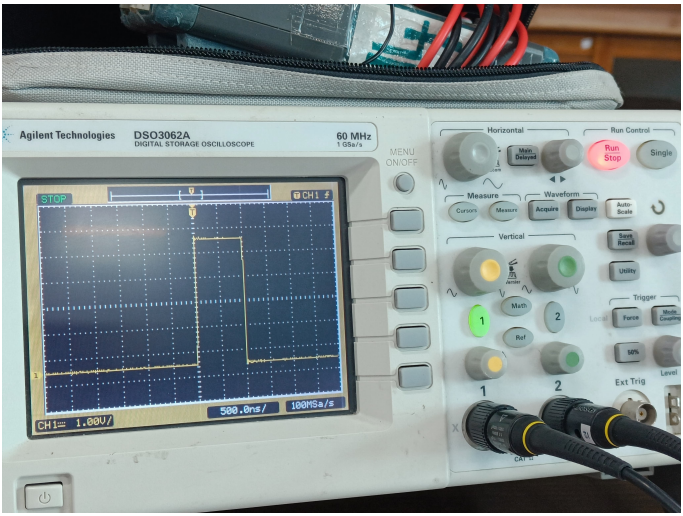


Fig. 8: Signal captured in CRO