Conduct Cost-effective Activities with Mobile Apps in Physics Lesson

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Physics lesson

- Light meter -> Lux Camera app -> measure the illuminance -> verify the Lambert's cosine law
- Real Racing 3 app -> demonstrate the centripetal force required by a car making turns with friction
- Decibel X -> measure sound intensity level
- Magnetometer app -> measure magnetic flux density

Provided a light meter in a very low cost by using a Lux Camera app

Luminous flux Φ, illuminated area A , illuminance is $E=\frac{\Phi}{A}$.

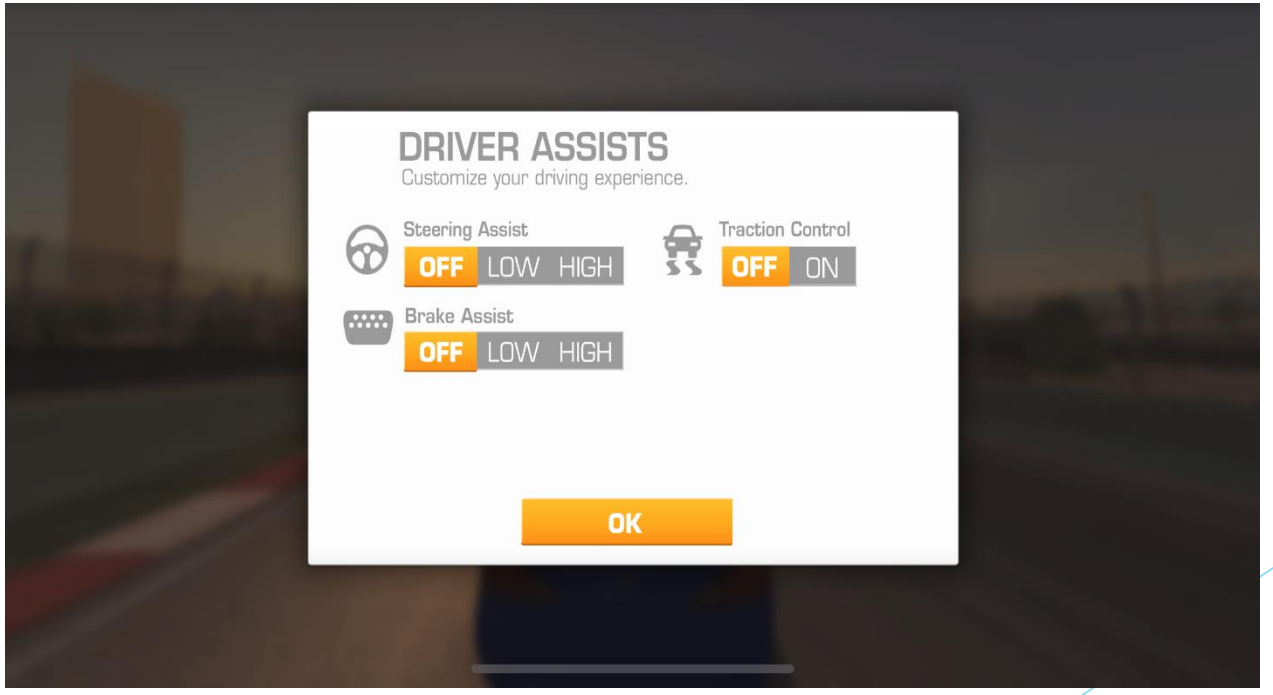
- When the surface is tilted at an angle θ,
- $A' = \frac{A}{\cos\theta}$
- illuminance E' is given by:
- $E'=\frac{\Phi}{A'} = \frac{\Phi}{\frac{A}{cos\theta}} = \left(\frac{\Phi}{A}\right) cos\theta = Ecos\theta$
- Lambert's cosine law


6755
LUX
Shutter Speed
Aperture
ISO
8s
f/1.4
1600
HOLD
LOG

LUX Light Meter FREE

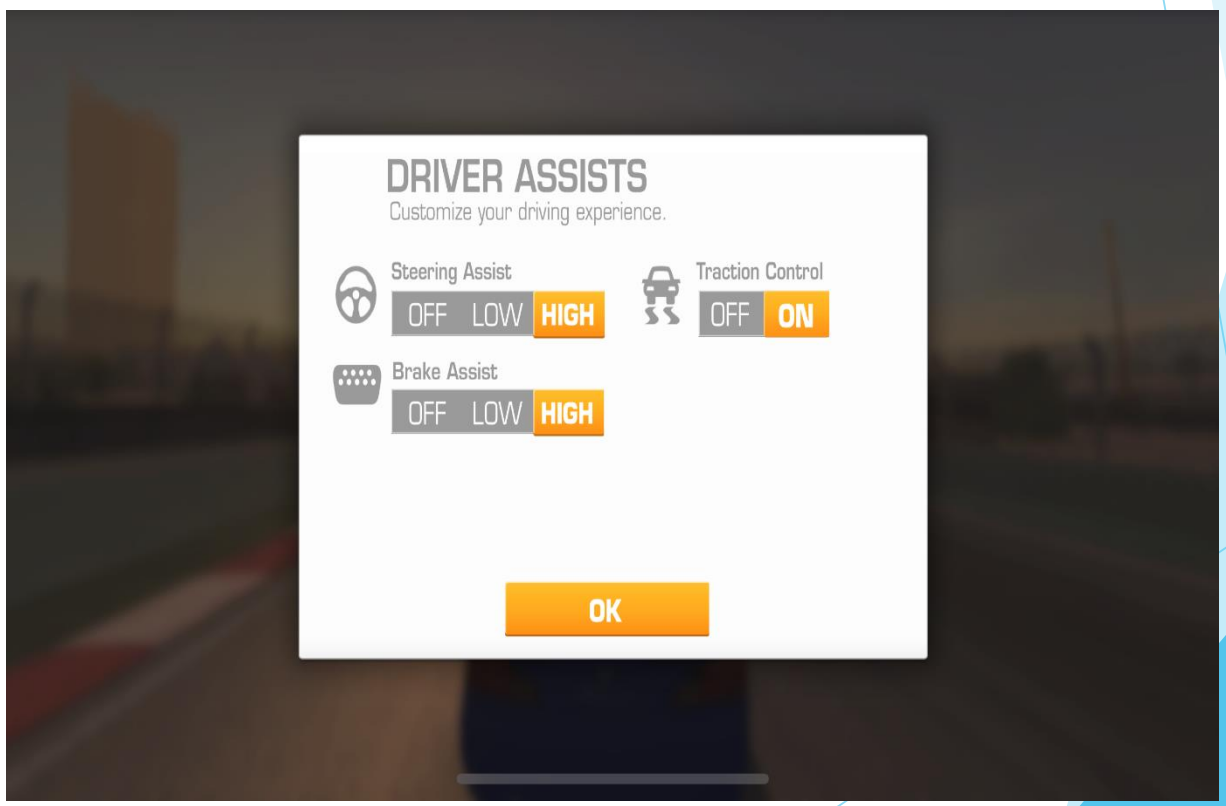
Arouse Students' Learning Motivation

- Using mobile app in learning uniform circular motion



On a level road, the centripetal force required comes from the friction f between the road and the tyres

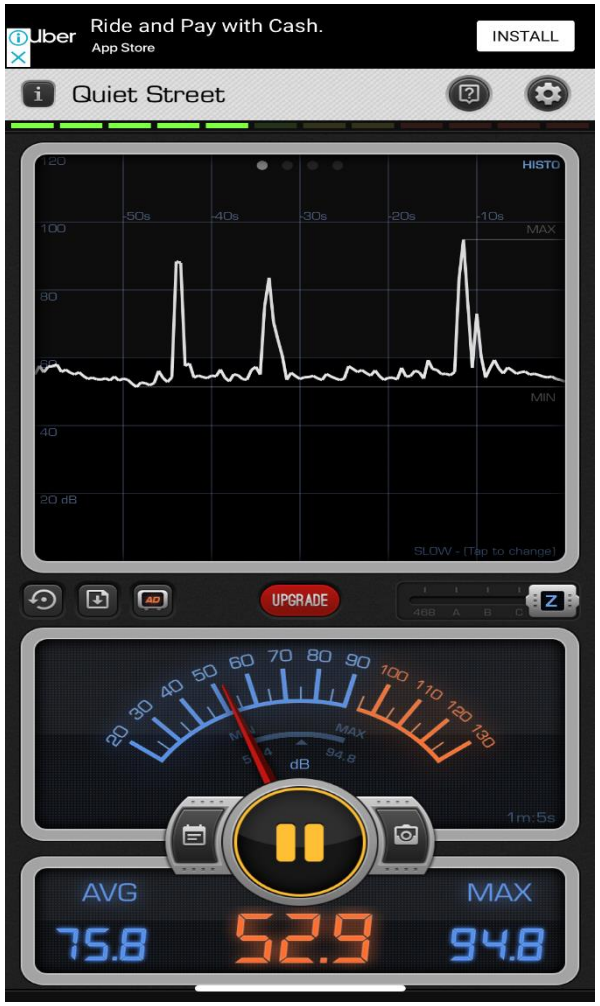
$$f = \frac{mv^2}{r}$$




DCFLO1
48 mph
DCFLO1
60 mph

Real Racing 3

Using mobile app in learning sound intensity level



Decibel X

Using mobile app in learning magnetic flux density

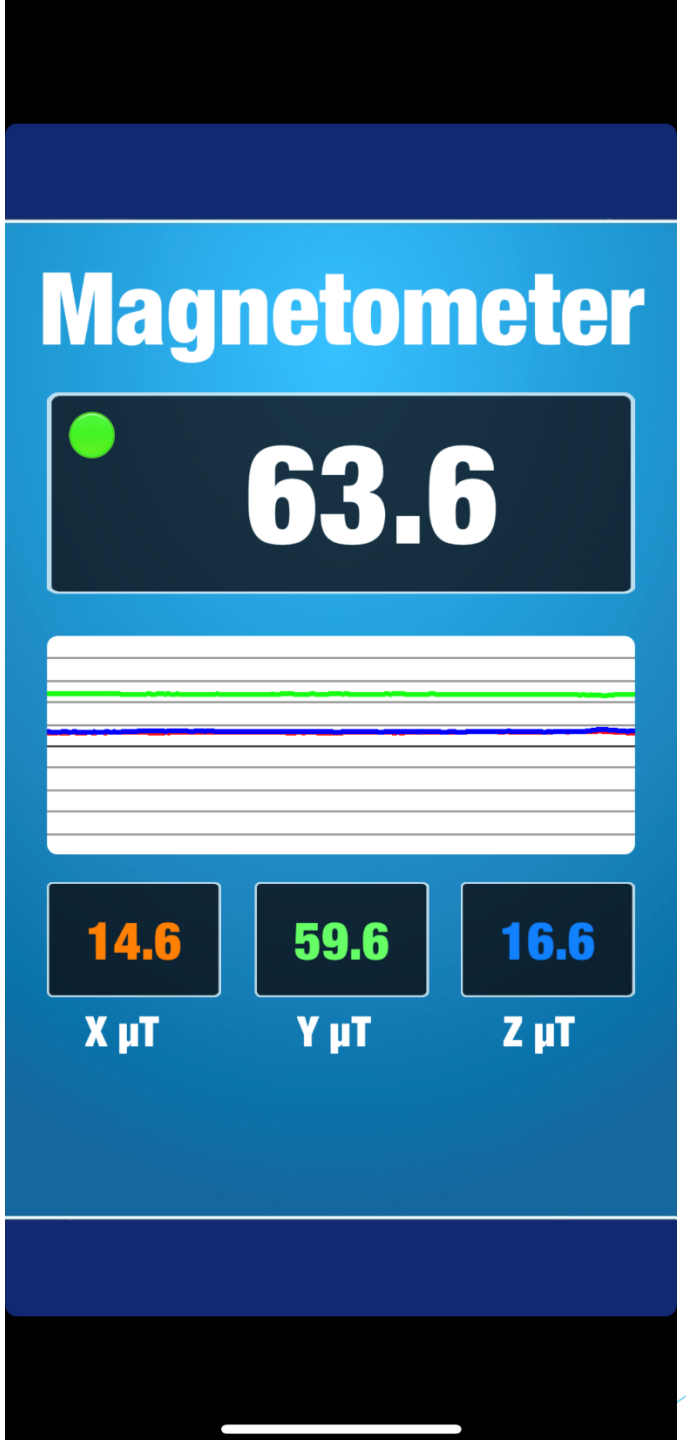
- Magnetic flux $\Phi = BA$
- When the magnetic field B was not at right angles to the coil,
- magnetic flux $\Phi = (B \cos\theta)A$
- $\Phi = BA \cos\theta$

- Coil with N turns
- Total magnetic flux through the coil:

- Magnetic flux linkage = NΦ

- Magnetic flux density = magnetic field B
- Φ=BA -> $\mathrm{B} = \frac{\Phi}{A}$ -> magnetic flux per unit area

- The unit of magnetic flux density was weber per metre squared (Wb m^{-2}) or tesla (T).


Magnetometer
63.6
14.6
59.6
16.6
X µT
Y µT
Z µT

Magnetic Detector LITE

Conclusion

- Students' learning motivation is enhanced through the implementation of Lux Camera app and Real Racing 3 app during Physics lesson.
- Cost of using light meter -> lower
- Students can visualize the effect of the angle and verify the Lambert's cosine law by using Lux Camera app and Rotating Sphere Clinometer app effectively.

- Students also visualized the relationship between the velocity of a car and the friction between the road and the tyres of a car when the car makes turns by using Real Racing 3 app.

- Further explorations will be done to study the effectiveness of implementing Lux Camera app, Rotating Sphere Clinometer app and Real Racing 3 app in enhancing students' academic performance in future.

Lux Camera - Light Meter & Measurement

Real Racing 3

Decibel X

Magnetometer

Learning & Teaching Expo 2021

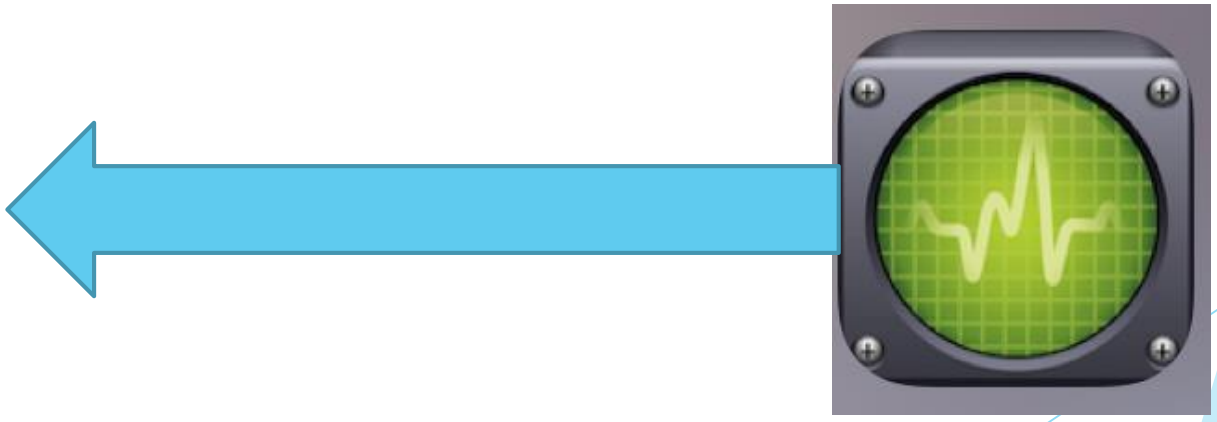
- New verion of Lux Camera app and Magnetometer app will be used.

LUX Light Meter FREE

Real Racing 3

Decibel X

Magnetic Detector LITE



Thank you