

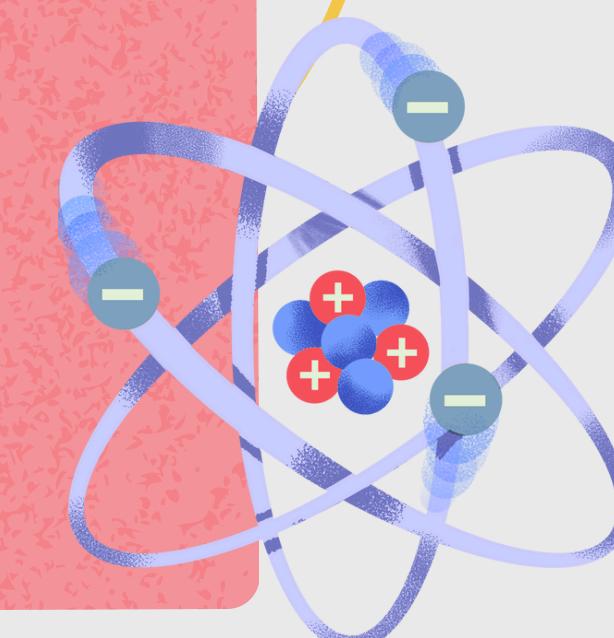
المركز العلمي البحريني
لأهداف التنمية المستدامة

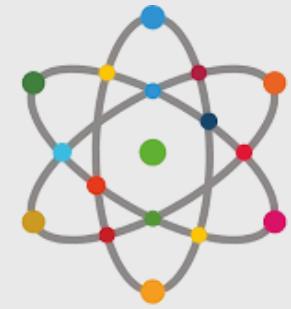
BAHRAIN SCIENCE
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EXPERIMENTAL PHYSICS

Ms. Raghad Rashed

August-2025



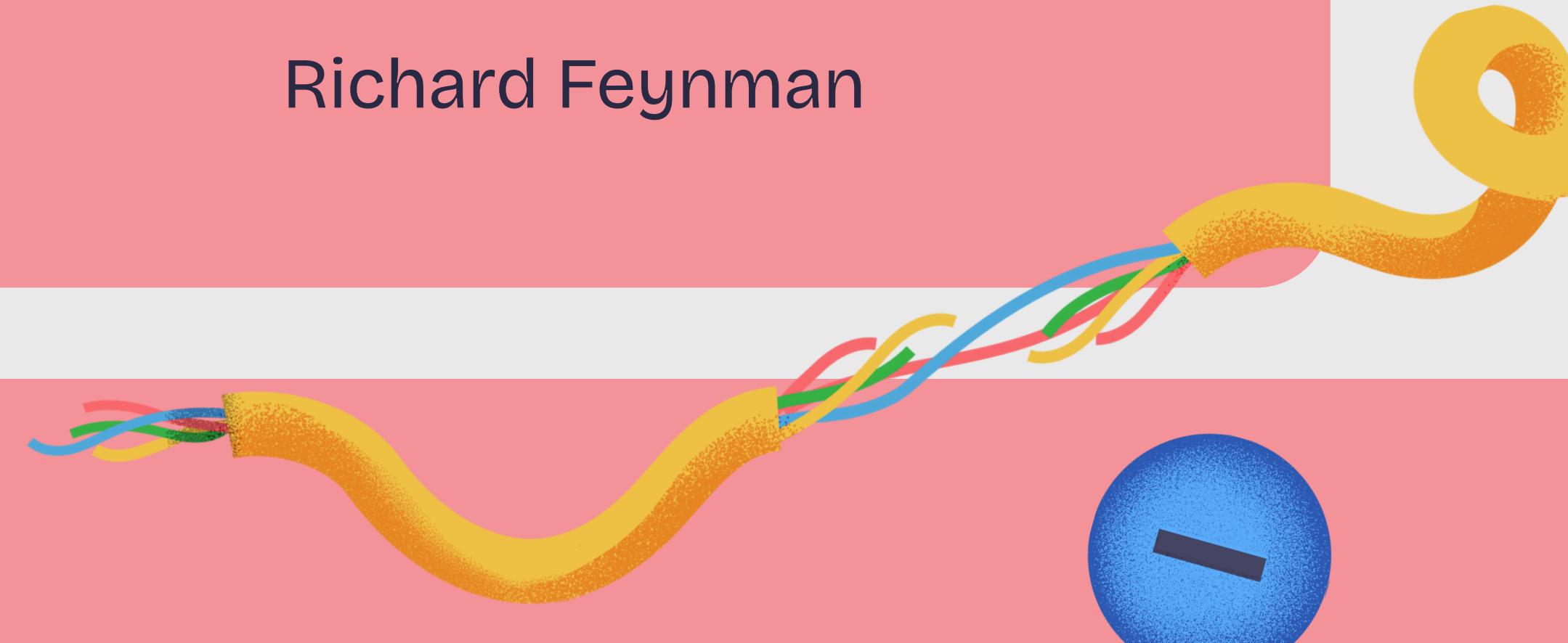
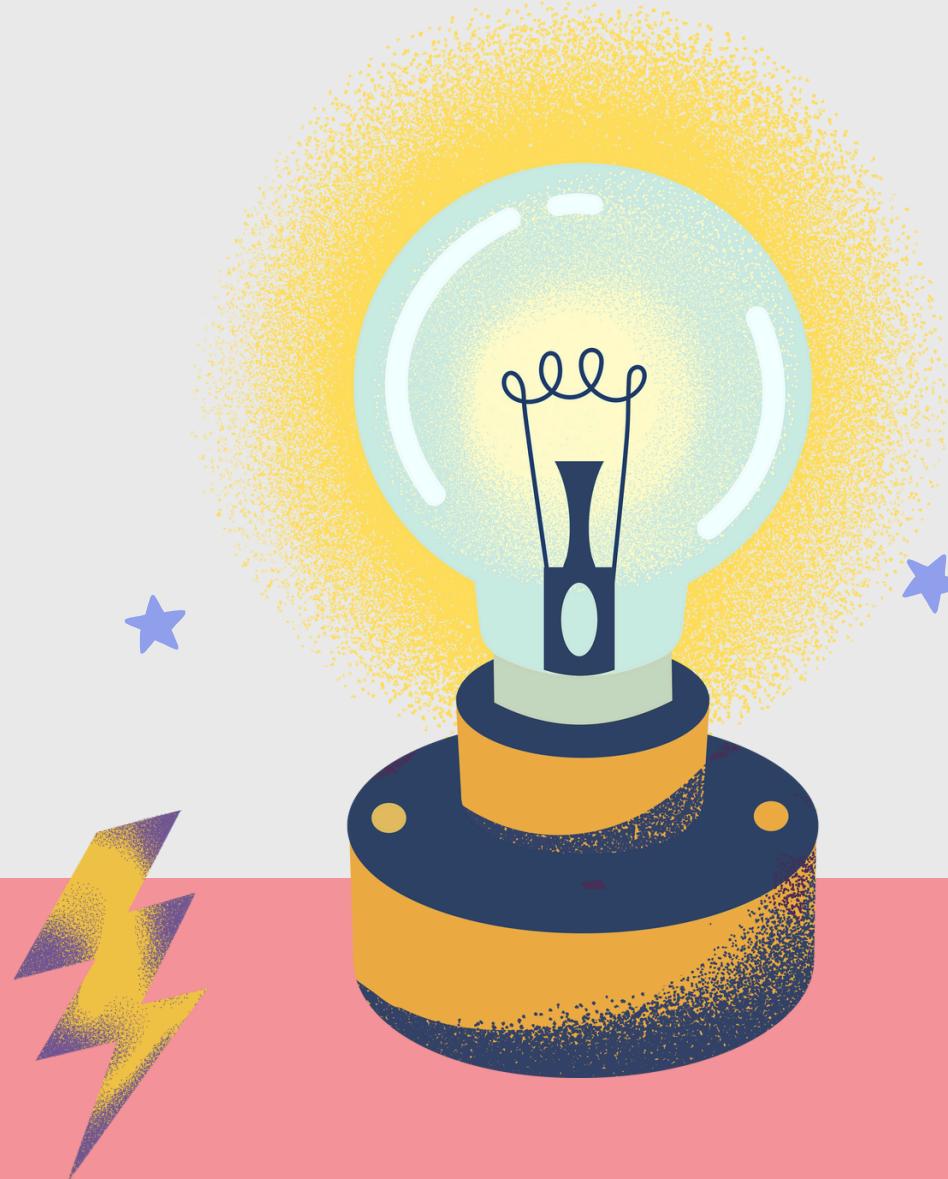


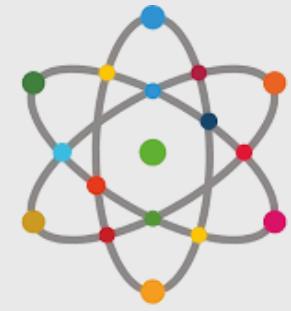
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**The test of all knowledge is
experiment. Experiment is the
sole judge of scientific truth.**

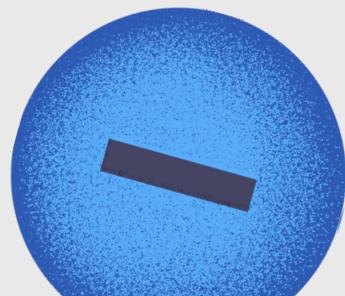
Richard Feynman

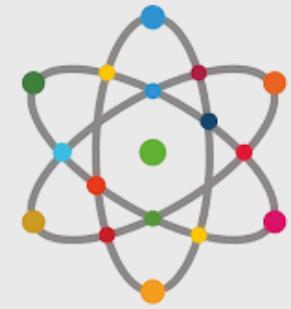




SPARK
سبارك

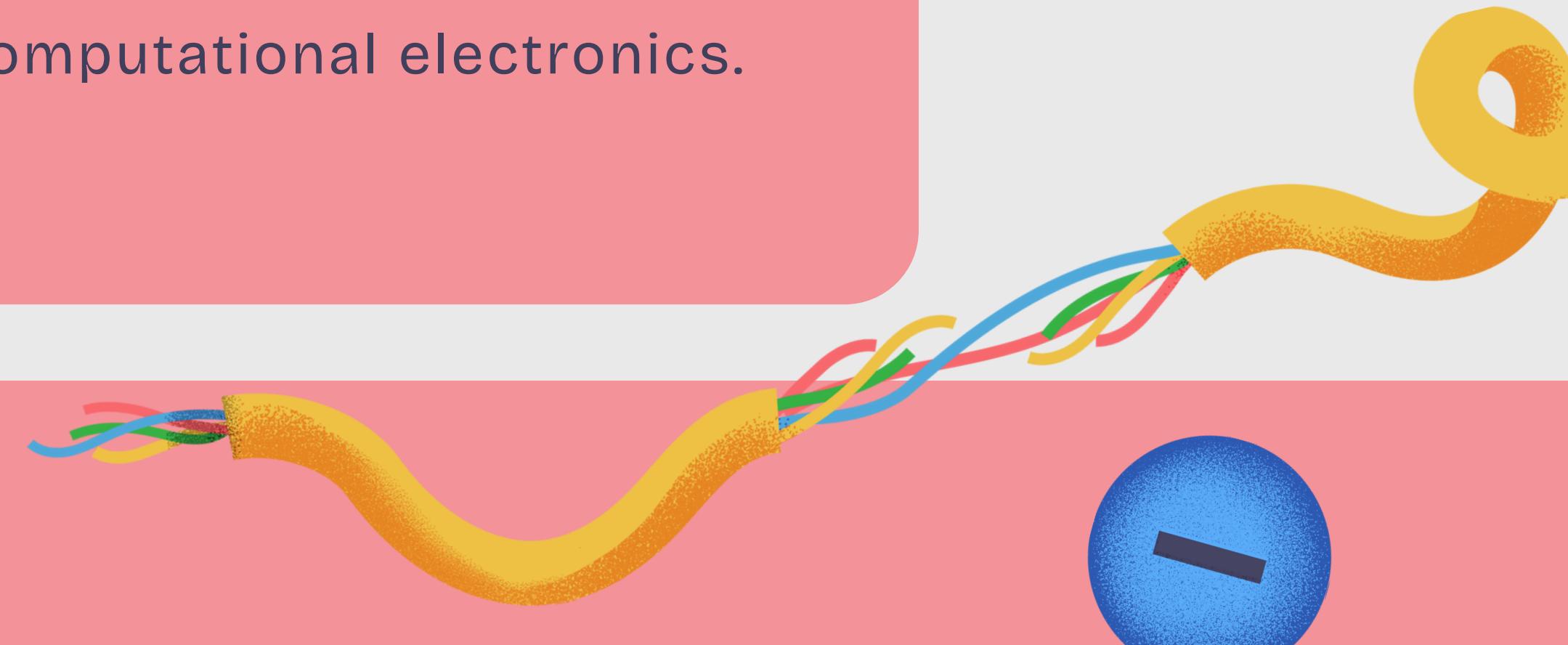
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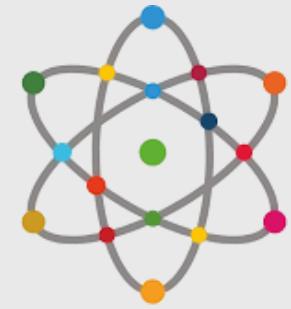




WHAT WE ARE GOING TO DO

- To get Familiarize with physical computing.
- Learn basic coding to control sensors.
- Perform two hands-on experiments applying physics with computational electronics.





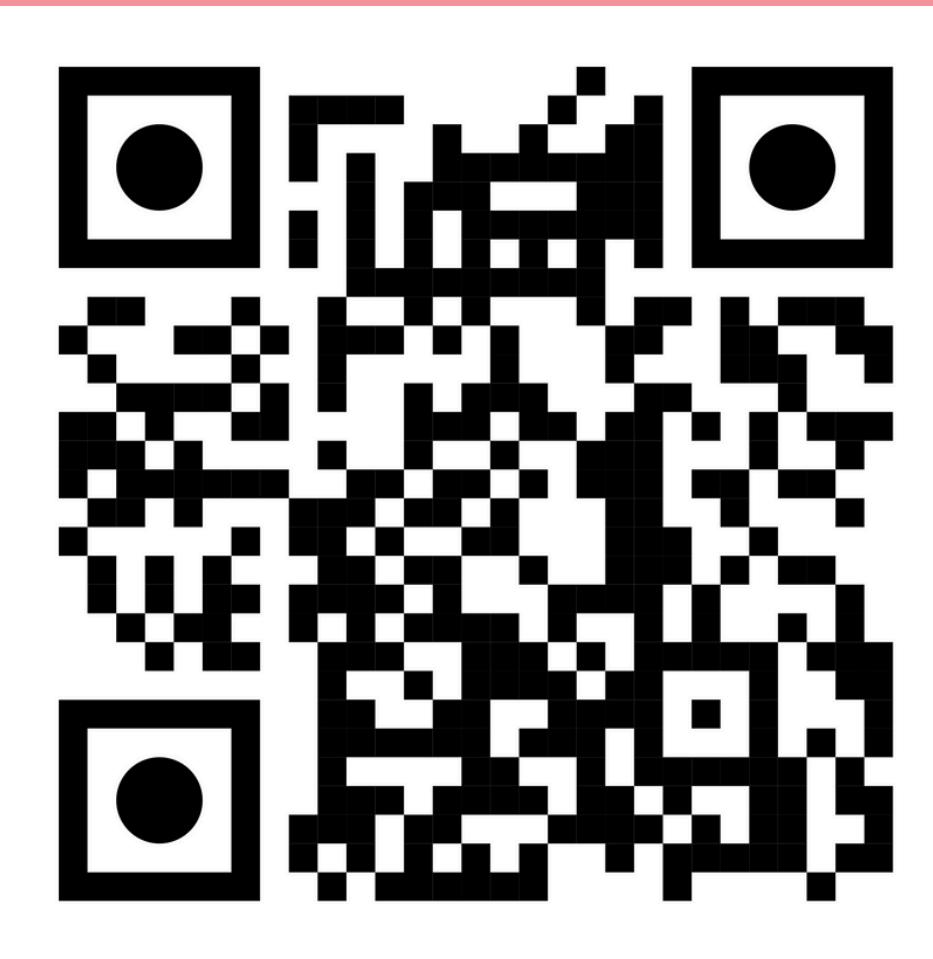
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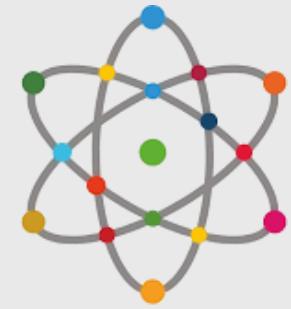
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PREPARE YOUR KIT



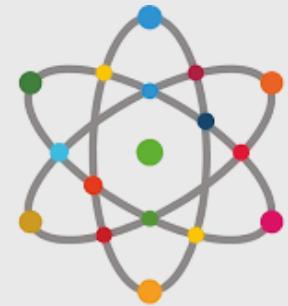


1

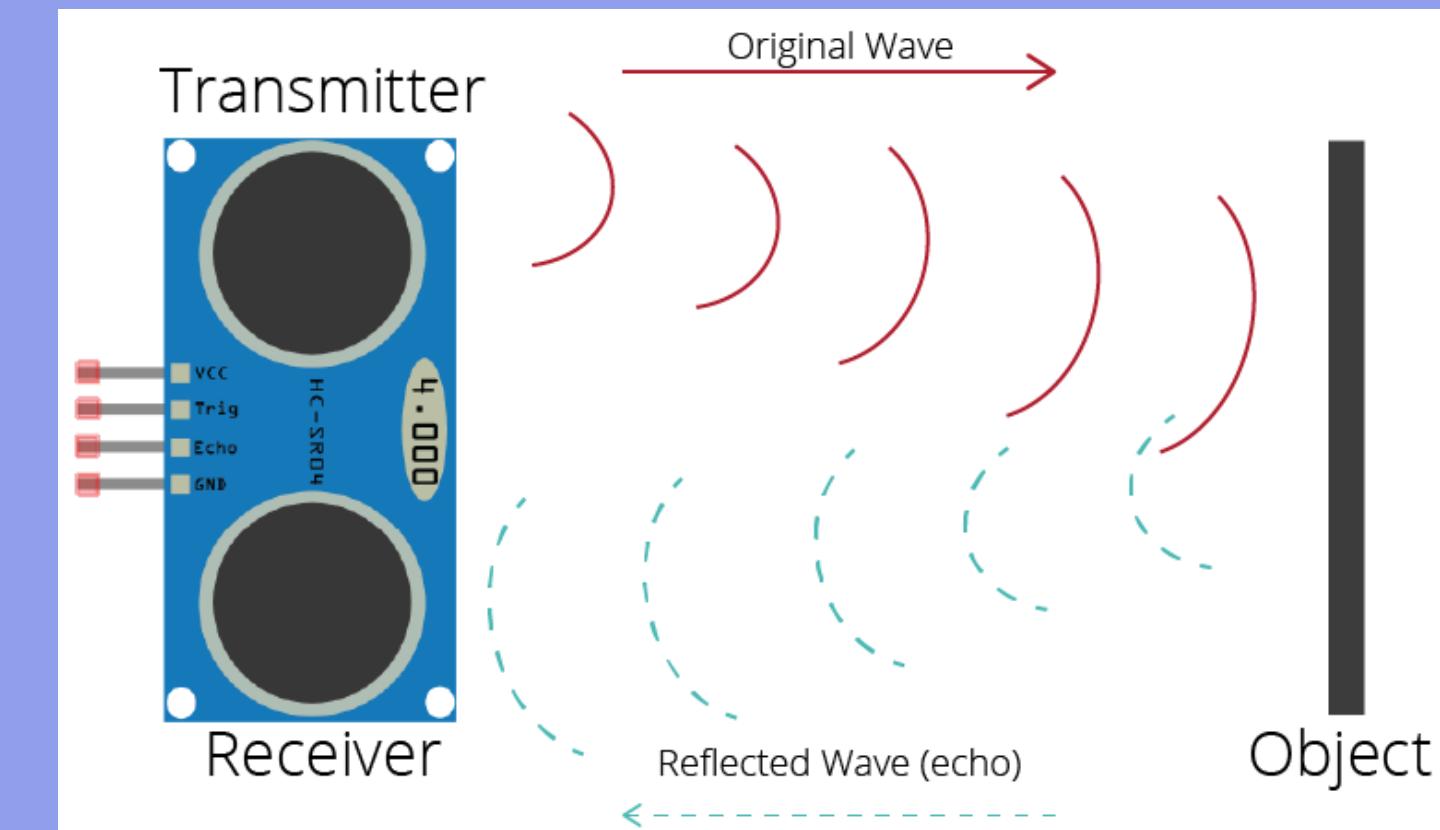
CAN WE MEASURE THE AREA OF THE BUILDING WITHOUT A TAPE MEASURE?

هل يمكننا قياس مساحة
المبنى بدون استخدام
الشريط المتر؟



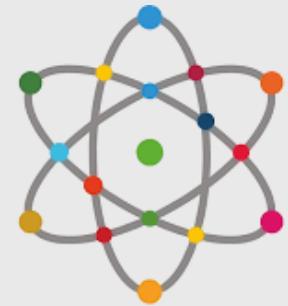


ULTRASOUND WAVES

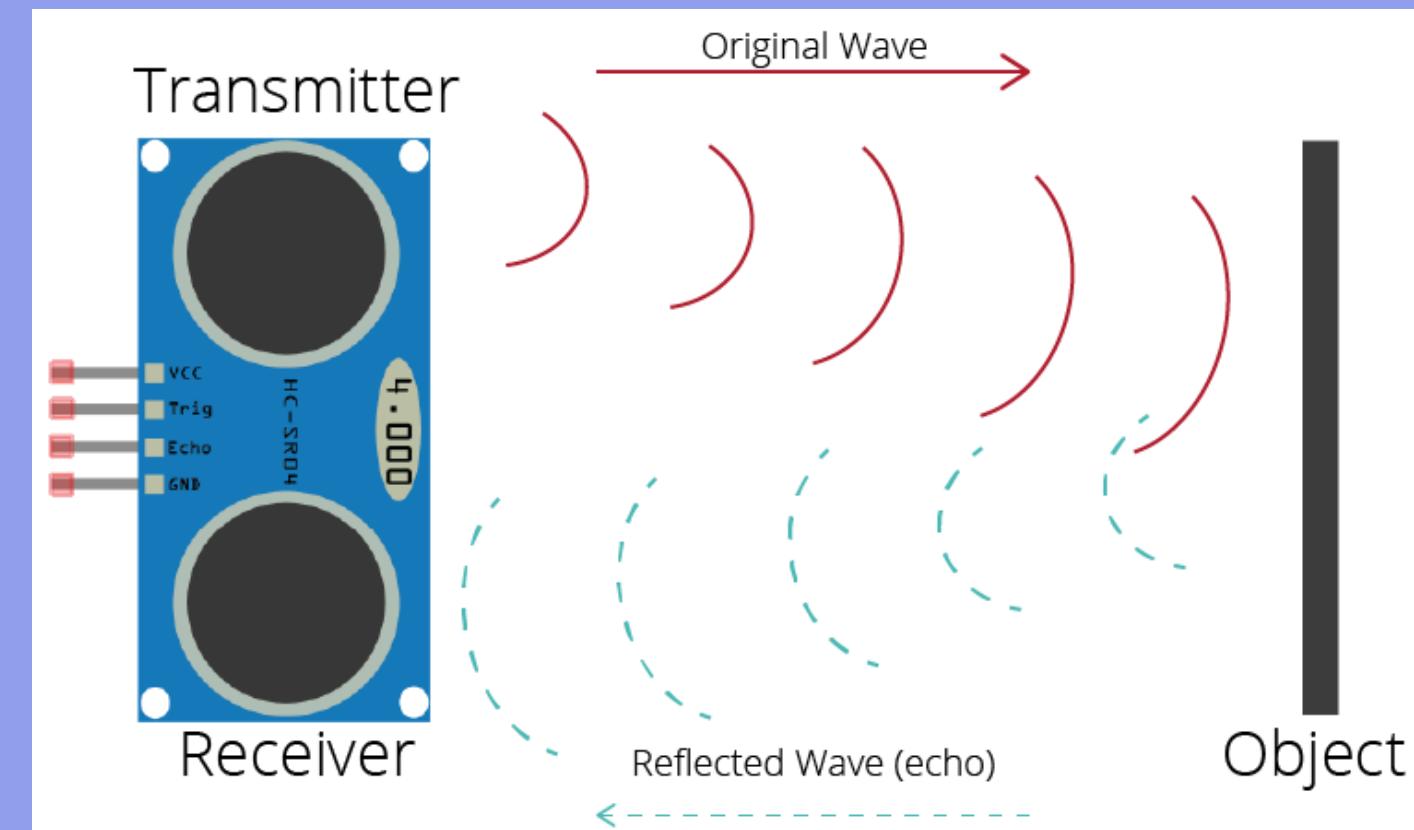


Ultrasonic sensors measure distance by sending a high-frequency sound pulse and analyzing the time it takes for the waves to return after reflecting off an object.

يتم قياس المسافة عن طريق إرسال موجة فوق صوتية بتردد عالٍ. عندما يكتشف وجود جسم ما، تنعكس الموجة عن الجسم ويتم حساب الوقت الكلي.



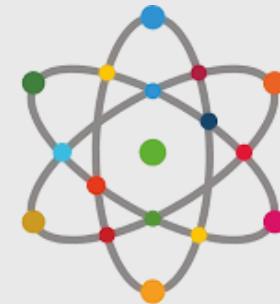
ULTRASOUND WAVES



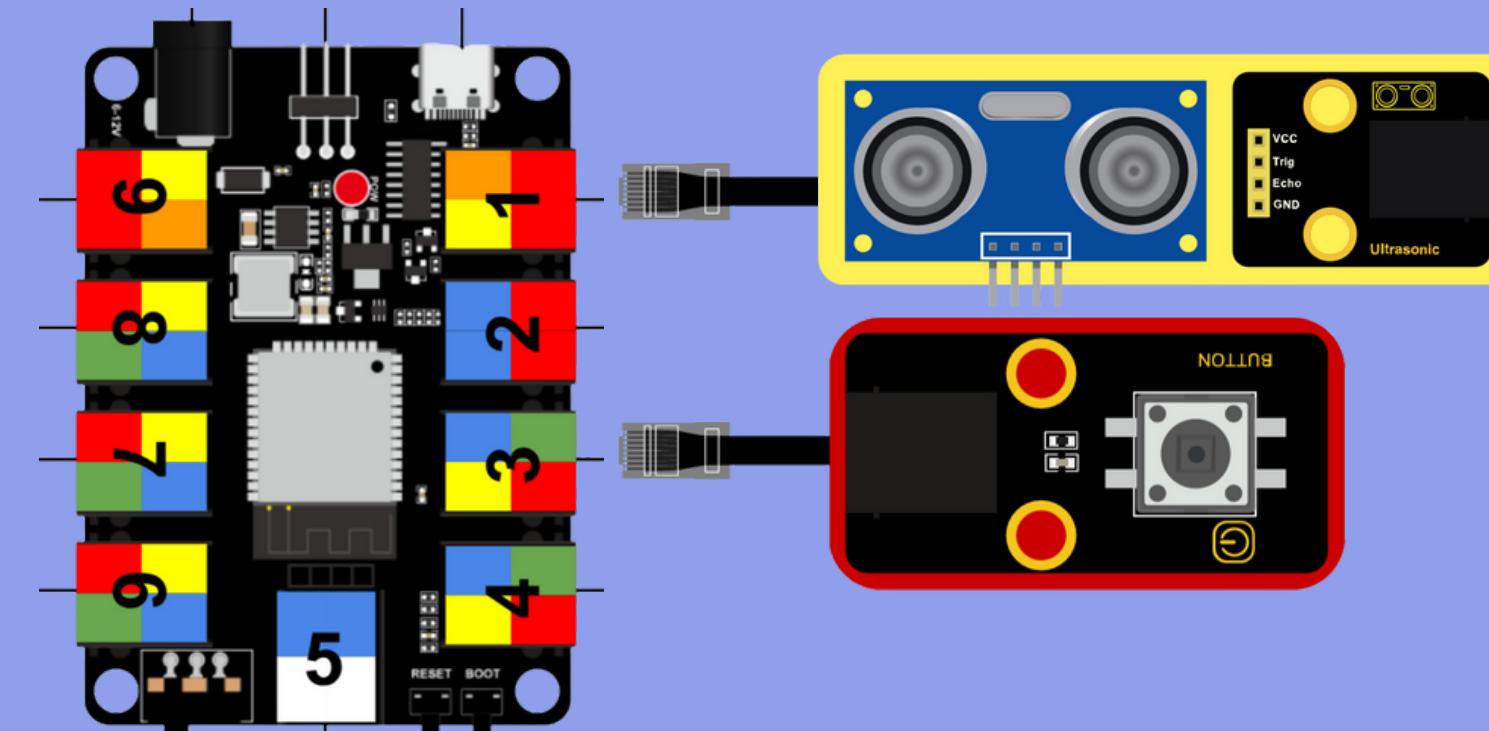
Distance = Time × Velocity



$$Distance = \frac{Time \times 343}{2}$$



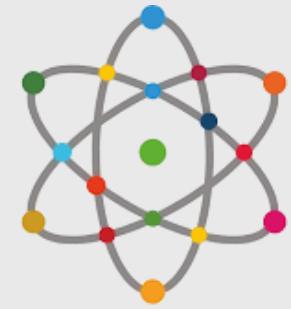
SETUP--STEPS *



1. Connect the **ultrasonic sensor's** signal pin to digital **pin 1**.
2. Connect the **button** to digital **pin 3**.
3. Upload the code (lab1.ubp), write down your measurements and estimate the area!

To measure long distances, break the distance into segments of 5 meters
Sum these individual measurements to determine the full length.

لمساحات الطويلة، قسّم المسافات إلى كل 5 متر، ثم قم بجمع القياسات المفردة لحساب الطول الكلي.



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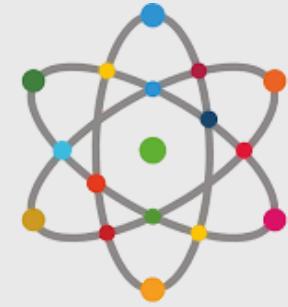
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THE PLACE COVERS
 $\sim 1000\text{m}^2$

Source: OANA



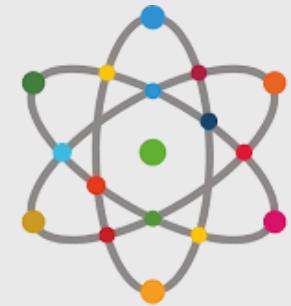


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لأهداف التنمية المستدامة

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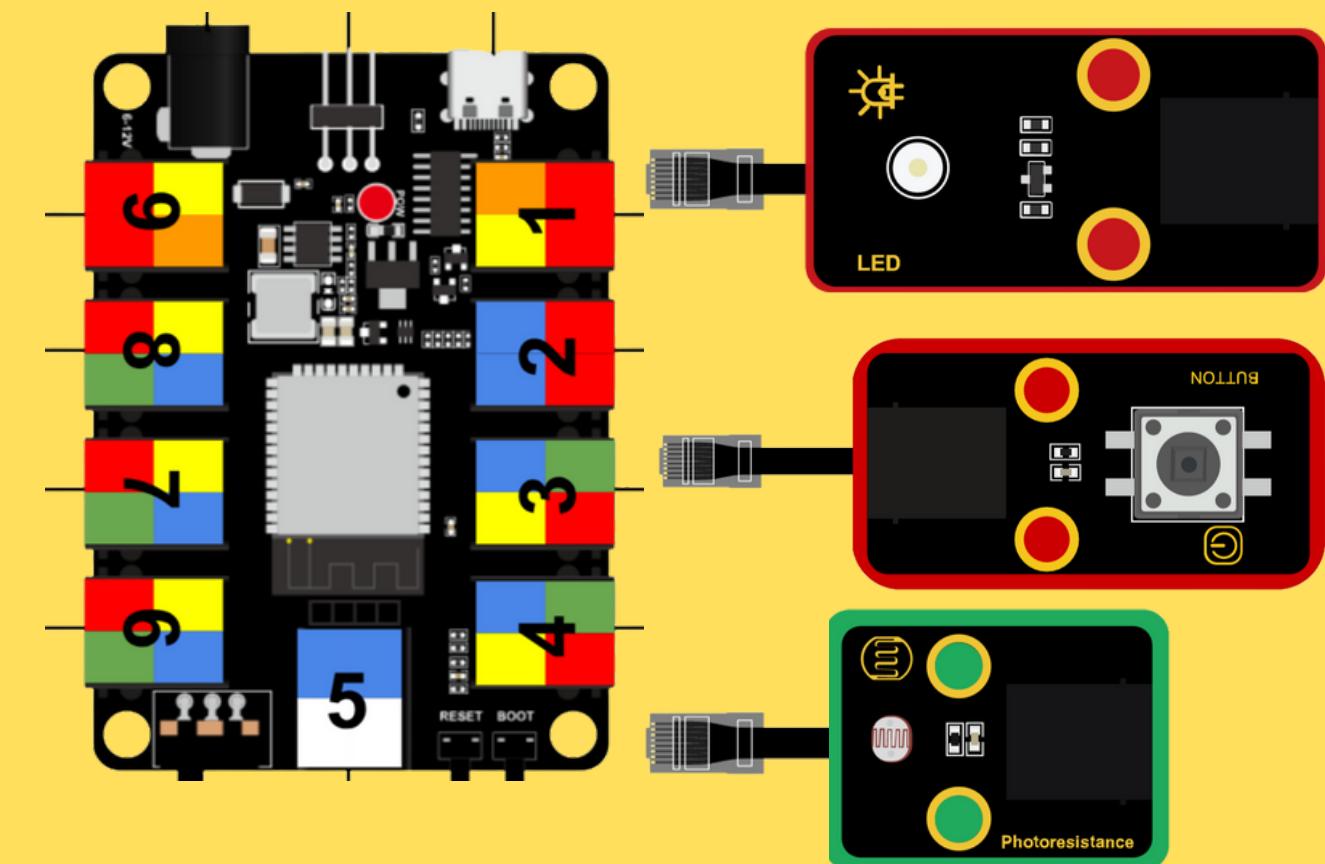
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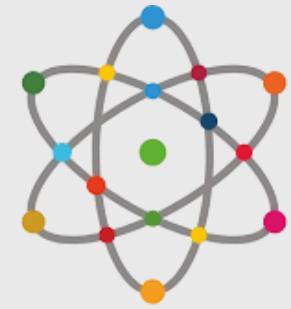
IRRADIANCE EXPERIMENT



SETUP--STEPS *

1. Connect LED to PIN 9, Button to PIN 1 ,
Photoresistance to PIN 4.
3. Connect microcontroller to your laptop, upload
code [**irradiance.ubp**]
4. Open graph, click on button
5. place LED as close as possible from
Photoresistance, without shadowing, then
click button again
6. Get LED further each time, then click on button
again



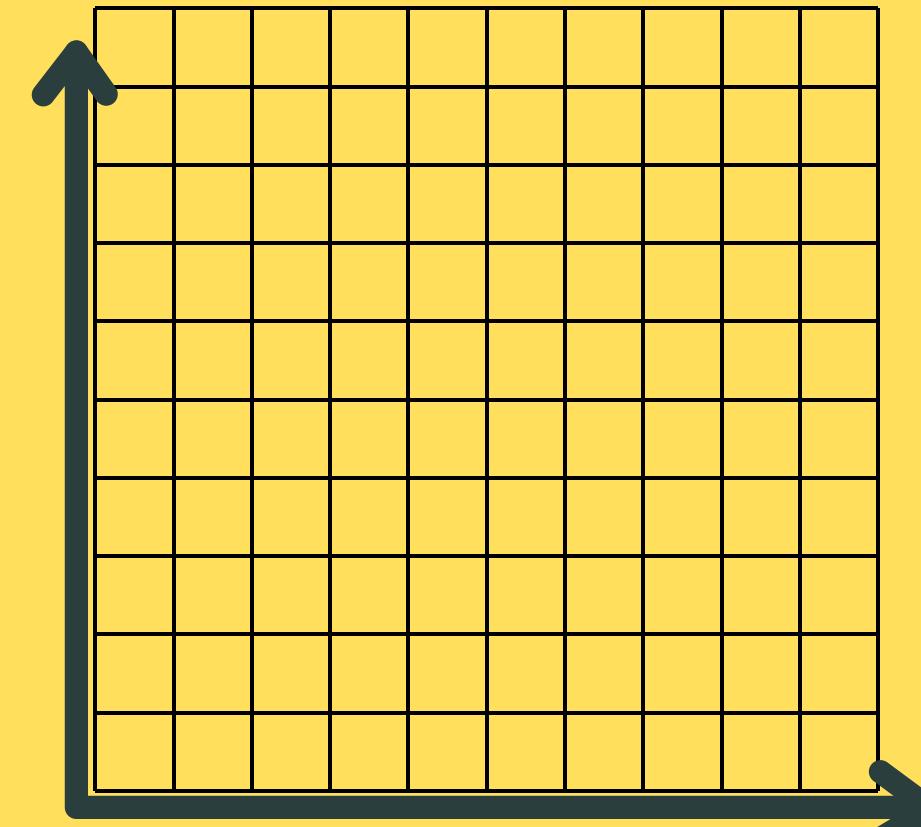


DATA

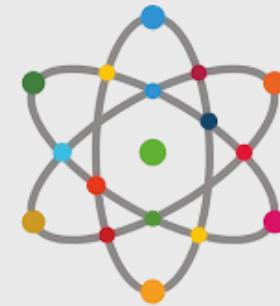


Position
Closest
1.0 cm
1.5 cm
2.0 cm
2.5 cm
3.0 cm
Furthest

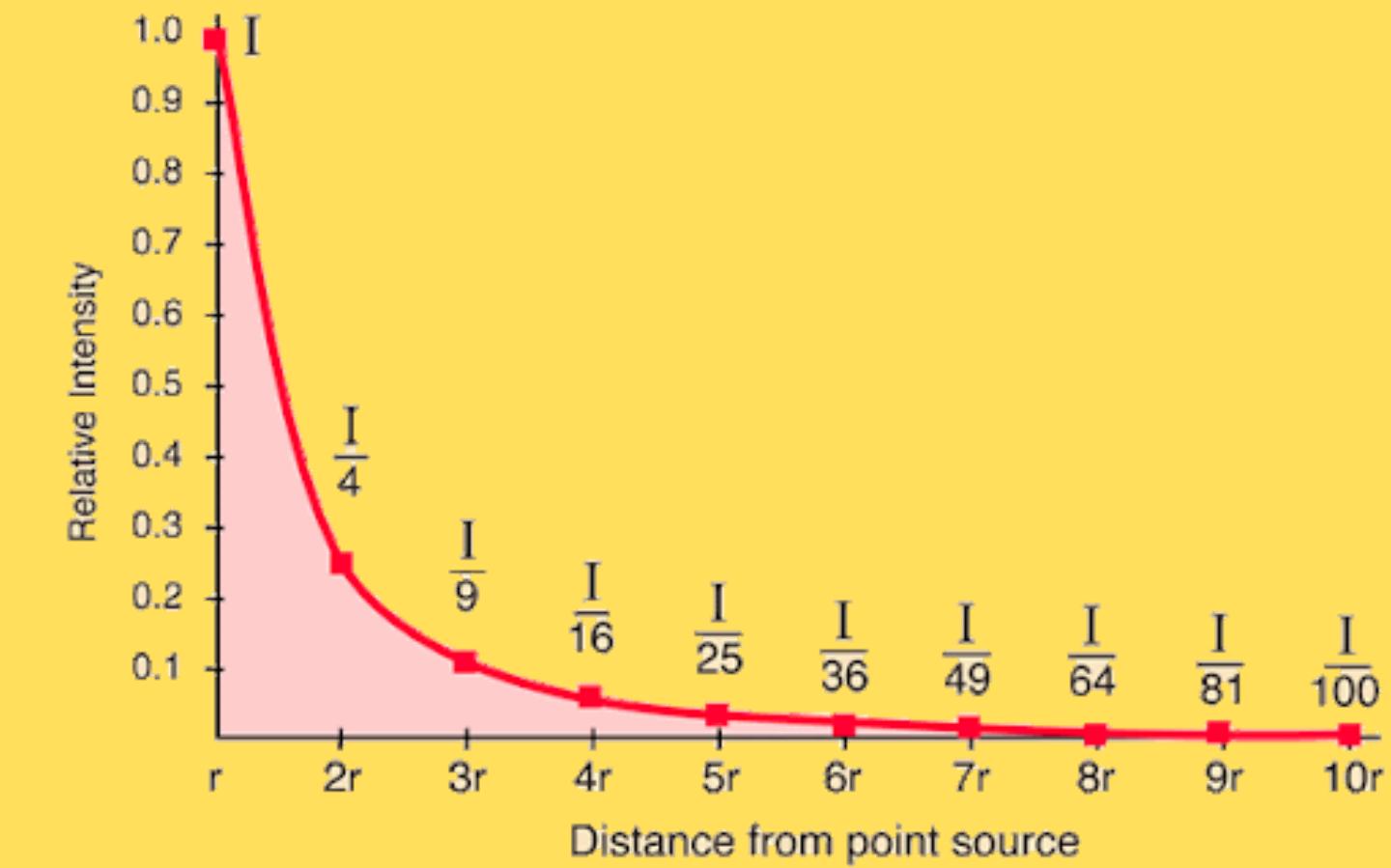
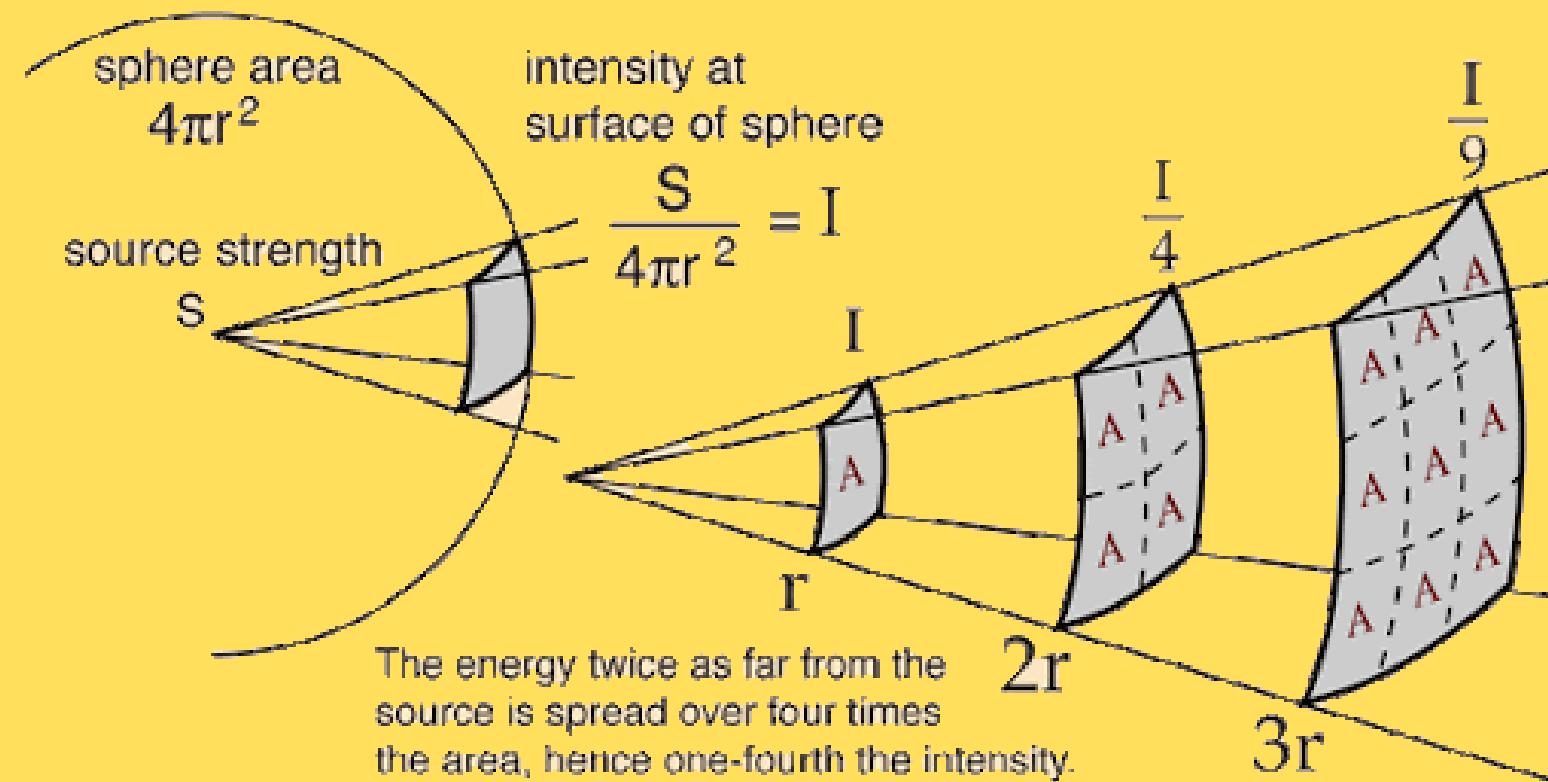
light intensity



Distance (cm)



INVERSE SQUARE LAW



APPLICATION



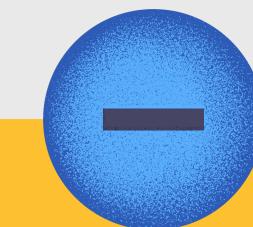
Medicine

determine safe distances
and exposure times



Astronomy

determine the
distances of stars



Electromagnetism

$$F = k \cdot \frac{q_1 \cdot q_2}{r^2}$$

CONCLUSION

LEARN ARDUINO VIA:

