

Using An Ultrasonic Sensor to Find An Object on a Coordinate Grid

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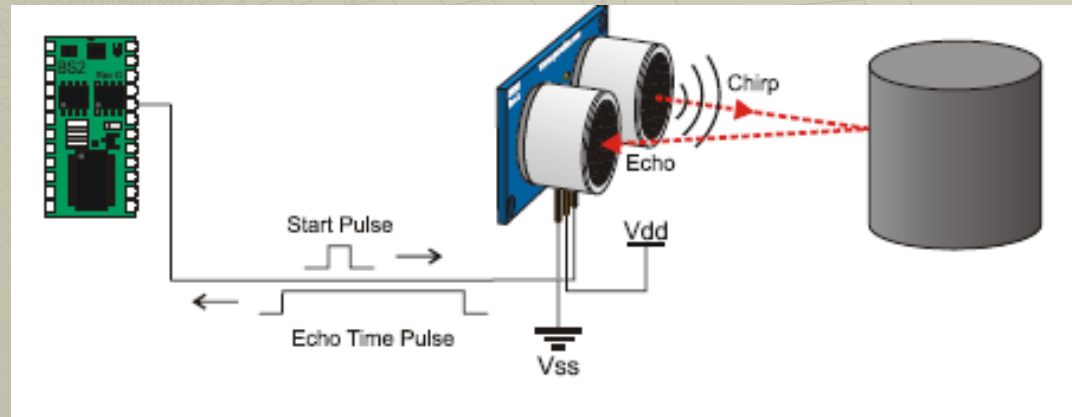
Background

- ◆ Global positioning systems use sensors to locate many different objects (cars, planes, people, etc.)
- ◆ Position of objects is commonly taught in algebra using x - y coordinate grid
- ◆ The trigonometric functions sine and cosine can also be used to determine an object position if the angle is known and the distance from the origin is known

Background

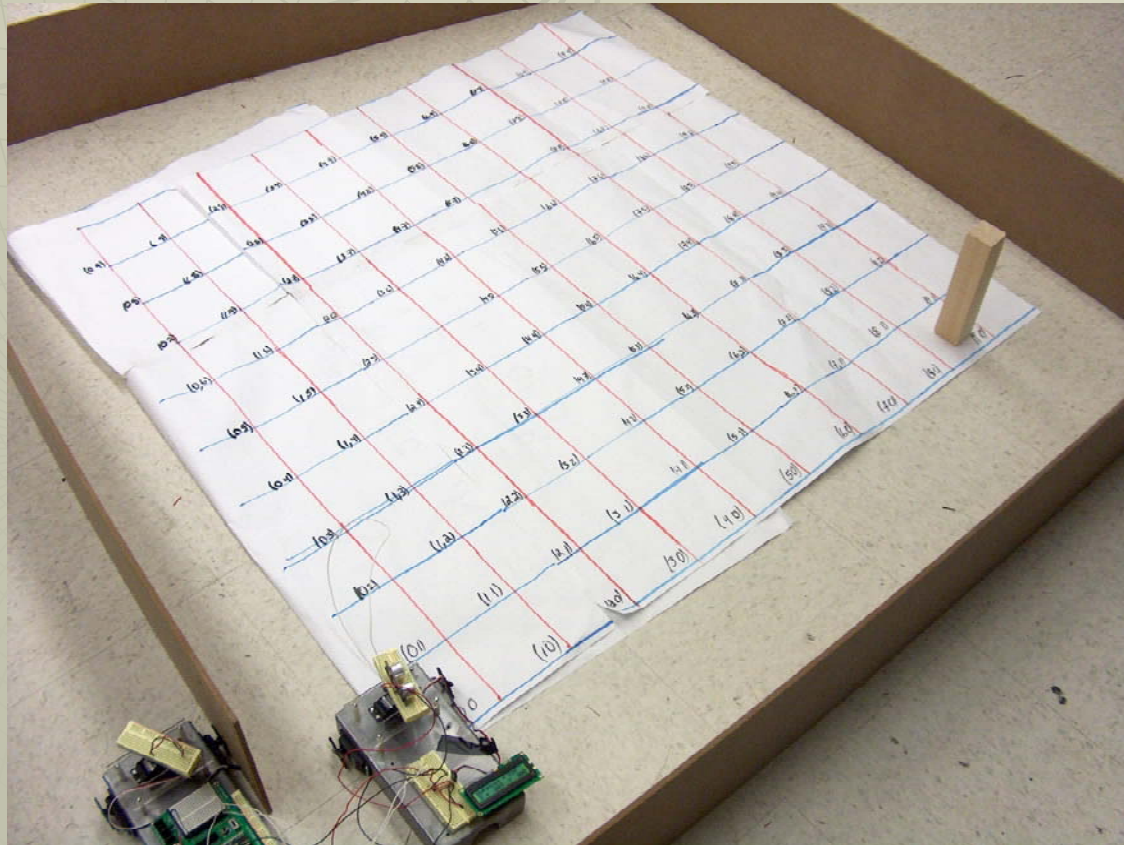
Ping Ultrasonic Sensor

- ◆ Distance = elapse time * speed of sound
- ◆ Emits high frequency (40kHz) sound wave to an objects and measures the time it takes for the wave to return

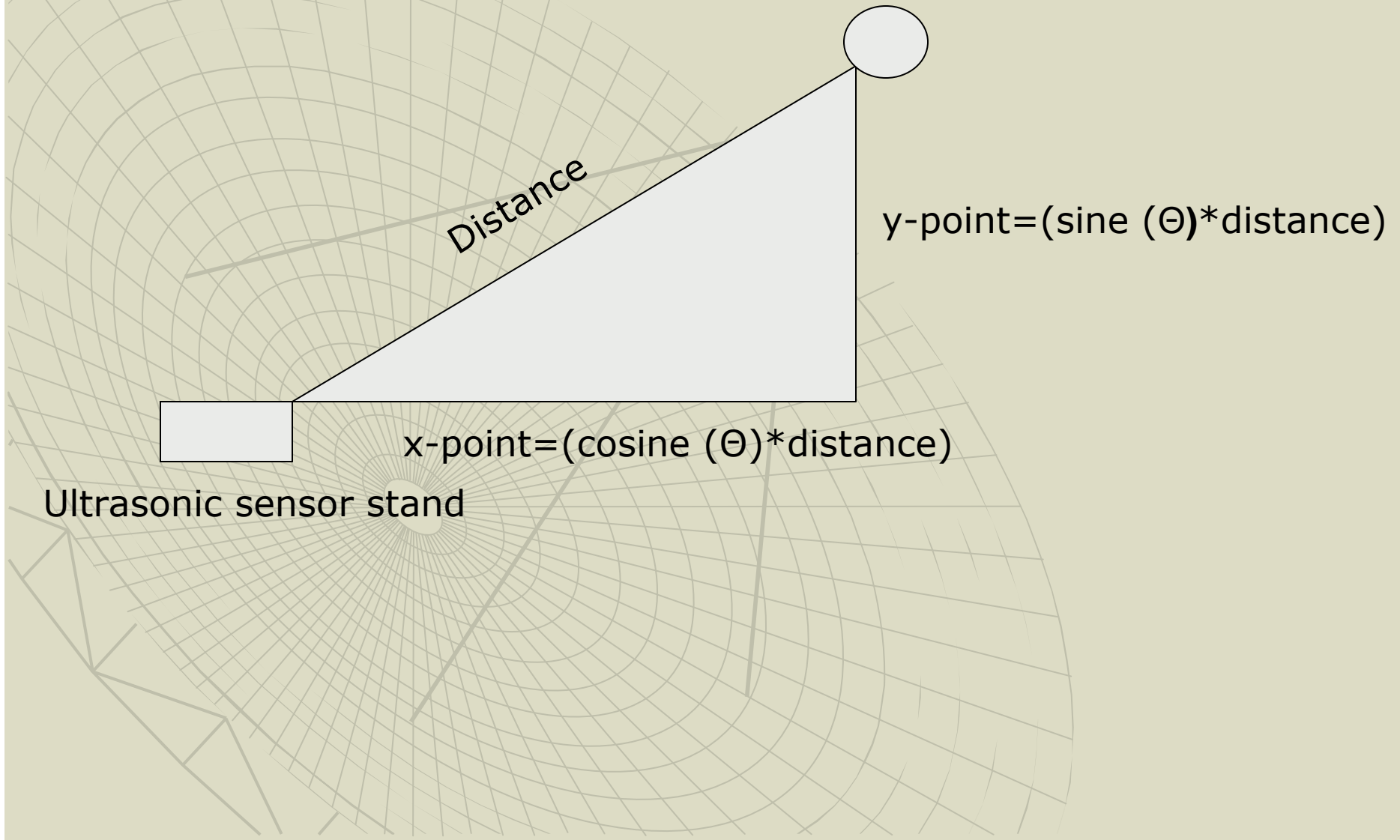


x-y Coordinate Grid

- ◆ Object Testing

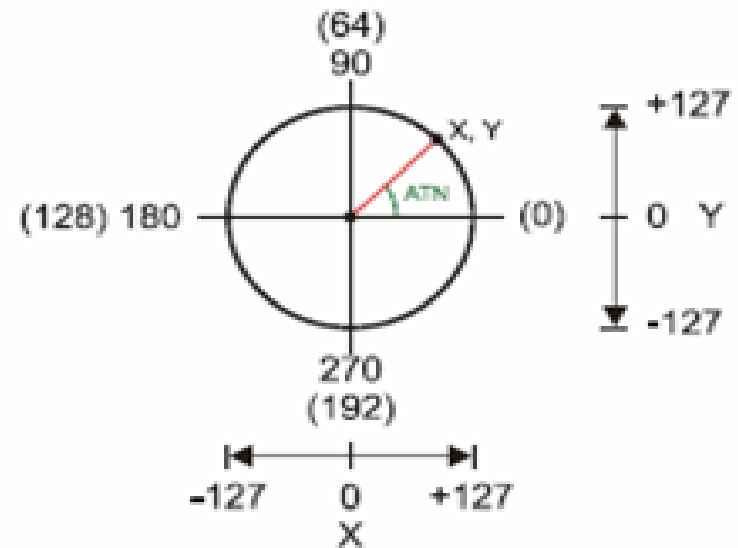


Using Sin and Cosine



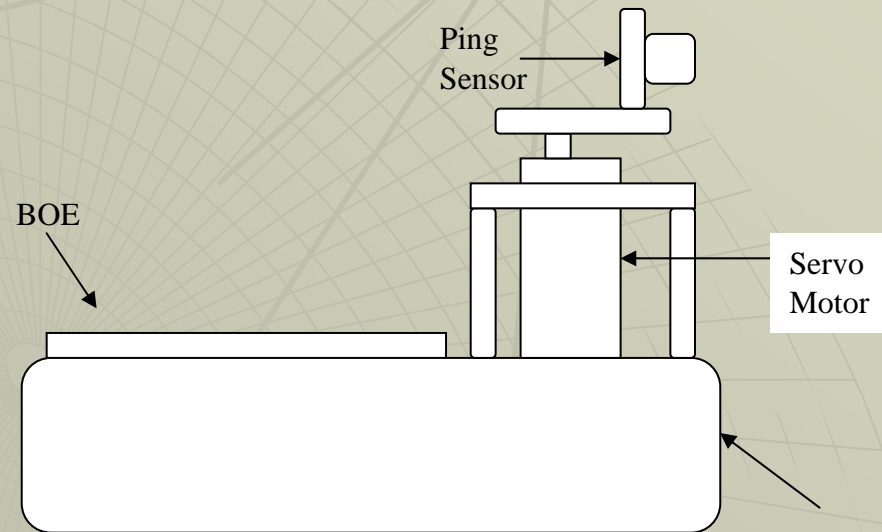
Using Sin and Cosine

- ◆ Angles in pBASIC are determine by using the unit brad
- ◆ 128 brads = 180 degrees
 - ◆ Sin (64 brads) = 1
 - ◆ Cos (64 brads) = 0



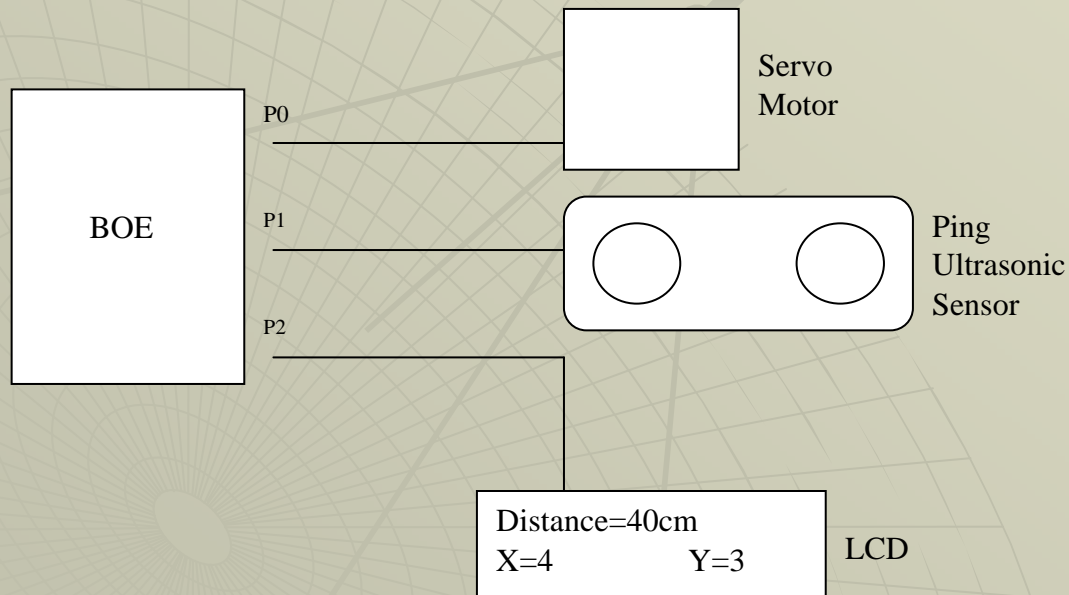
Ultrasonic Sensor Stand

- ◆ As the servo motor rotates, the angle of rotation is determine



Component Connection

◆ Pin Selection



Problems With Ping Sensor

- ◆ False-positive reading
Fix - Fence
- ◆ Ping not giving the correct distance
Fix-Change the types of objects
- ◆ Totally missing the object
Fix – Reduce the number of brads rotated for each reading

Future Works

- ◆ Create another unit, and have both units move along their respective axes until the object is located.
- ◆ Place sensors at end of x - y coordinates respectively. Solve two equations using the distance formula simultaneously for x and y .
- ◆ Have locators find a moving object.