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| **TITLE:** |  | | **DURATION:** |
| ULTRASONIC SENSOR | | | 30 mins |
| **OBJECTIVES:** | | **RESOURCES REQUIRED** | |
| * Fit Ultrasonic Sensor * Describe how an Ultrasonic Sensor Works * Write a new sketch to read values from the sensor | | * Robot * Testing Jig * USB-B Cable * Laptop * Batteries * Ultrasonic Sensor * Sensor Mount | |
| **SECTION** | **POINTS TO COVER** | | |
| **Introduction:** | * To make the robot autonomous, we need a way for it to detect obstacles * We will use an Ultrasonic Sensor | | |
| **Main:** | * Describe that ultrasonic sensors measure distance * Get cadets to deduce how the sensor works * Explain how the sensor works   + One speaker is a transmitter, the other is a receiver   + When triggered by the Arduino, the transmitter sends a pulse of ultrasonic sound   + This sound will bounce off a surface and be received by the receiver   + We can calculate the time between sending and hearing the pulse, do some speed = distance/time and calculate the distance to the surface. * Now get cadets to open a new Arduino sketch * Tell them that they will learn by themselves how to program the Arduino to use the Ultrasonic Sensor * Direct cadets to the **“Ultrasonic Sensor HC-SR04 and Arduino – Complete Guide”** by **How to Mechatronics**.   + In this guide, they will find information of how the sensor works and how to program it   + Tell them to find the website, learn all they can and try the code to measure distance using the Ultrasonic Sensor and output to the Serial Monitor * Advise cadets that when they find their code, get them to add a ‘delay(50);’ line at the end of the ‘loop()’ function, this gives the Ultrasonic Sensor time to work * Monitor cadets to make sure:   + They are on the correct site   + They are using the correct code   + They understand what the code is doing | | |
| **Conclusion:** | * Now we have motor control and sensor, we have all the tools to make an autonomous car. * Next, we will combine these two things to make our Autonomy Algorithm * Break for 15 Minutes | | |