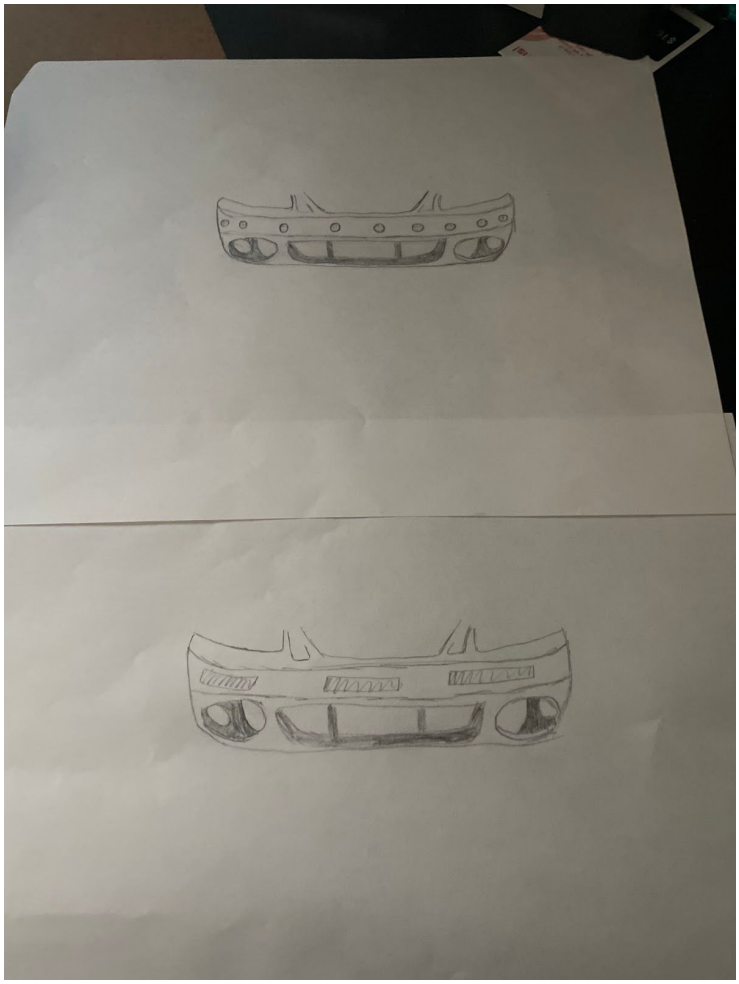
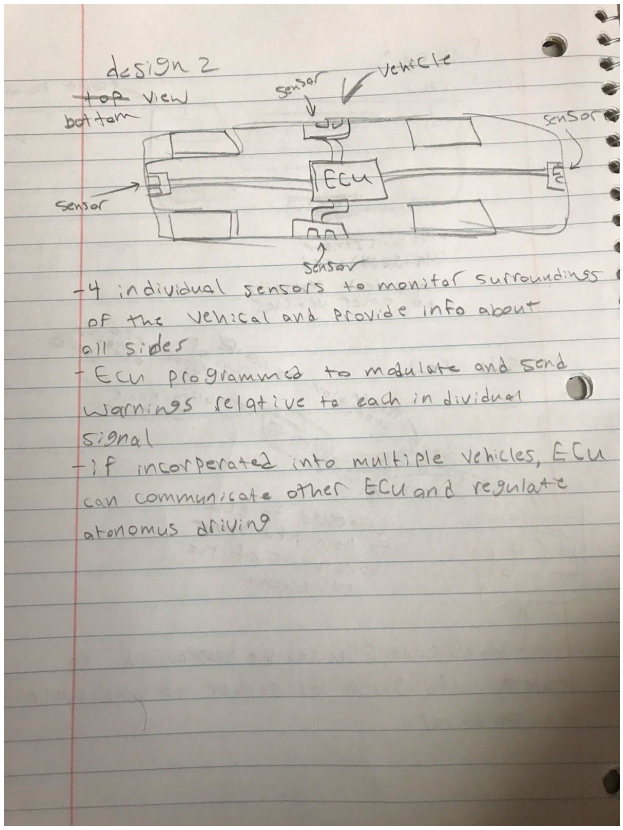
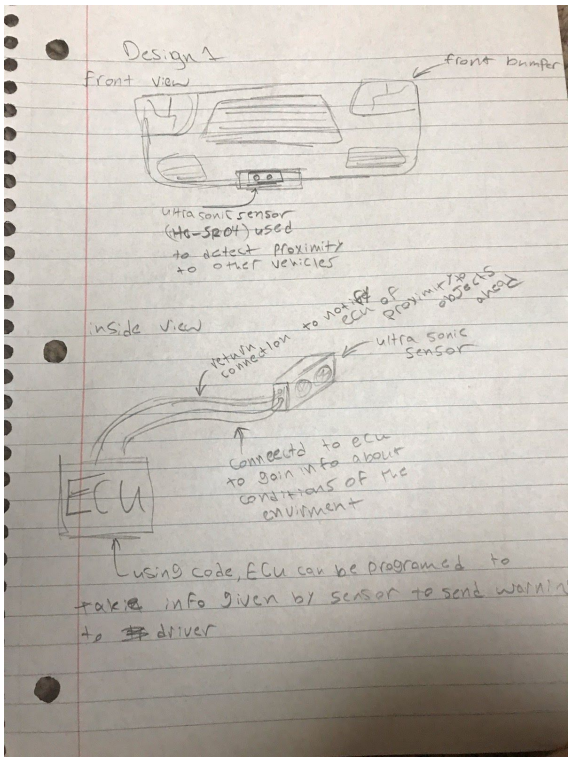
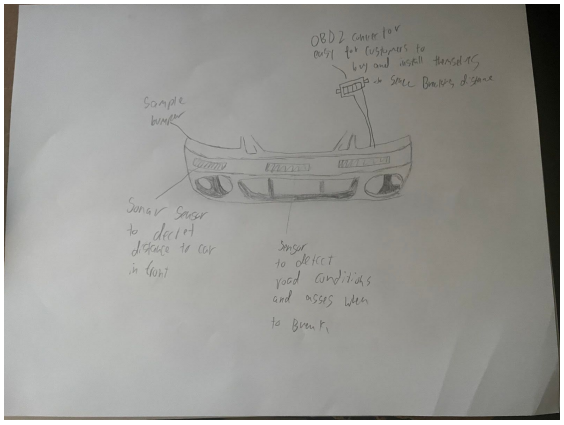
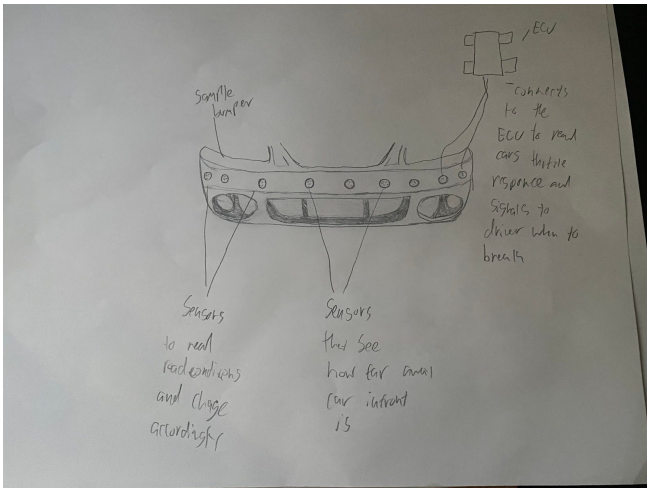
Product/Goal: our goal in this project is to create a safety system within automobiles that uses sensors to detect objects like other vehicles and pedestrians in front of the vehicle. The main goal of the system is to alert the driver of how close they are in relation to the object in front of the vehicle. The aim of the system is to warn the driver about whether they are too close to the vehicles in front of them (tailgating) by sending a warning message or light with a beep to the driver once the event occurs. The way we plan to institute this system is by enabling the sensor to constantly screen what is in front of it while the vehicle is moving. The sensor will be attached to the ECU or equivalent and take into account speed, tire traction, and the distance between it and the vehicle ahead to send warning signals regarding the proximity of the two vehicles accordingly.
https://docs.google.com/presentation/d/1jmLjvDZBEmzMmiXqto6j20ajSqjEf8j4-pMURgC1hQY/edit#slide=id.gbef3a3c00c_1_20











Research:

https://www.fierceelectronics.com/sensors/what-ultrasonic-sensor

- This source contains general information about ultrasonic sensors and their function.

https://www.amazon.com/ultrasonic-sensor/s?k=ultrasonic+sensor

- Here is a link to potential sensors and different sensor styles that we could use to incorporate into our design

https://www.youtube.com/watch?v=6F1B_N6LuKw

https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812926

https://www.cdc.gov/transportationsafety/distracted_driving/index.html

https://www.arduino.cc

https://en.wikipedia.org/wiki/Cruise_control

https://www.extremetech.com/extreme/165320-what-is-lane-departure-warning-and-how-does-it-work

https://www.trackdays.co.uk/news/anti-lock-braking-system-abs/

https://projects.raspberrypi.org/en

- This source goes into detail on HC-SR04 sensors and how they work, common applications, and how to could them

PLTW | Engineering

Decision Matrix

	Criteria					
Ideas	cost	complexity	integration into vehicle	effectiveness	ease of repair	**Totals**
Idea 1	2	4	9	10	5	30
Idea 2	8	7	8	9	7	39
Idea 3	7	8	10	8	4	37

Planning

Project Title/Topic	Safety sensor

Goal	
Goal: Formulate an inquiry question or statement that clearly shows your goal, based on your personal interests. Be concise but specific and clear.	Increase the safety of automotive vehicles
What is the purpose of the goal? What do you hope to achieve?	The purpose of this goal is to create or incorporate a sensor in a vehicle that delivers warnings and potential hazards to the driver about road conditions and other vehicles
What prior learning and subject specific knowledge is relevant to the project? How does the project relate to an academic class you are currently enrolled in or have taken?	The prior learning needed is how road conditions affect braking and sensor coding in order to warn drivers ahead of time

Global Impact	
Identify how this will impact the community/world:	It will make the world safer and reduce load collisions

Product/Outcome	
What product/outcome will you create in response to the goal, global context and criteria?	A sensor that provides warnings to the driver regarding their proximity to the driver in front of them
Form: Function: User/Audience: Costs:	A sensor in the vehicle To create a safer driving experience for all vehicles Anyone with a vehicle 50-200

Research	
What will be the focus of your research?	Sensor tech and vehicle traction control and breaking distance
Surveys: Would surveying your potential audience be useful?	Yes we could see the value and market potential of this product and be able to

	determine what type of user/audience would implement this
Interviews:What human resources can you tap into for your project?	Anyone that drivers and cares about their safety
Other sources for research?	Research on coding and functions of a sensor

Specifications

Prompts	Student-Designed Criteria	Test or method of evaluation
Form: What will your project look like? What materials will you use? What size will your project be? What tools will you use? How will you assemble your project?	It will look like a sensor on the front bumper that tells driver the safe distance to be away from the person in front We will use sensors We will attach them inside the bumper	See if the sensors are hidden underneath the bumper while still being effective and staying relatively small
Function: What is the purpose of your project?	To warn the driver about how close they are to the vehicle ahead	We will see if the sensor provides the warning at the right time to the driver and assess accordingly
User/Audience: Who is your project for? What needs do you expect your project to satisfy? Where/why will you project be used?	This is for most drivers to make sure they are at a safe distance This will be used to avoid collisions	Survey potential customer and see if they could use such a device
Costs: How much will your project cost to make? ***How much will you sell it for? ***How much profit could be made on your item/project?	$15-$25 $50-$200	We will add up the amount of money we spent the product and see how much people are willing to pay for it.

Decision Matrix

Ideas	Criteria: cost	complexity	integration into vehicle	effectiveness	ease of repair	Totals
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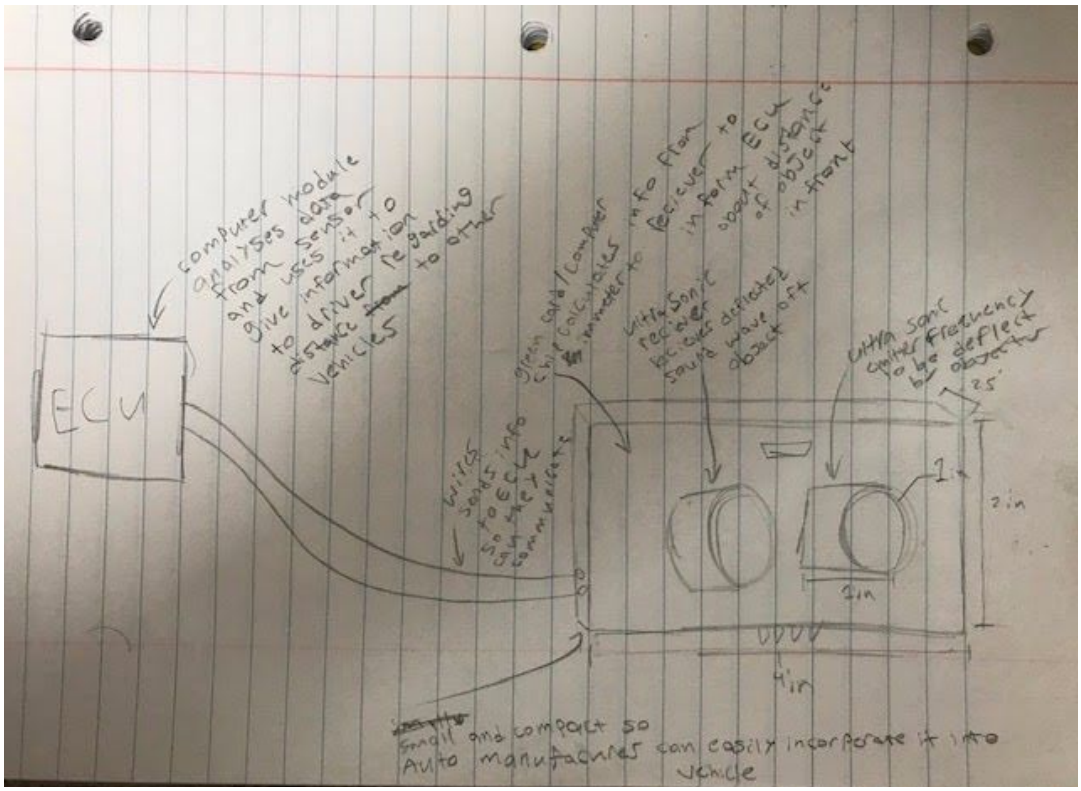
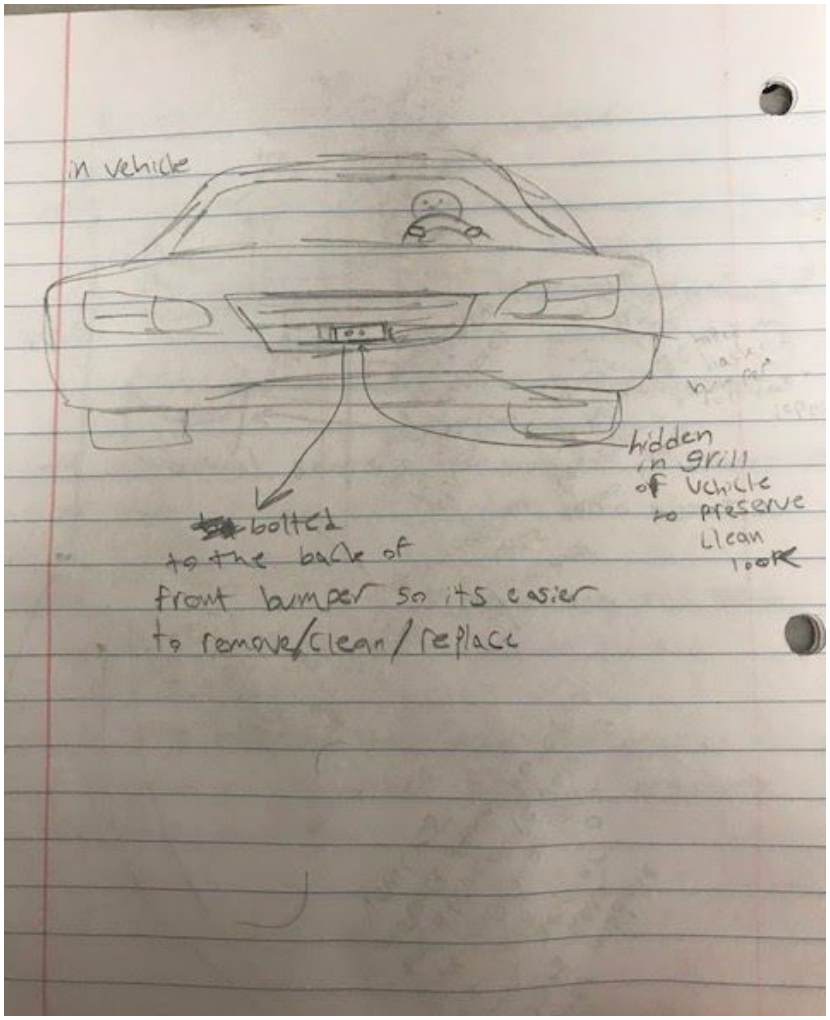
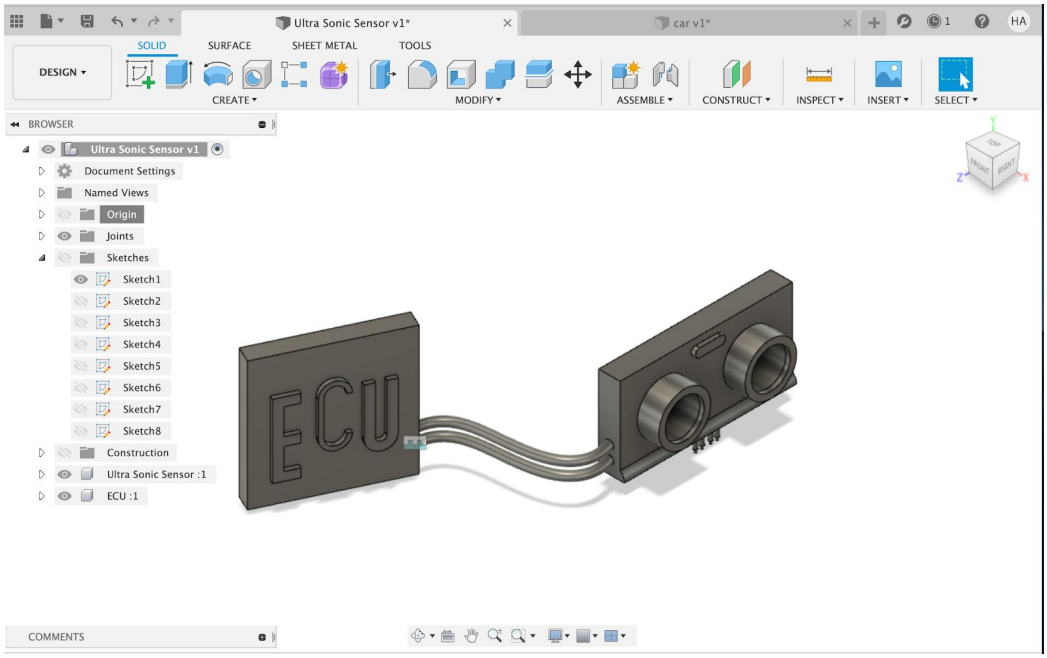
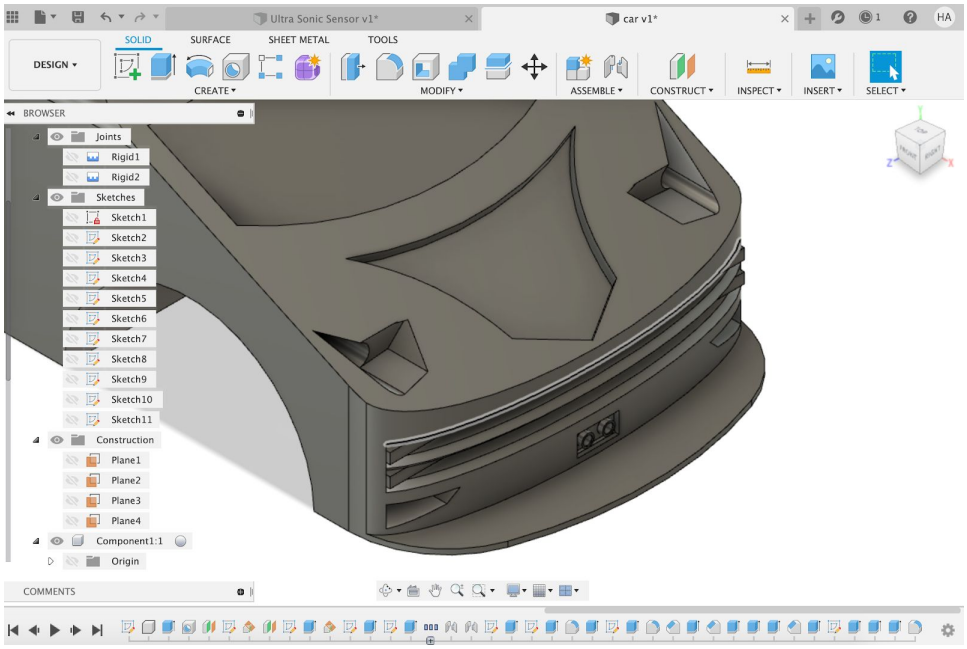



in vehicle
hidden in grill of vehicle to preserve clean look
bolted to the back of front bumper so its easier to remove/clean/replace


Ultra Sonic Sensor v1*
car v1*
DESIGN
SOLID
SURFACE
SHEET METAL
TOOLS
CREATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
SELECT
BROWSER
Ultra Sonic Sensor v1
Document Settings
Named Views
Origin
Joints
Sketches
Sketch1
Sketch2
Sketch3
Sketch4
Sketch5
Sketch6
Sketch7
Sketch8
Construction
Ultra Sonic Sensor :1
ECU :1
ECU
COMMENTS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Sketch4
Sketch5
Sketch6
Sketch7
Sketch8
Sketch9
Sketch10
Sketch11
Construction
Plane1
Plane2
Plane3
Plane4
Component1:1
Origin
COMMENTS