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# Bus Safety

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Mathew Sinadinos, Quinn Murphy, Nikhil Nambiar

“Approximately 25 million students ride school buses daily in the United States alone.”



“In 2017, more than 104,000 school bus drivers observed 77,972 vehicles illegally passing school buses in a single day. At that rate, more than 14 million violations would occur in a school year.”

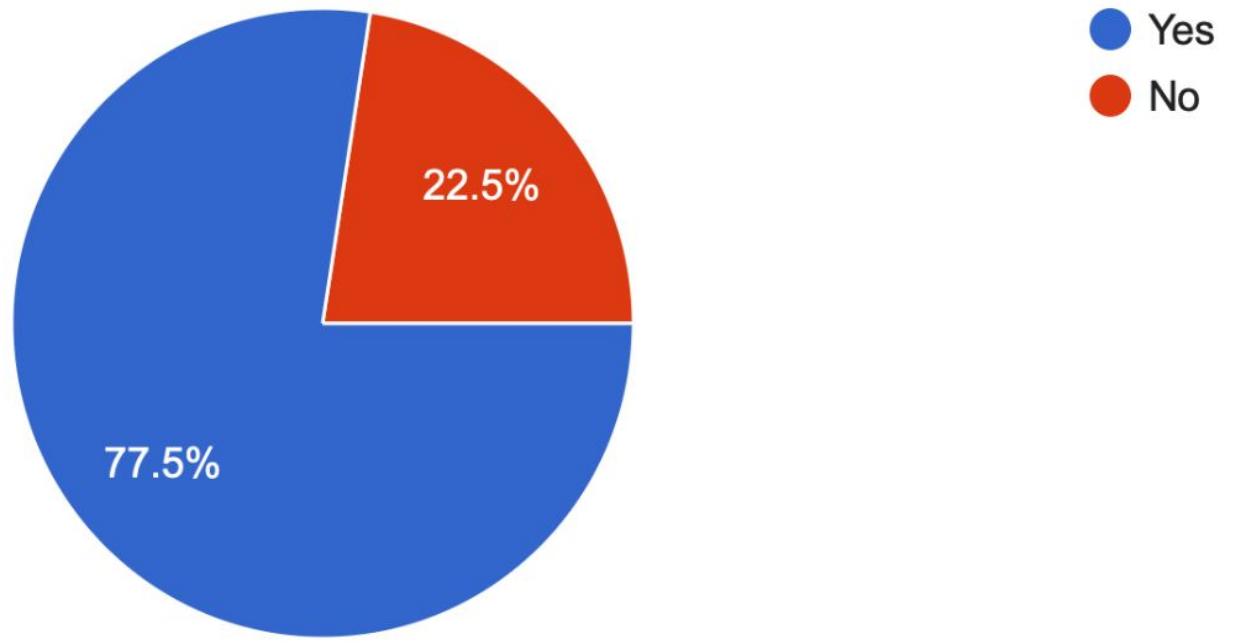
# Problem Statement

According to the State Directors of Pupil Transportation Services' 2019 Stop Arm survey, 72% of about 130,000 bus drivers reported that at least one vehicle illegally passed their bus on a single day. This widespread problem of illegal passing of school buses puts students at risk of being struck by a vehicle when they are crossing the street. This problem needs to be addressed in order to protect the safety of students and prevent tragedies from occurring.

# Student Surveys

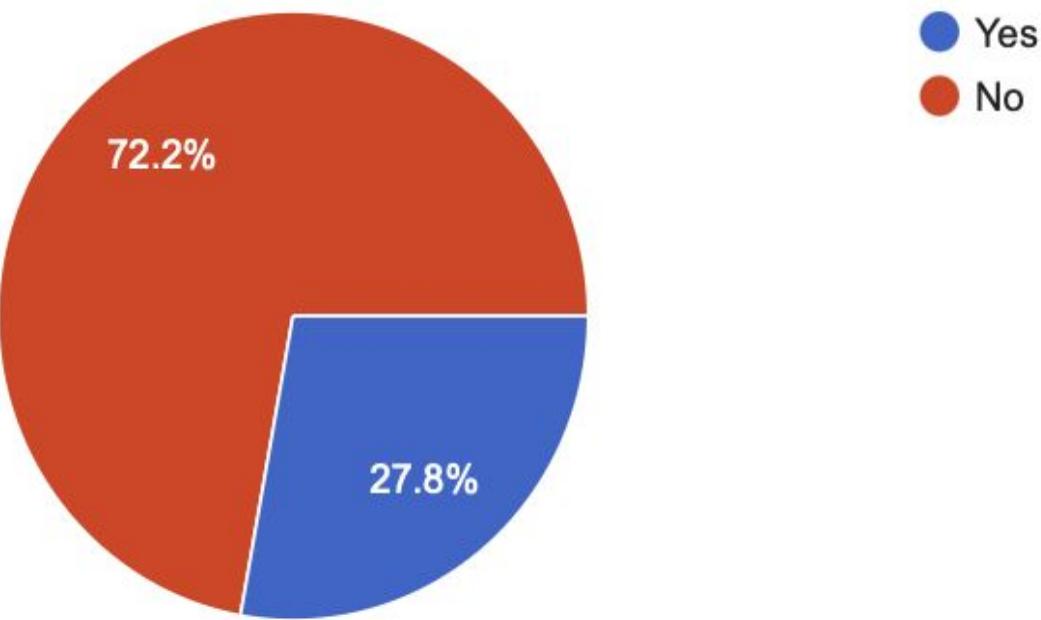
Have you ever taken a school bus to school?

102 responses



When getting on/off the bus, were you ever concerned for your safety due to oncoming traffic?

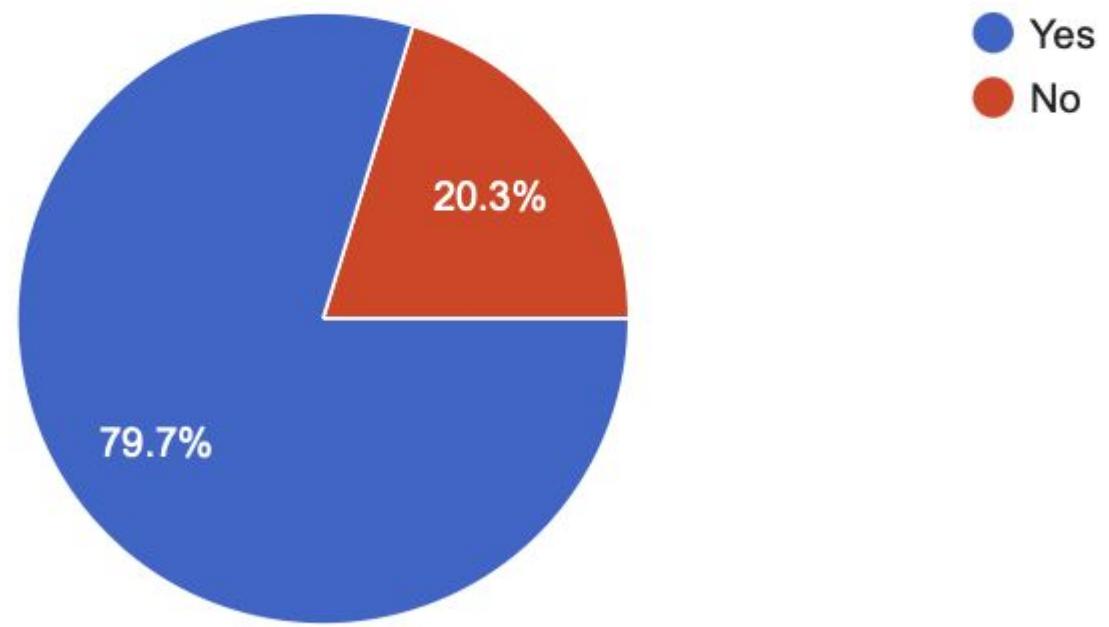
79 responses



# Student Surveys

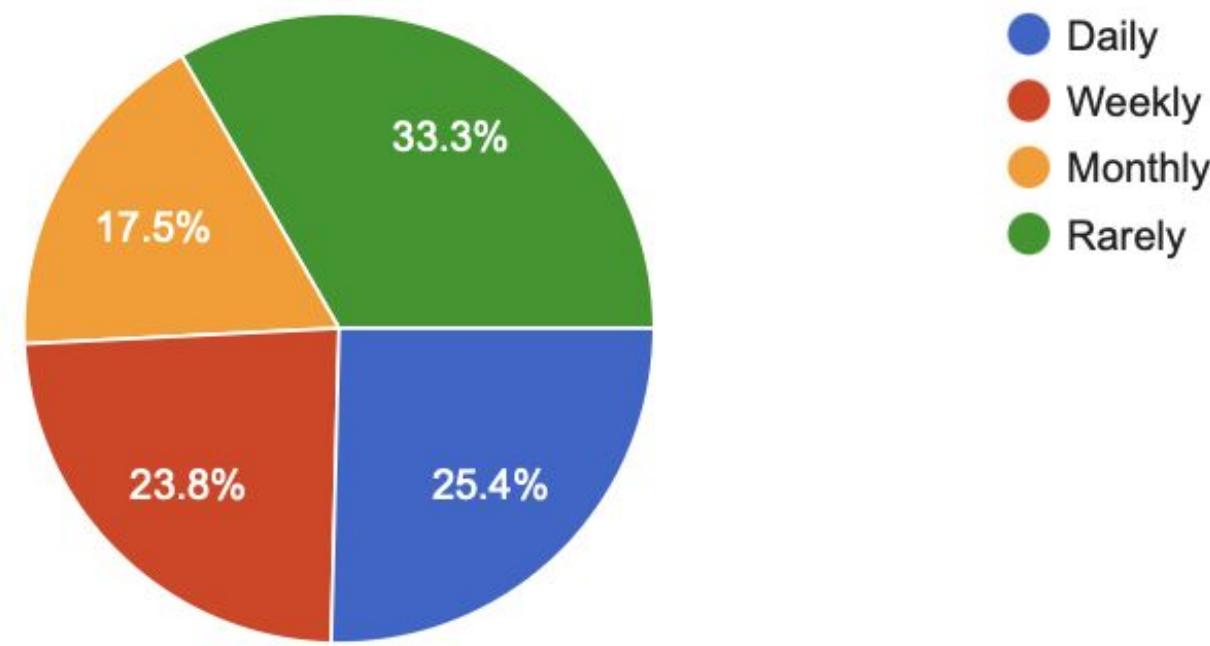
Have you ever seen a vehicle pass a stopped school bus with the stop arm deployed?

79 responses



While riding the bus, how often have you seen a vehicle pass a stopped school bus with the stop arm deployed?

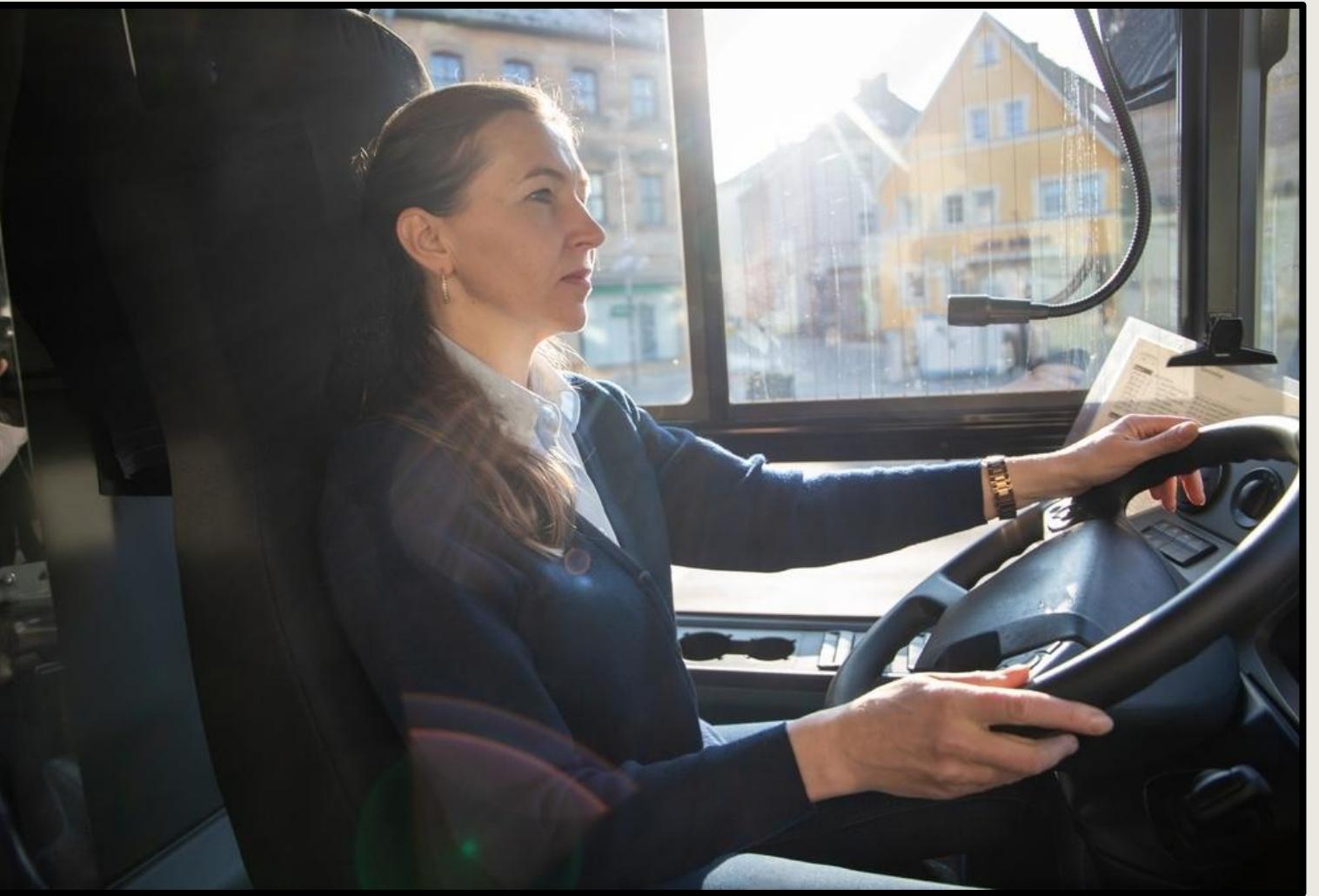
63 responses



# Expert Interviews

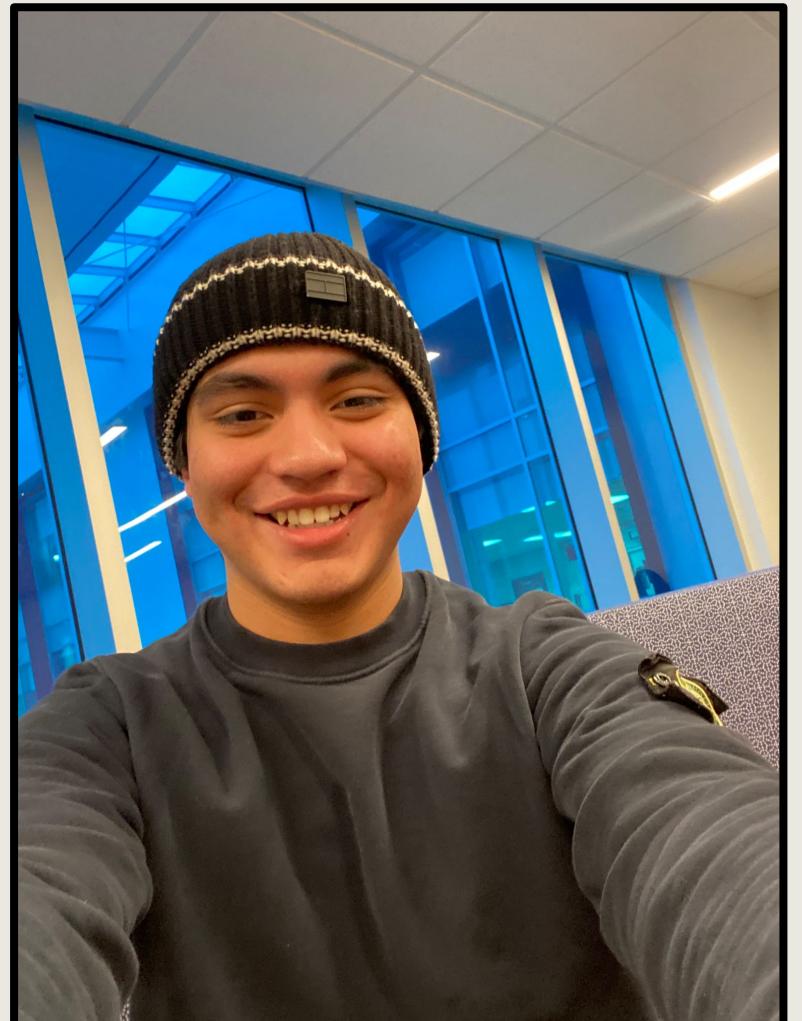
Beth (*Bus Driver at Downers Grove South*)

- Cars are not stopping for buses when they are stopped at bus stops.
- This behavior is dangerous and against the law.
- Drivers should pay attention and follow the rules of the road to ensure the safety of all road users, including bus drivers and passengers.

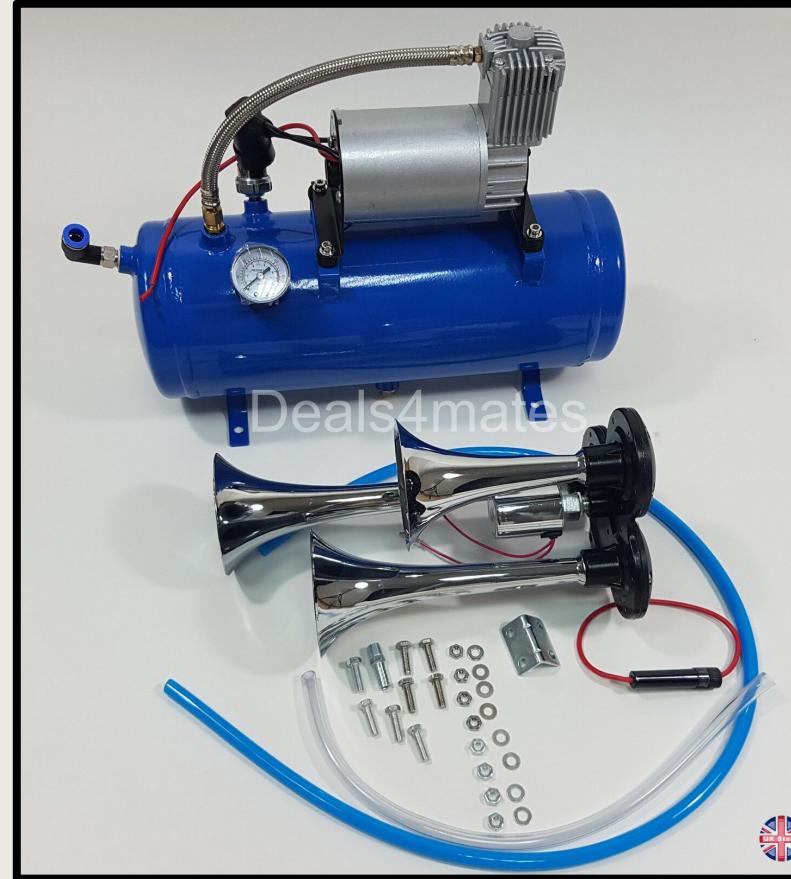


Leo (*Downers Grove South Student*)

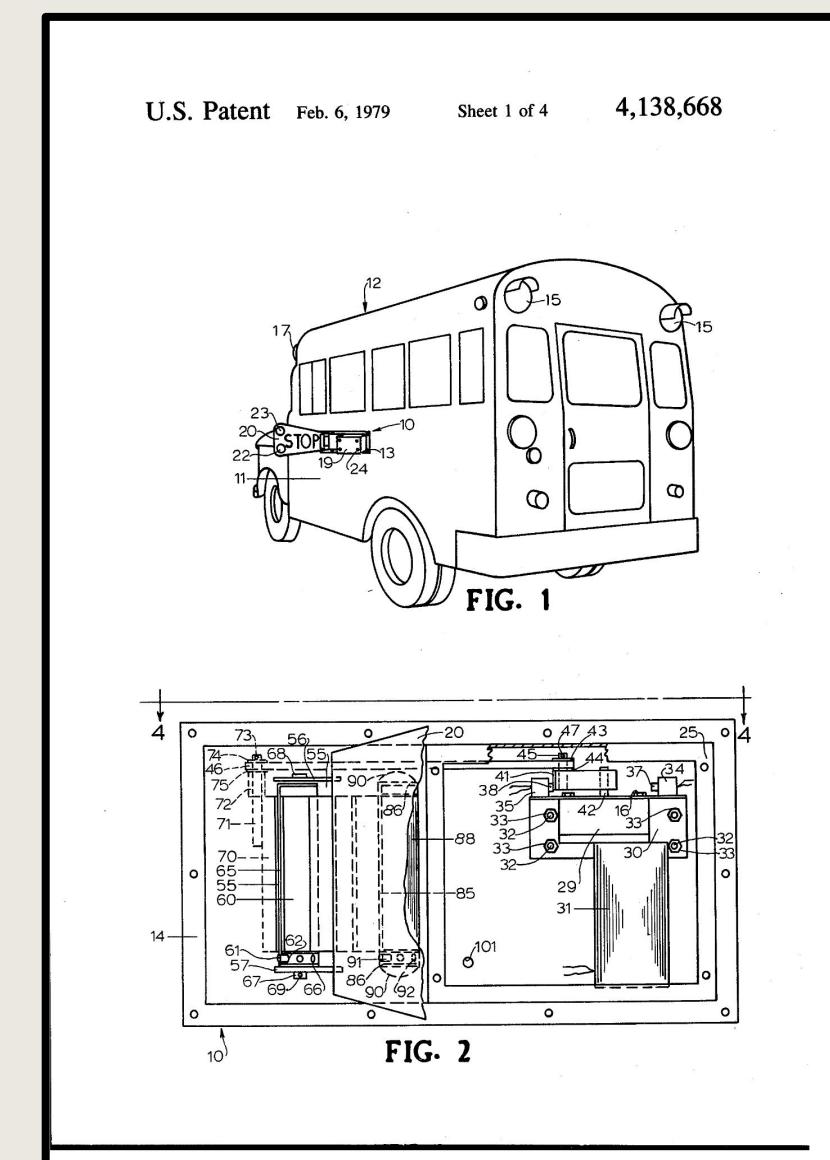
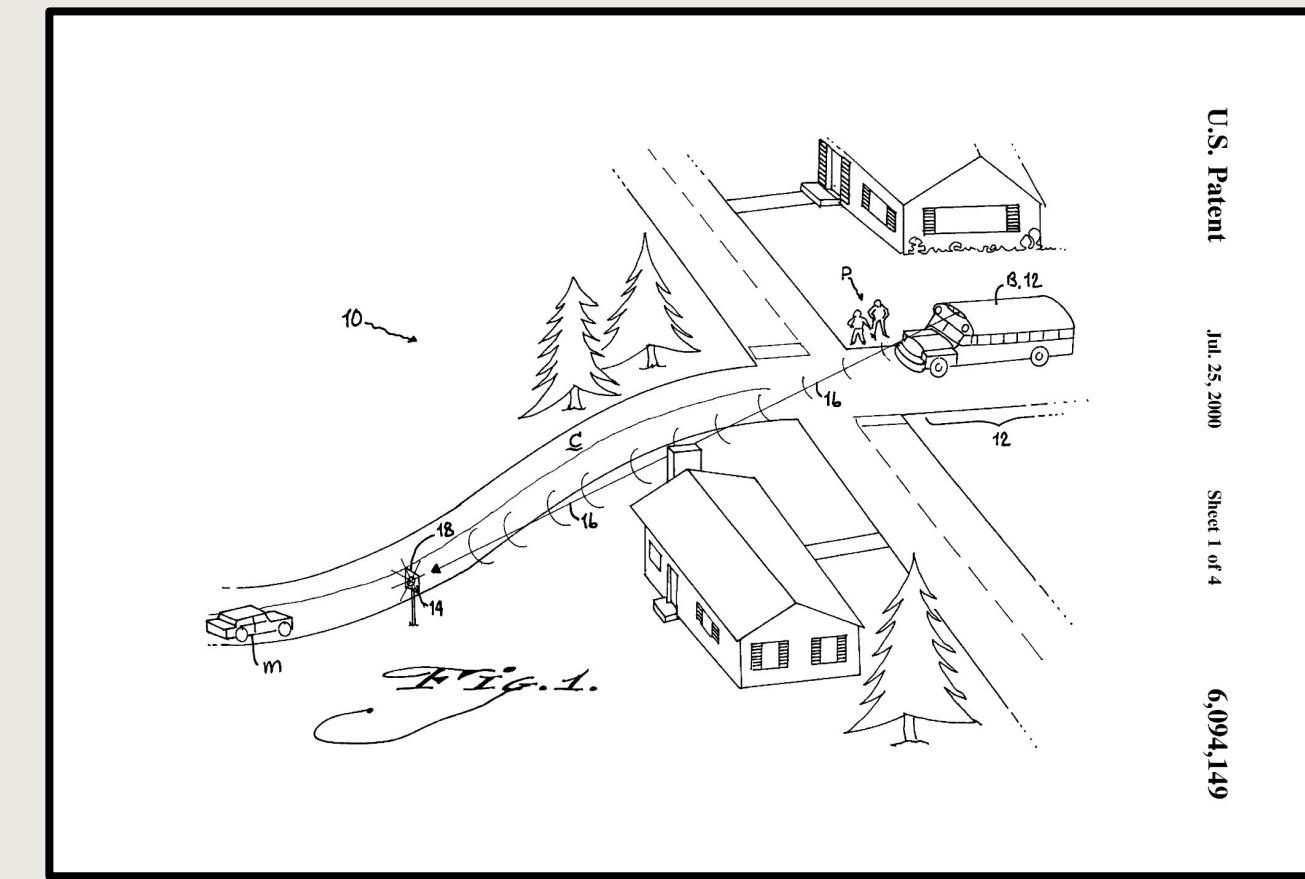
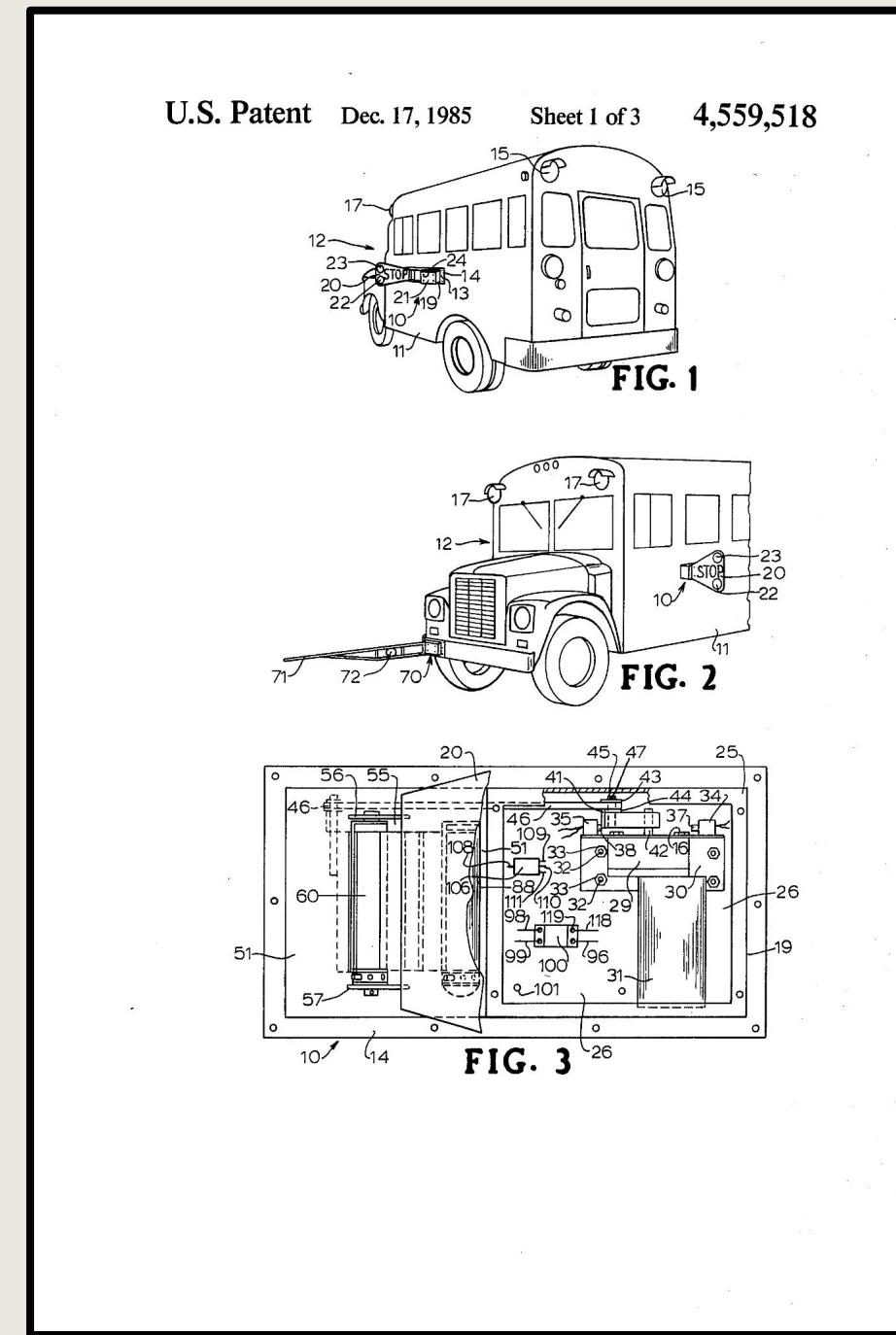
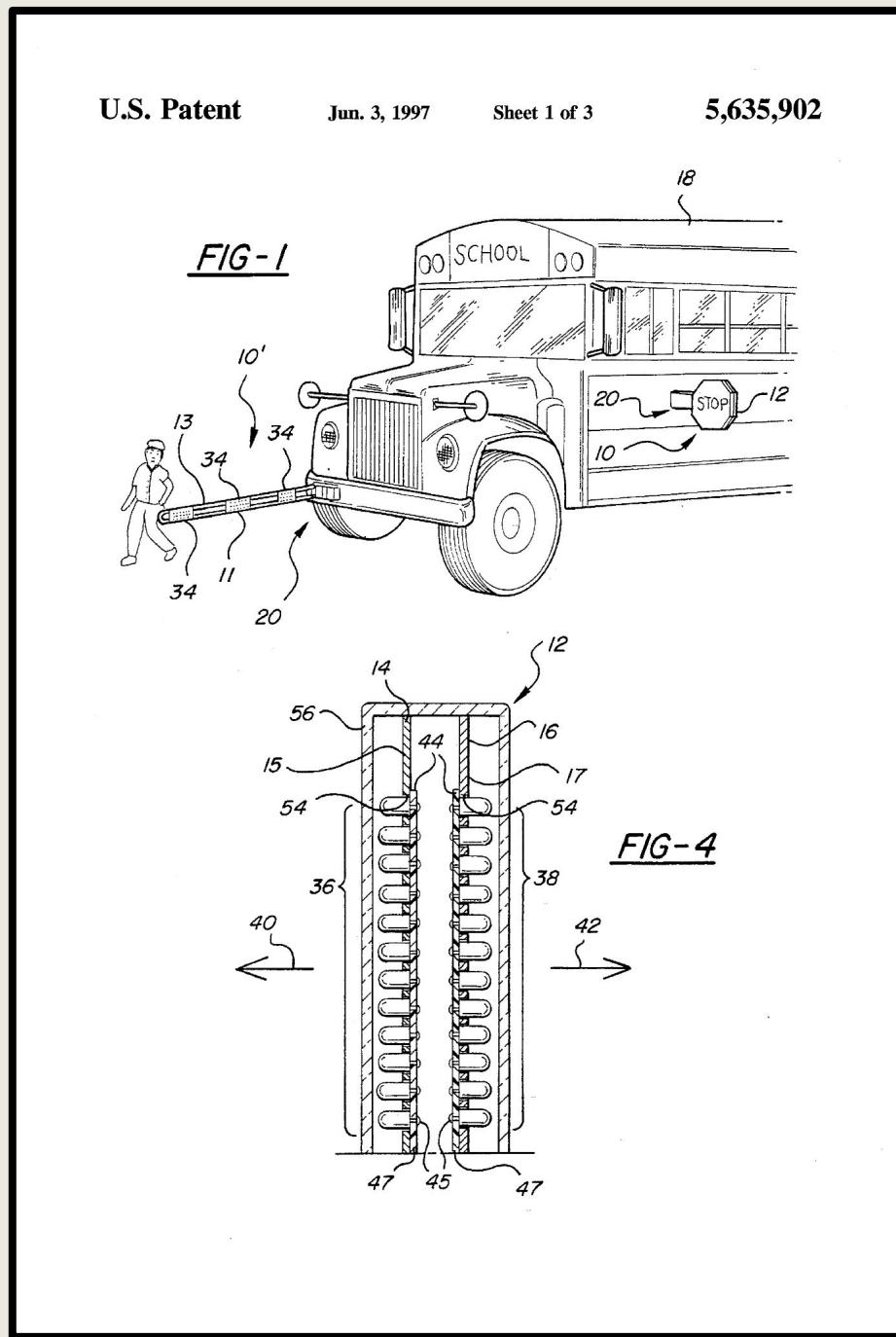
- The student witnessed cars passing the school bus when the stop arm was extended and the red lights were flashing.
- This poses a risk to students as they have to wait for cars to pass and there is a risk of cars not seeing them or stopping in time.
- The student highlights the importance of following the rules of the road to ensure the safety of students getting on and off the bus.



# Prior Solutions



# Patents



# Design Specifications

Solution should:

- not compromise bus driver safety
- be weather resistant
- provide reliable long-term effectiveness
- be user-friendly and affordable

# Brainstorming solutions



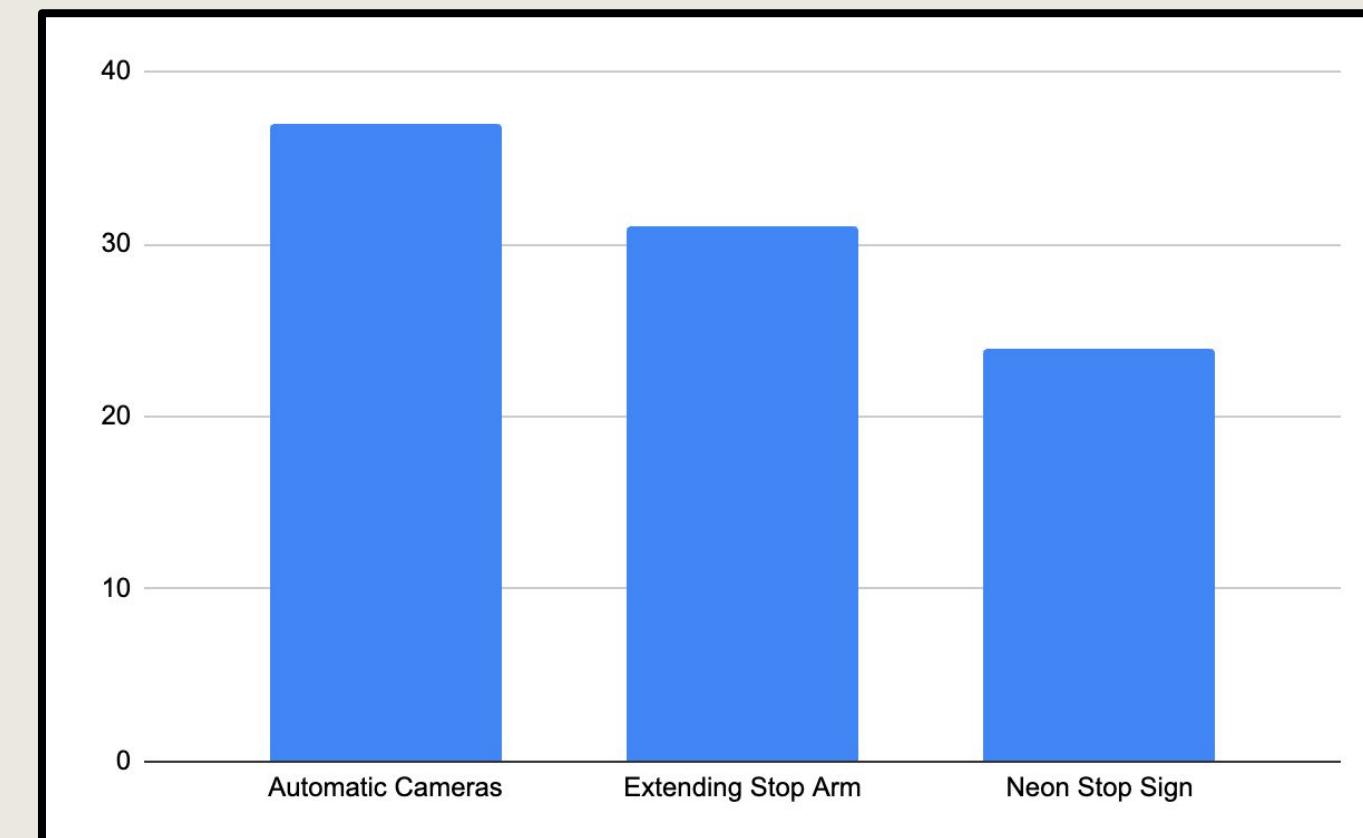
# Design Matrix

Names	Cost	Need/		Prototype		Uniqueness	Efficiency	Ease of use	Total points
		Simplicity	Time	Design	Approval				
Extendable Stop Arm	2	5	1	3	4	3	2	4	28
Neon Stop Sign	4	5	2	3	3	4	1	2	28
Automatic Cameras	3	1	3	5	4	3	4	4	32

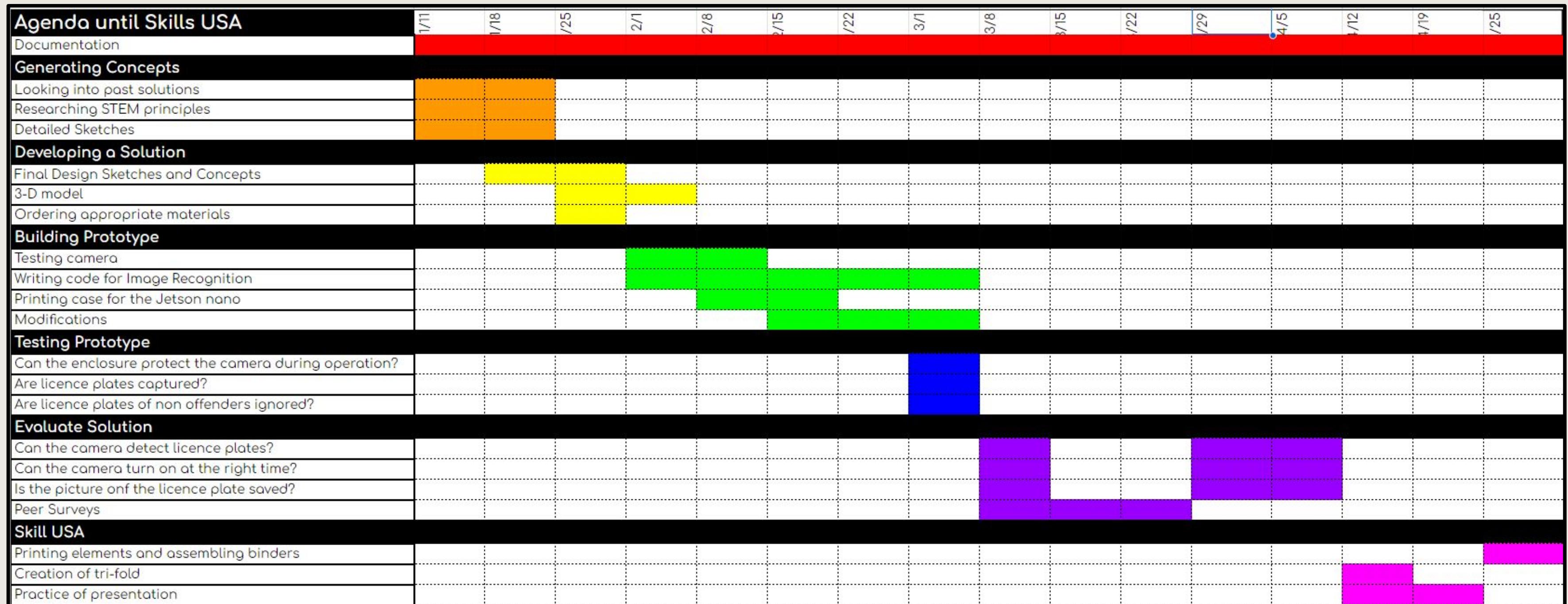
# Expert and Consumer Feedback

- Expert recommends using cameras on the bus for improving child safety.
- Automatic license plate recognition and traffic pattern monitoring make cameras the best option.
- Extended Stop Arm is not as reliable due to potential damage, vandalism, and driver negligence.
- Normal sign on the back of the bus is a good reminder, but not foolproof and lacks objective evidence of violations.

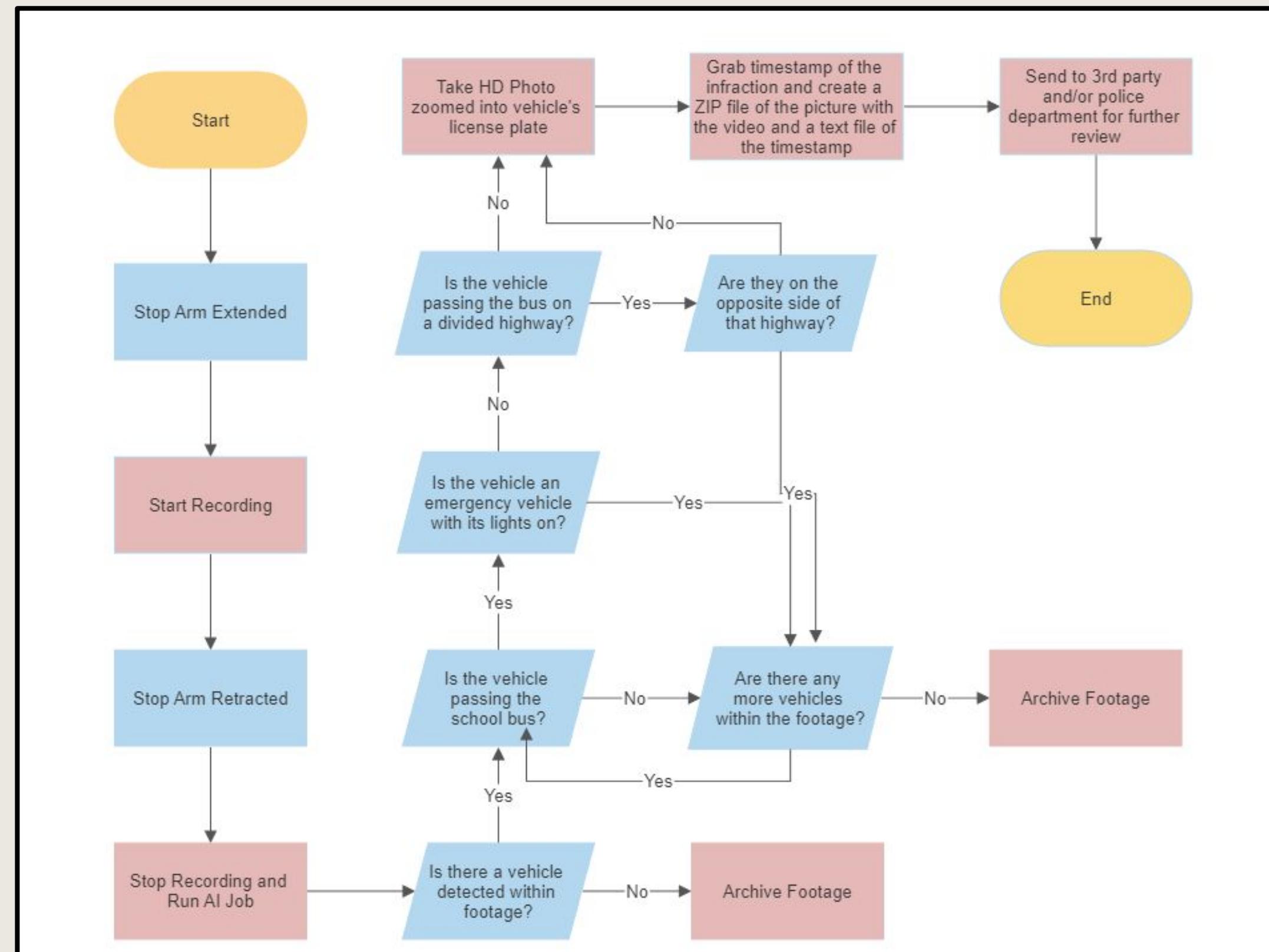
## Consumer Responses

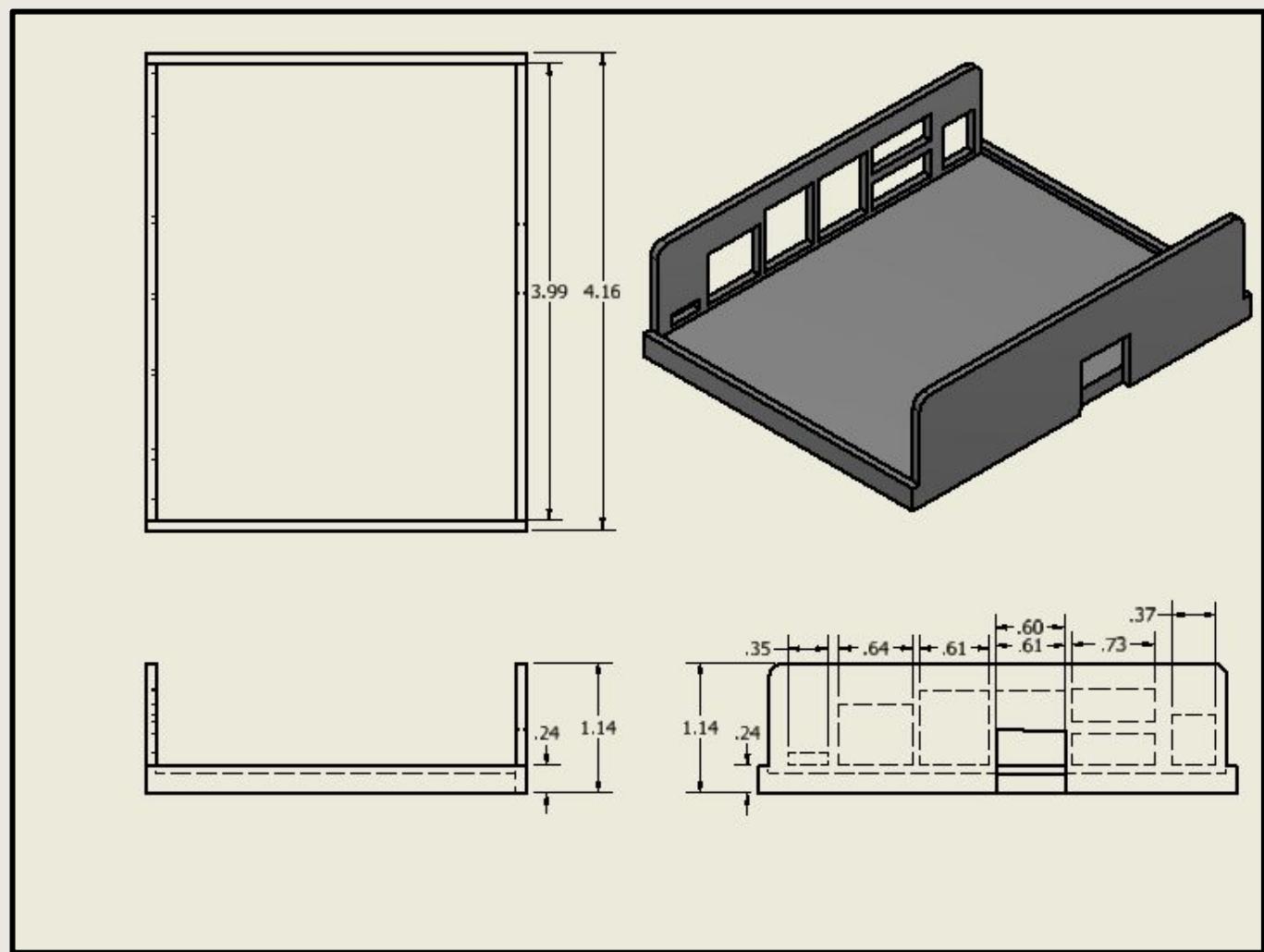


# Gantt Chart

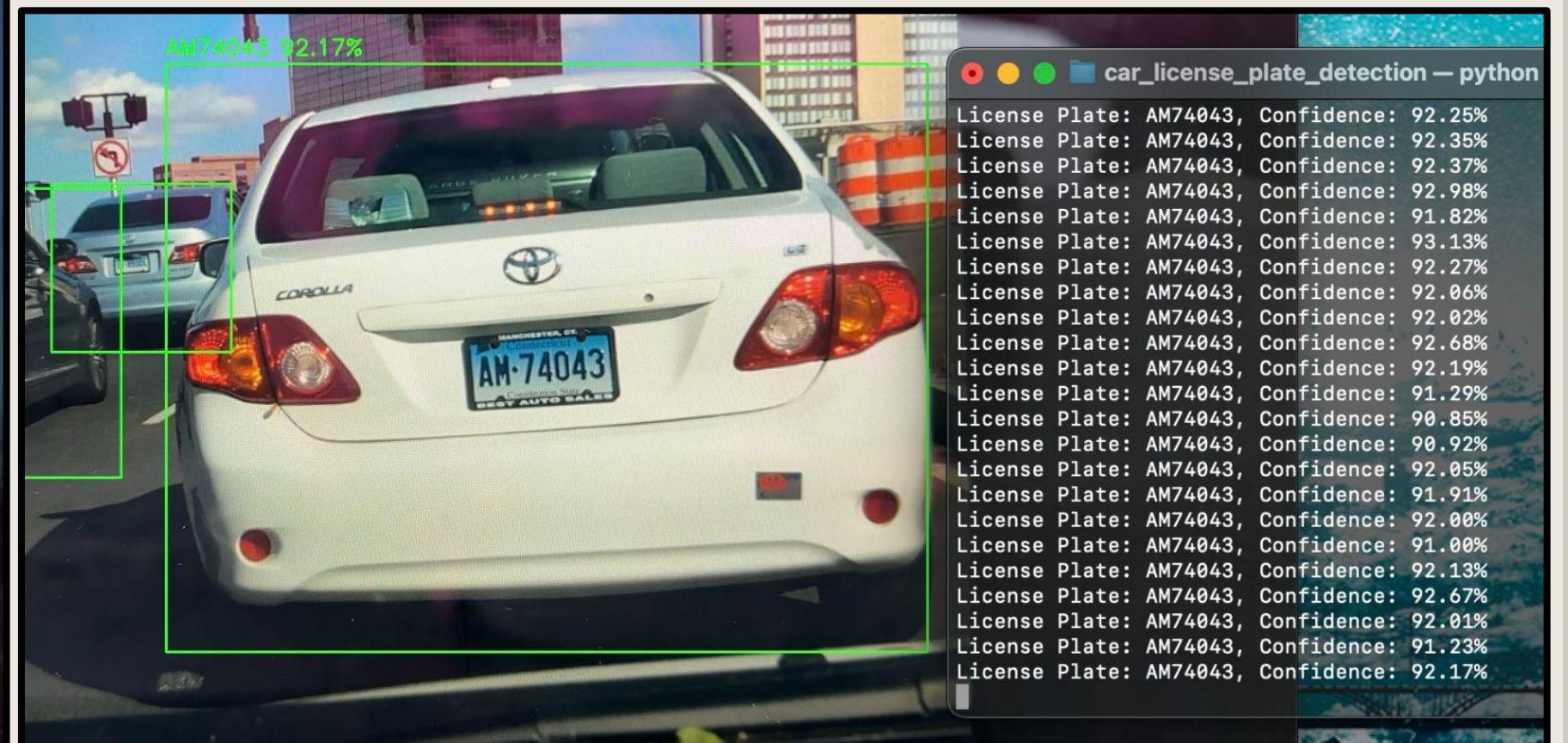


# Process Flow Chart





# Testing



# Thank you!

# Works Cited

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