Safety First

Chris Murphy
Dan Spillane
Cullen Young
Saf Faruk
Shifali Bose

Background

- Airbags are based around a simple concept. On frontal impacts on a vehicle, a deflated balloon is stored in the steering wheel and is rapidly inflated under high pressures to protect the driver.
- Airbag deployment takes only about 0.1 seconds.
- Even though automobiles have progressed to become a lot safer a study by the NASSCDS in 2011 found that 30% of belted drivers suffered spinal injuries from airbags.
- The speed of an airbag can lead to abrasions or burns and severe eye injuries as well.

Mission Statement

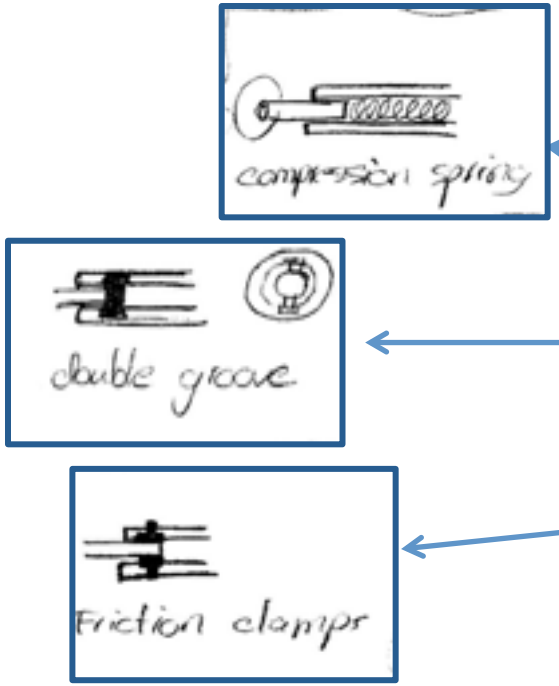
- Our goal is to design a new safety feature that will overall improve the safety of the driver in the case of an automobile accident or collision.

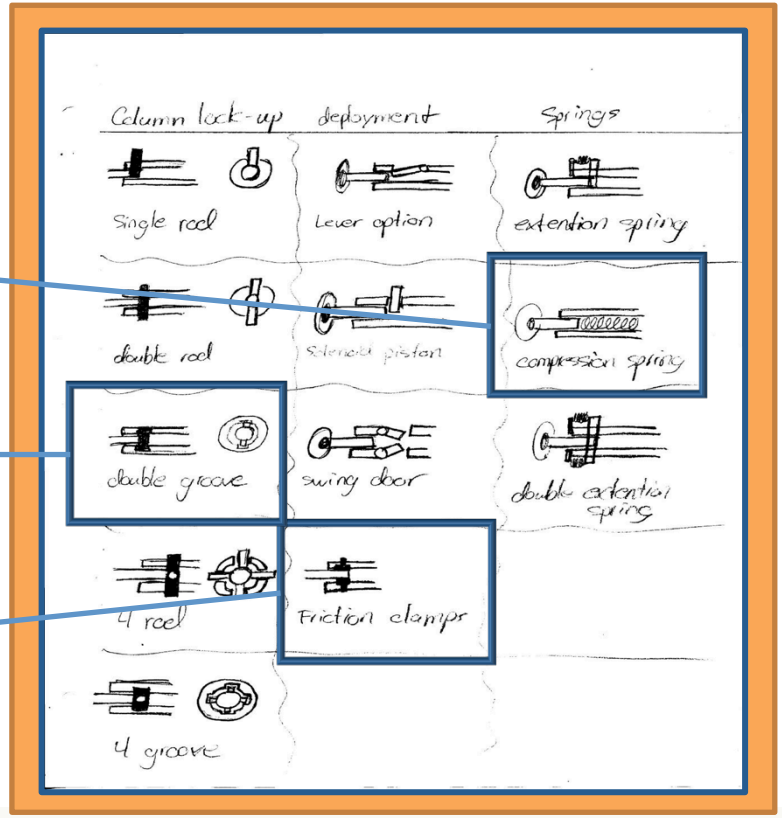
- We are to design a feature that will compliment the deployment of an airbag, causing less physical harm to the driver.

Customer Needs & Ranking

	Doesn't interfere w/ driving	Reduces injuries	Minimal deployment time	Luxuries intact	Doesn't increase price	Minimal impact with airbag	Reliable sensors	Reliable deployment	Top SRS rating	Doesn't interfere w/ other safety features	Total	Weight
Doesn't interfere w/ driving	1	0.2	0.2	3	5	0.2	0.33	0.14	1	3	14.07	0.0607
Reduces injuries	5	1	1	9	9	3	1	1	3	0.33	33.33	.1437
Minimal deployment time	5	1	1	7	7	1	0.33	0.33	1	7	30.66	.1322
Luxuries in tact	0.33	0.11	0.14	1	0.33	0.2	0.11	0.11	0.2	0.11	2.64	.01138
Doesn't increase price	0.2	0.11	0.14	3	1	0.2	0.11	0.11	0.14	0.11	5.12	.0221
Minimal impact with airbag	5	0.33	1	5	5	1	0.33	0.2	1	0.33	19.19	0.0828
Reliable sensors	3	1	3	9	9	3	1	1	3	1	34	0.1466
Reliable deployment	7	1	3	9	9	5	1	1	5	0.33	41.33	0.1782
Top SRS rating	1	0.33	1	5	7	1	0.33	0.2	1	0.2	17.06	0.0736
Doesn't interfere with other safety features	0.33	3	0.14	9	9	3	1	3	5	1	34.47	0.1487
										Totals	231.87	1.00

Generation of Concepts

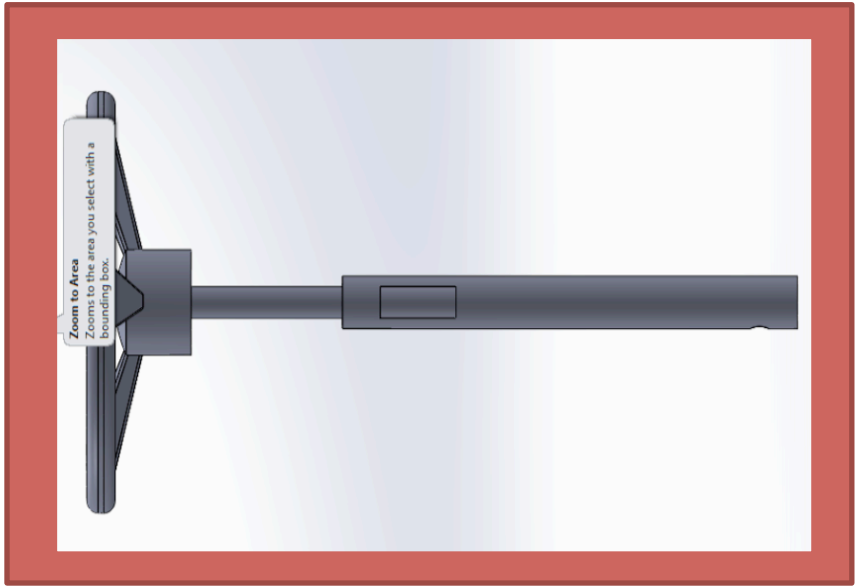


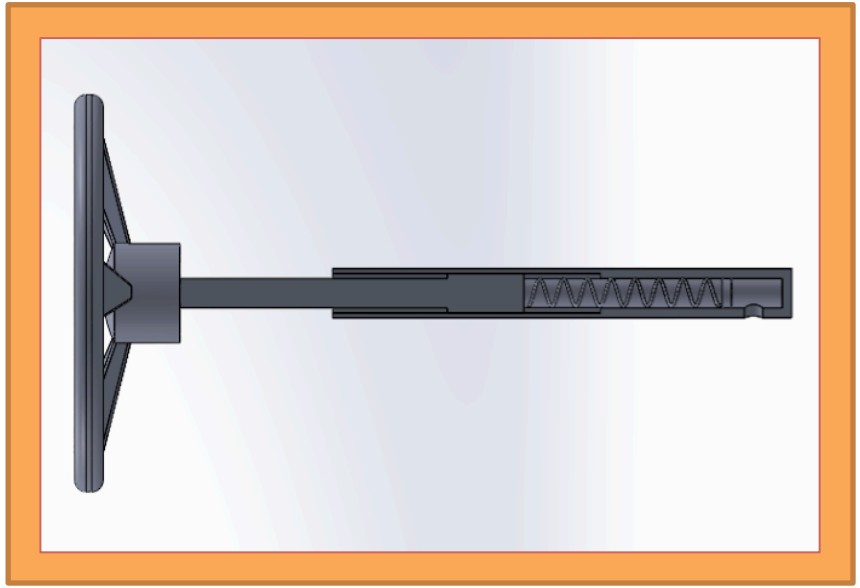


Concept Selection

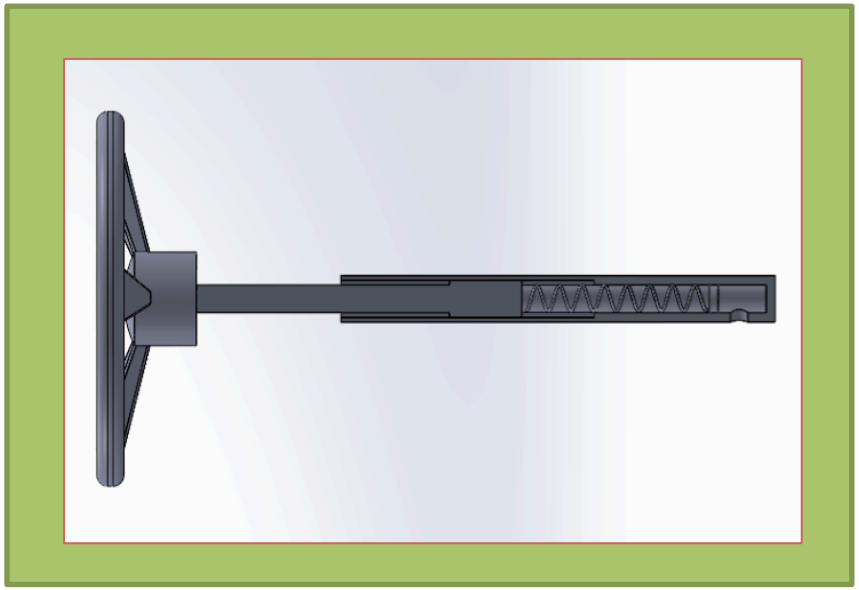
	4 groove, lever option, compression spring	4 rod, lever option, compression spring	Double groove, lever option, compression spring	4 groove, solenoid piston, compression spring	4 rod, solenoid piston, compression spring	Double groove, solenoid piston, compression spring	Double groove, friction clamp, compression spring
Reliable deployment	+	-	+	+	-	+	+
Reliable sensors	0	0	0	0	0	0	0
Reduces injuries	+	+	+	+	+	+	+
Doesn't interfere with safety features	+	-	+	+	-	+	+
Minimal deployment time	0	0	0	-	-	-	+
Minimal impact with airbag	0	0	0	0	0	0	0
Doesn't interfere with driving	+	+	0	+	+	0	+
Sum +'s	4	1	3	4	2	3	5
Sum 0's	3	3	4	1	2	3	2
Sum -'s	0	2	0	2	3	1	0
Net Score	4	-1	3	2	-1	2	5
Rank	2	5	3	4	5	4	1

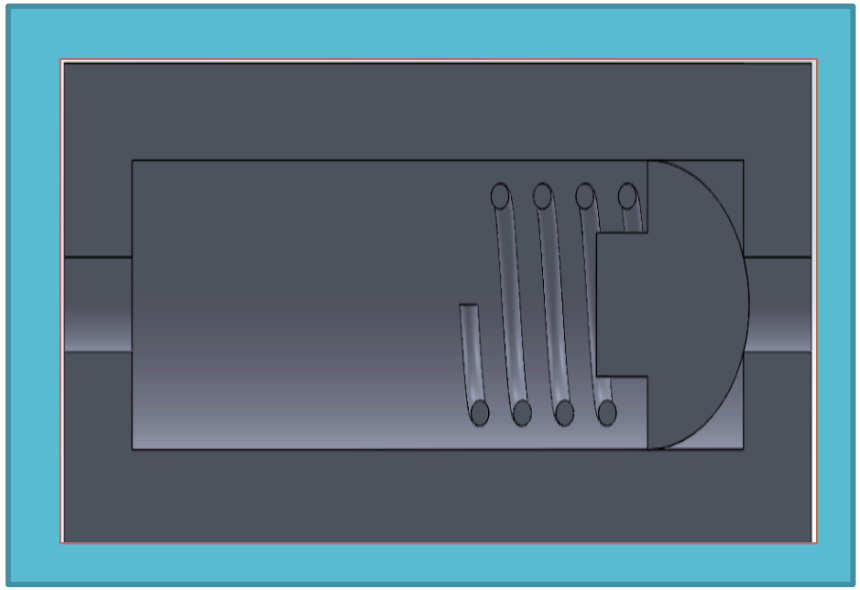
Prototype & Testing





Prototype & Testing





Difficulties & Project Reflections

- We had trouble finding a plausible way as to how the locking release would be hooked up to a sensor and how early the locking system should be released after the point of impact.
- There were many variables to take into account such as, where in the car should this new system be fitted, making sure it didn't interfere with other features of the car, and assuring that a false deployment would not occur.
- We found it is important that safety features that have been previously applied should not be interfered with because it could cause too many variables to account for and leave more room for error.
- We also concluded that if necessary, limiting luxury features in order to add this new safety feature would be acceptable because it would be serving more customer needs.

Patent Search

- Stadler, Michael, and Ingo Schütz. Motor Vehicle with Retractable Steering Wheel. Audi Ag, assignee. Patent US20140028008 A1. 30 Jan. 2014. Print.
- Roycroft, Terence J., and Marie A. Roycroft. Wheel-retraction Apparatus and Method for Amphibious Vehicle. Roycroft; Terence J., Roycroft; Marie A., assignee. Patent US5531179 A. 2 July 1996. Print.z
- Jianjhong, Fong. A Retraction Device for Steering Wheel of Vehicle. Patent WO2007118410 A1. 25 Oct. 2007. Print.
- Takeomi, Miyoshi. Apparatus for the Retraction of a Steering Wheel of a Vehicle in the Event of a Front End Collision Thereof. Honda Motor Co Ltd, assignee. Patent US3578782 A. 18 May 1971. Print.
- Duval, Benoit, Frederic Gentent, and Pascal Millet. Device for Active Retraction, in the Event of Impact, of an Automobile Vehicle Steering Column. Lemforder Nacam Sa, assignee. Patent US5769455 A. 23 June 1998. Print.

Thanks & Questions