

Team #	P19231	Team Name:	O-SHIFT
Revision Date:	9/3/19	Revision #	4

ID	Category	Risk Item	Effect	Cause	Likelihood	Severity	Importance	Action to minimize risk	Owner	Notes
1	Technical	Clutch pedal feel is inaccurate	Lack of feeling for proper learning	Fail to replicate the pedal feel	9	1	9	Perform extensive study into mechanical makeup of a real clutch pedal	Tyler	This likelihood remains at 9, because clutch was moved to dead pedal zone and stroke length was shortened.
2	Technical	Communication between the components is not accurate or fast enough	Lack of feeling for proper learning	Not proper installation / signal interference	0	3	0	Make inter-device communications as simple as possible, wired backup if necessary	Kevin	By design, it has been decided to go full wired communication through CAN. This likelihood of the risk has been demoted to zero.
3	Technical	OBD-II port cannot send all of the data we need	Not been able to consolidate the data need to replicate the shifter components	Wrong reader/ data is simply not monitored by car	1	3	3	Research to ensure the device can extract the needed info	Jenco	
4	Technical	Clutch pedal gets jammed	System becomes obsolete	Not properly manufactured / not strong enough	3	9	27	Create simple design for clutch pedal to mitigate failures and decrease likelihood of obstruction	Steven	
5	Technical	Timing inaccuracy between actual shift and O-Shift	Lack of proper learning	Not proper installation / signal interference	3	3	9	Research shift data of the "test car" for initial prototype, expand research to more cars later	Matt	
6	Technical	Device might not fit in multiple vehicles	Limited amount of people that will be able to use device	Not making the device modular	9	1	9	Create general mounting structures that could be customized to fit multiple models	Kevin	
7	Technical	Strength of components might cause failure being stepped on	Components break	Poor design such that mechanical components struggle with stress	9	3	27	Perform a material strength analysis on the mechanical components to decrease the possibility of a break or permanent deformation; could	Steven	Likelihood increased to 9 due to the change of design needed to be done. This new design compromises the integrity of the clutch.
8	Technical	Point of contact between car and device could damage car	Mounting system scratches or otherwise harms car	Design includes permanent adhesive or sharp components	1	3	3	Design system to prevent any permanent damage to the car in which device is installed	Tyler	likelihood reduced to 1. Shifter drops nicely into cupholder, clutch will be attached to a floormat.
9	Technical	Control/display unit loses communication with clutch and shifter	Display unit is unable to provide feedback	Faulty wireless connection	0	3	0	Incorporate capability for wired backup connection	John	By design, it has been decided to go full wired communication through CAN. This likelihood of the risk has been demoted to zero.
10	Technical	Shifter and clutch may be difficult to manufacture	Increased cost and time to build prototype	Complex mechanics	3	3	9	Conduct extensive study in the mechanical makeup of a real clutch and shifter	Tyler	Designs seem reasonable. likelihood remains at 3, as issues may still arise if design needs to be modified.
11	Technical	Difficulty in synchronizing device shift timing with car shift timing	Decreased realism in device use	Automatic shifts may not align at all with standard ones	9	3	27	Conduct heavy data analysis to determine when the car will shift under specific conditions	Matt	
12	Technical	Shifter to clutch interaction may not be accurate	Shifter could be moved regardless of clutch position, decreasing realism	Difficulty designing extra stops and internal components in shifter	1	3	3	Collect data on shifter-clutch timing and interaction	Tyler	Likelihood of risk has been reduced to 1 due to device going full wired communication through CAN. Likelihood of failure still possible if lock-out design is not done correctly.
13	Technical	Shifter could get stuck or jammed	Shifter doesn't move	Internal part failure	1	9	9	Create simple shifter design that is unlikely to malfunction and easy enough to unjam	Steven	Design unlikely to jam, likelihood reduced to 1
14	Technical	Device could interfere with engine computer	Car performance is changed by device	Data is sent into the car computer from the OBD-II device	1	9	9	Ensure OBD-II device is only reading data, not inputting it to engine	Kevin	
15	Resource	Shipped parts might not arrive on time	Could critically set back the design of all components and product as a whole	Negligence on ordering parts on time	1	3	3	Order parts early and proactively	Kevin	Parts are being ordered and estimated to arrive before production & building starts. Likelihood will remain 1.
16	Resource	May require ample time to collect car performance and driving data	Could critically set back the design of the feedback system. Feedback system could also be inaccurate	Not enough people devoted to task, not enough physical devices available to log data	3	9	27	Collect as much data as soon as possible	Matt	

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17	Resource	Do not have OBD-II logging ability for research by needed date	Set back on the design due to lack of data	Not making a decision on whether to buy or build OBD-II Logging device	1	9	9	Buy or build device before data collection phase begins	John	Likelihood reduced to 1 as a proof of concept design has been tested and data has been started to be collected. Likelihood will not be reduced to zero as it is still a proof of concept
18	Resource	Unable to find/collect enough manual car data	Limit the amount of data of manual cars to reproduce on device	Lack of test vehicles	9	1	9	Understand what data is not easily available and consider means to collecting it	Kevin	
19	Resource	Time needed to test system could run considerably longer - need access to someone's car	Delay in final analysis of prototype	Inadequate planning and scheduling	3	9	27	Start the data collecting phase as soon as possible and be proactive on the data collection	Steven	
20	Resource	Lack of budget	Not been able to continue with project and possibly have a set back	Poor budgeting scheme / Resources outscale the initial budget	0	9	0	Potentially reach out to sponsors for more support; take time to plan budget	Kevin	Likelihood has been set to zero due to the budget being increased.
21	Resource	Unable to find vast locations for proper testing	Not having the device properly tested before release	Not possible to use device outside of limited areas	9	3	27	Test device on as many possible locations and repeating same use scenario to verify product	Kevin	
22	Resource	Unable to find enough/varied cars to use device in	Reduce the modulation of device to use in different vehicles	Lack of test vehicles	9	1	9	Ask all of our moms to borrow their cars	Tyler	Device was designed very specifically to the 2010 fusion. We are accepting this "risk" as one that is happening.
23	Safety	Device is a distraction while driving	Possible incident on user	User not properly handling the device / not following disclaimers / device too large on manufacturing	3	9	27	Design device to be as small and unobtrusive as possible; make the least flashy as possible; make not too loud	Steven	
24	Safety	Device obscures driver view	Possible incident on user	Device too large	1	3	3	Design device to be as small and unobtrusive as possible	Kevin	Likelihood reduced to 1 due to having a pretty robust idea on our display subsystem that by its dimensions it will not obscure drivers view.
25	Safety	Device too close to car pedals	Possible incident on user	Improper Manufacturing	1	3	3	Measure dimensions of space available on car floor and design accordingly	Tyler	likelihood reduced to 1 when clutch component was moved to dead pedal region
26	Safety	Device too close to emergency brake	Possible incident on user	Improper Manufacturing	3	3	9	Determine range of motion of emergency brake and design device accordingly	Tyler	Device does not impede movement of the handbrake, although it is uncomfortable to pull. Likelihood will be remained at 3 and severity will go up to 3 until device is tested on vehicle
27	Safety	Device components are not secure and interfere with driver	Driver has reduced ability to control the car	Insufficient pedal mounting structure	3	9	27	Implement redundant mounting systems to hold components in place, particularly with the clutch, because it is in danger of interfering with other pedals	Steven	Likelihood increased to 3 due to a new clutch design potentially not being stable when being pressed.
28	Safety	Device is electronic and could overheat	Lose data/create hazard on the driver	Many components	1	3	3	Create device to be low-power; add a heatsink	Matt	
29	Safety	Device communication method can be a hazard to user	Create hazard on the driver	Improper wiring management	3	9	27	Proper wire management when installing the device	Kevin	New risk item added to the list due to the communications done by cables; which adds a new layer of safety to be regarded.
30	Social	Other drivers could potentially be hit by driver using O-Shift	Reduce the likeability from new user to get device	User not properly handling the device / following disclaimers	1	9	9	Put disclaimers on product to minimize our liability, could add disclaimers about use on public roads	John	
31	Social	People might not be keen on modifying their car	Lack of interest from many users	Personal interest	1	1	1	Make the device the least intrusive as possible for proper usage while being safe and secure	Kevin	

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32	Social	Legality may be questionable in some states	Lack of interest from many users	States have different laws	9	3	27	Put disclaimers on product to minimize our liability; could add disclaimers about use on public roads	Matt	
33	Social	May complicate obtaining insurance coverage	Lack of interest from many users	Insurance not willing to cover or keep cover due to car modification	3	3	9	Put disclaimers on product that it should be approved by customer's insurance agency or used at own risk without insurance	Kevin	
34	Social	May complicate cost of insurance coverage	Lack of interest from many users	Insurance not willing to cover or keep cover due to car modification	3	3	9	Put disclaimers on product that it should be approved by customer's insurance agency or used at own risk without insurance	Kevin	
35	Environmental	Physical structures could potentially be damaged by driver using O-Shift	Damage on the car due to the install and use of the device	Improper manufacturing / improper installment of the device	1	9	9	Put disclaimers on product to minimize our liability; could add disclaimers about use on public roads	Steven	
36	Environmental	Device might not be energy efficient	Not being able to use device for long times	Many components	1	1	1	Minimize number of sensors/displays	Kevin	