Use Case:	Turn on the Autonomous Vehicle
Actors:	Driver
Description:	When the autonomous vehicle is turned on the PCAS should not be turned on as the autonomous vehicle has not been shifted into drive.
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	1
Use cases:	N/A

Table 1: Use case description for *Turn on Autonomous Vehicle*

Use Case:	Shift Autonomous Vehicle to Drive
Actors:	Driver, Brake By wire System, Stereo Camera
Description:	When the autonomous vehicle is shifted to drive mode, the PCAS shall activate within .25 seconds. The brake by wire system and stereo camera will also be activated. It shall immediately begin analyzing the packets of information coming from the stereo camera.
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	1, 3
Use cases:	Turn on the car

Table 2: Use case description for *Shift Autonomous Vehicle to Drive*

Use Case:	Autonomous Vehicle in Drive
Actors:	Stereo Camera
Description:	When the autonomous vehicle is in drive the stereo camera should be communicating with the PCAS sending packets of information every

	100 milliseconds.
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	4, 5
Use cases:	Turn on the Autonomous Vehicle, Shift Autonomous Vehicle to Drive

Table 3: Use case description for *Autonomous Vehicle in Drive*

Use Case:	Interpret Sensor Data
Actors:	Stereo Camera
Description:	The PCAS continuously analyzes packets of information from the stereo camera to determine if the autonomous vehicle needs to slow down. The PCAS will also continuously monitor the stereo camera feed every 5 minutes to determine if it is obstructed.
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	2, 4, 5, 12
Use cases:	Turn on the Autonomous Vehicle, Shift Autonomous Vehicle to Drive, Autonomous Vehicle in Drive

Table 4: Use case description for *Interpret Sensor Data*

Use Case:	Detect Pedestrian
Actors:	Stereo Camera
Description:	The stereo camera detects a pedestrian in the path of the autonomous vehicle. When it detects a pedestrian the PCAS must perform calculations to determine if there will be a collision.
Type:	Primary
Includes:	N/A

Extends:	N/A
Cross-refs:	2, 6
Use cases:	Turn on the Autonomous Vehicle, Shift Autonomous Vehicle to Drive, Autonomous Vehicle in Drive

Table 5: Use case description for *Detect Pedestrian*

Use Case:	Brake Autonomous Vehicle
Actors:	Brake by Wire System
Description:	When the PCAS determines it needs to brake it will tell the brake by wire to slow down the autonomous vehicle. It will come to a stop and stay stopped until the pedestrian is no longer in the path of the autonomous vehicle.
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	1, 6, 7, 10
Use cases:	N/A

Table 6: Use case description for *Brake Autonomous Vehicle*

Use Case:	Accelerate Autonomous Vehicle
Actors:	Brake by Wire System
Description:	Once the pedestrian is no longer in the path of the autonomous vehicle the PCAS shall no longer notify the Vehicle Brake by Wire System to stop the autonomous vehicle and allow the vehicle to accelerate at a steady rate of 0.25g until the autonomous vehicle reaches its steady state speed of 50kph. This shall happen within 5s of the pedestrian no longer being in the path of the autonomous vehicle.
Type:	Primary
Includes:	N/A
Extends:	N/A

Cross-refs:	11
Use cases:	N/A

Table 7: Use case description for *Accelerate Autonomous Vehicle*

Use Case:	Play beeping sound to alert driver
Actors:	Alarm Warning System
Description:	When the PCAS determines it needs to brake the autonomous vehicle it will also send a message to the alarm warning system to play a beeping sound within .01 seconds of the brakes being activated.
Type:	Primary
Includes:	Alert the Driver
Extends:	N/A
Cross-refs:	8
Use cases:	Brake Autonomous Vehicle

Table 8: Use case description for *Play beeping sound to alert driver*

Use Case:	Vibrate seat to alert driver
Actors:	Alarm Warning System
Description:	When the PCAS determines it needs to brake the autonomous vehicle it will also send a message to the alarm warning system to vibrate the driver's seat within .01 seconds of the brakes being activated.
Type:	Primary
Includes:	Alert the Driver
Extends:	N/A
Cross-refs:	8
Use cases:	Brake Autonomous Vehicle

Table 9: Use case description for *Vibrate seat to alert driver*

Use Case:	Alert The Driver

Actors:	Driver, Alarm Warning System
Description:	When the autonomous vehicle begins to slow down due to a pedestrian alert the user (driver) using two different sensory inputs.
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	8
Use cases:	Brake Autonomous Vehicle

Table 10: Use case description for *Alert The Driver*

Use Case:	Override the PCAS
Actors:	Driver
Description:	To override the PCAS the driver must wait until the autonomous vehicle comes to a complete stop. Once it has come to a complete stop the driver must press the brake. When this happens the PCAS will alert the driver using the alarm warning system to play a voice recording that says “The PCAS has been turned off”. The PCAS will no longer be liable for any collisions.
Type:	Primary
Includes:	N/A
Extends:	N/A
Cross-refs:	9
Use cases:	Brake Autonomous Vehicle

Table 11: Use case description for *Override the PCAS*

Use Case:	Activate the Failsafe System
Actors:	Failsafe System
Description:	If there is a problem with the main system (software failure, malicious attack), the PCAS will switch to the failsafe system. This system has a slower response time by 200ms to 900ms. The driver will be notified

	that the failsafe system is activated with an audio beep from the alarm warning system.
Type:	Primary
Includes:	Brake Autonomous Vehicle
Extends:	N/A
Cross-refs:	14
Use cases:	N/A

Table 12: Use case description for *Activate the Failsafe System*

Use Case:	Deactivate the Failsafe System
Actors:	Failsafe System
Description:	Once the problem with the main system is resolved the failsafe system will deactivate within 5 seconds.
Type:	Primary
Includes:	Brake Autonomous Vehicle
Extends:	N/A
Cross-refs:	14
Use cases:	Activate the Failsafe System

Table 13: Use case description for *Deactivate the Failsafe System*

Use Case:	Shift Autonomous Vehicle out of Drive
Actors:	Driver
Description:	When the vehicle is shifted out of drive the PCAS shall turn off within 0.25 seconds.
Type:	Primary
Includes:	N/A
Extends:	N/A

Cross-refs:	13
Use cases:	N/A

Table 14: Use case description for *Vehicle Shifted out of Drive*