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ASEAN NCAP's Study on the Effectiveness of Passenger Car Blind Spot Technology (BST) to Detect Motorcycles

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Abstract – *This paper shall explain the effectiveness of Blind Spot Technology (BST) fitted in passenger cars to detect small engine capacity motorcycles. A total of eight passenger cars and six motorcycles were involved in this research study as the target vehicles (TVs) and subject vehicles (SVs), respectively. The experiment took place at a makeshift test track in Putrajaya (a recreational airfield), in which the TVs overtook SVs at certain predefined speeds and distances. The results show that the detection performance varies for SVs, whereby the distance of TVs from SVs is the main aspect of concern regarding detection in order to avoid car-motorcycle crashes owing to the blind spot phenomenon. Additionally, based on the results, it is predicted that the complexity and various scenarios as exemplified in the research are most likely encountered in everyday driving.*

Keywords: Blind Spot Technology (BST), active safety, ASEAN NCAP, target vehicle (TV), subject vehicle (SV)

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1.0 INTRODUCTION

The Blind Spot Technology (BST) is part of the Advanced Driver Assistance Systems (ADAS) that help drivers avoid potential dangers. Its role is to assist the driver to manoeuvre the car in certain situations – BST can monitor and detect an obstacle to the driver's view while driving (Md Isa et al., 2015). It can recognize when another vehicle is travelling diagonally behind the driver's car, before sending out signals using indicators in the vehicle. These indicators are commonly located either on the side view mirror or the A-pillar panel. A flashing indicator and an audible signal will then alert the driver to the presence of another vehicle (Wu et al., 2013). The driver shall be assisted while driving with BST detecting and warning them of the presence of another vehicle in the blind spot area. Hence, BST can prevent the occurrence of road crashes (Chen & Chen, 2009).

Many road accidents involving the car and motorcycle occur in the blind spot area especially along the highway. Negligence on the driver's part is also to blame for such accidents especially during lane departure/switching. According to the Royal Malaysia Police (RMP), motorcyclist fatalities in Malaysia recorded the highest number in 2017 with 4,348 deaths compared to other road users (RMP, 2018). The figure represents 64.5% of the total number of recorded road deaths of 6,740 (ASEAN NCAP, 2018). In addition, motorcyclist fatalities in the ASEAN region in general and specifically in Malaysia remains significantly high. BST therefore aims to reduce collision between passenger cars and other vehicles especially moped and underbone motorcycles, coming from the blind spot area either on the side or rear end of the car. By having BST, the driver will be able to detect when a motorcycle is approaching (Forkenbrock et al., 2014). This will help to deter a collision or minimise the injury sustained by the motorcyclist, in the event when the driver is about to perform a lane-changing manoeuvre or making a turn (Forkenbrock et al., 2014).

The New Car Assessment Program for Southeast Asian Countries (ASEAN NCAP) has included BST in its current assessment protocol as part of the requirements of the star rating under the safety assist pillar. Aside from BST, the safety assist pillar also includes seat belt reminder (SBR), effective braking and avoidance (EBA) and other advanced safety assist technology (SATs). However, BST does not have its own protocol in the ASEN NCAP star rating, and merely follows the regulations set by the International Organization for Standardization, i.e. Lane Change Detector Aid System from ISO 17387:2008 (ISO, 2008).

Here, we shall elaborate on the regulation and requirements for the automotive industry to develop the BST in their vehicle. The test target (motorcycle with rider) requirements shall follow the dimension (2.0-2.5) metre length × (0.7-0.9) metre width × (1.1-1.5) metre height, or is also known as category 250 cc and above (ISO, 2008). In Malaysia and other ASEAN member countries, the under bone motorcycles largely dominate the category where the dimension is not as stated by ISO 17387:2008.

Based on the different requirements of ISO 17387:2008 for motorcycles in Malaysia and ASEAN countries, ASEAN NCAP hopes to determine whether BST can detect the different target vehicles (TVs), namely small engine capacity motorcycles while approaching and overtaking the subject vehicles (SVs), namely a car with BST. Hence, this research aims to substantiate the importance of BST in Malaysia and ASEAN in detecting and warning the driver on the presence of a motorcycle in the blind spot zone.

1.1 ISO 17387:2008 Lane Change Detector Aid System (LCDAS)

Lane Change Decision Aid Systems (LCDAS) sends out warning to the driver against a collision that may occur due to a lane change manoeuvre. LCDAS is intended to supplement the vehicle's interior and exterior rear-view mirrors, and not to eliminate the need for such mirrors.

LCDAS is designed to detect vehicles at the rear and both sides of the SVs (see Figure 1). When the SV driver indicates the desire to perform a lane change, the system evaluates the situation and warns the driver if a lane change is not recommended. LCDAS is not meant to encourage aggressive driving. The absence of a warning will not guarantee that the driver can safely make a lane change manoeuvre. The system will not take any automatic action to prevent possible collisions. Responsibility for the safe operation of the vehicle, therefore, remains with the driver.

The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies. The work in preparing international standards is normally carried out through ISO technical committees. ISO specifies the system requirements and test methods for LCDAS. ISO also addresses LCDAS for use on forward moving cars, vans and trucks in highway situations. However, ISO does not address LCDAS for use on motorcycles or articulated vehicles such as tractor/trailer combinations and articulated buses.

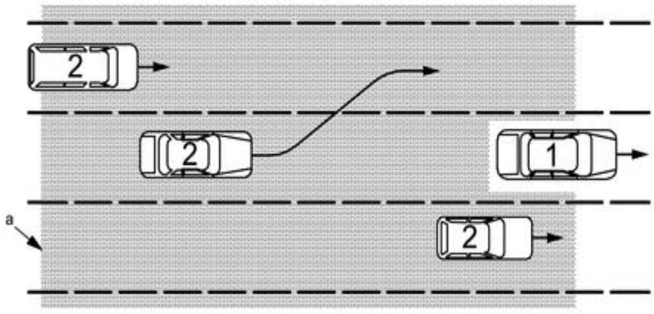


Figure 1: Concept of LSDAS (1 for SV and 2 for TVs)

2.0 METHODOLOGY

In this research, ASEAN NCAP has tested a total of eight car models which are sold in the ASEAN market. The cars have been fitted with various types of BST. Each car is tested against six target motorcycles that are popular in terms of sales in the ASEAN region (refer Figure 2).

The research was performed during the day. All eight car models were run against the six target motorcycles. ASEAN NCAP expects to assess the efficiency of different types of BST fitted inside different car models particularly during lane changing action. The BST development test also marked ASEAN NCAP's intention in performing an actual assessment to determine the effectiveness of BST in detecting moped travelling in the blind spot zone. This was in accordance with ASEAN NCAP objective to reduce motorcyclist fatalities especially during lane-changing action. The research was performed based on the requirement as stipulated in the ISO 17387:2008. It will also help in the preparation of ASEAN NCAP's future 2021-2030 roadmap that will place greater priority on motorcycle safety.

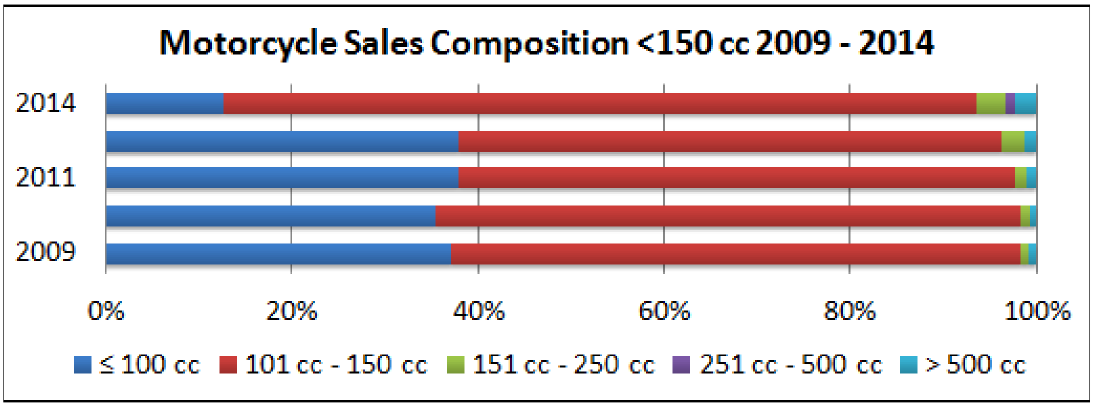


Figure 2: Motorcycle sales composition 2009-2014 (compiled by ASEAN NCAP)

2.1 Subject Vehicle (SV)

The research involved a total of eight subject vehicles (SVs), namely the Mercedes S-Class S400, Honda Accord 2017, Toyota CH-R 2018, Hyundai Ioniq 2017, Honda Odyssey EXV 2017, Mazda CX-5 2017, Mazda 3 GL 2017 and Toyota Camry Hybrid 2.5 2017. These vehicles were selected because they were fitted with BST. The cars were divided into different categories, namely sedan, SUV and MPV. Tables 1 and 2 illustrate the details of the vehicle for testing. They include the type of car, illustration of BST warning area, technology used, sensor location, icon, and availability of audible warning.

Table 1: Details of test subject vehicles (A-D)

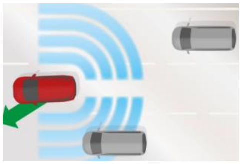
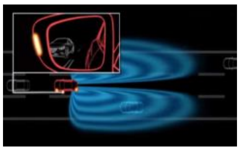
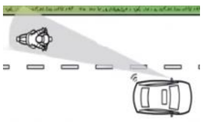
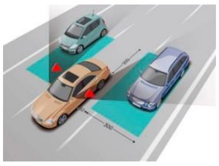
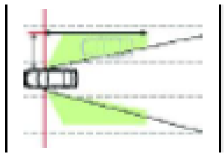
Vehicle	A	B	C	D
Model	Mercedes S400	Honda Odyssey EXV	Mazda CX-5	Mazda 3
Body Style	Sedan	MPV	SUV	Sedan
Illustration				
Trade Name	Blind Spot Assist (BSA)	Blind Spot Illustration (BSI) System	Blind Spot Monitor (BSM)	Blind Spot Monitor (BSM)
Technology	Radar	Radar	Radar	Radar
Sensor Location (s)	2 sensors; mounted in each corner of the rear bumper	2 sensors; mounted in each corner of the rear bumper	2 sensors; mounted in each corner of the rear bumper	2 sensors; mounted in each corner of the rear bumper
Icon / Display (on side mirror)				
Audible Warning	None	None	Yes	Yes

Table 2: Details of test subject vehicles (E-H)

Vehicle	**E**	**F**	**G**	**H**
Model	Toyota C-HR	Toyota Camry Hybrid 2.5	Hyundai Ioniq Hybrid	Honda Accord
Body Style	SUV	Sedan	Sedan	Sedan
Illustration				
Trade Name	Blind Spot Monitor (BSM)	Blind Spot Monitor (BSM)	Blind Spot Detector (BSP)	Blind Spot Information System (BLIS)
Technology	Radar	Radar	Radar	Vision
Sensor Location (s)	2 sensors; mounted in each corner of the rear bumper	2 sensors; mounted in each corner of the rear bumper	2 sensors; mounted in each corner of the rear bumper	Compact video camera mounted below each side
Icon / Display (on side mirror)				
Audible Warning	None	None	None	None

2.2 Target Vehicle

The target vehicles (TVs) shall be four underbone motorcycles (between 100cc and 150cc) and two naked bikes (range from 300cc to 700 cc) in order to simulate with current situation in Malaysia. The motorcycles in this research comprised the Yamaha LC 135, Yamaha Y15, Honda Beat 110cc, Honda RS150, BMW GS 310 and the Honda NC 700. These motorcycles were selected because they were available to the researchers. Table 3 below shows the details of motorcycles categories and their size comprising length, width and height, and Figure 3 contains their pictures.

Table 3: Details of TVs in BST test

No.	Motorcycle Make & Model	CC	Categories	Size		
				Length (m)	Width (m)	Height (m)
1	Yamaha LC 135	135	Underbone	1.960	0.695	1.080
2	Yamaha Y15	150	Underbone	1.960	0.670	1.080
3	Honda RS 150	150	Underbone	1.941	0.699	0.977
4	Honda Beat	110	Moped	1.869	0.676	1.047
5	Honda NC 700	700	Touring Bike	2.195	0.760	1.130
6	BMW GS 310	310	Naked Bike	2.075	0.880	1.230

(1) (2) (3)

(4) (5) (6)

Figure 3: The motorcycles in the research (numbered according to Table 3)

2.3 Test Location

The testing area is very important and it needs to have flat, dry asphalt or concrete surface. The place identified for this research was the Putrajaya Recreational Airfield (see Figure 4), where the airstrip is 637 metres (length) × 21metres (width) (the area size is 702,793.5 ft. sq.). Figure 5 shows the arrangement made for the test.

Figure 4: Ariel view of Putrajaya Recreational Airfield

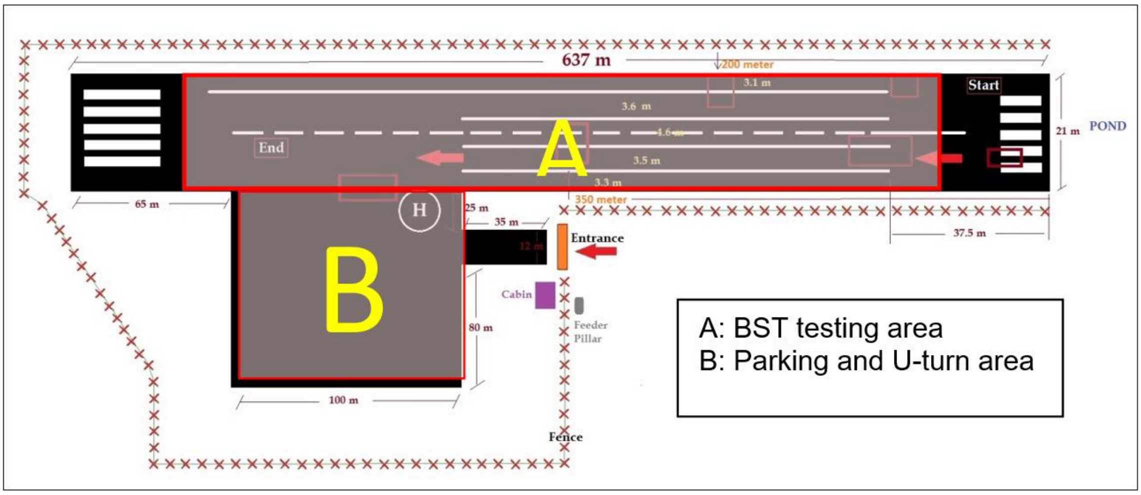


Figure 5: Arrangement for testing area

2.4 Test Plan

Each SV was subjected to one type of performance, namely straight line detection or closing vehicle warning test, divided into two target distances. The first target distance was in radar range within three metres from the SV. The second was a false warning test whereby the distance was six metres from the SV. The research was performed on a controlled straight test facility containing two lines that presented two targets on the surface roadway. The research was performed during the day, beginning around 8:00 am and ending at 5:00 pm. With regard to the weather, the team set the condition that it will still be conducted if there is a drizzle, and will be stopped if there is heavy rain and lightning.

2.4.1 True Warning Test

The true warning test for the both SVs and TVs was done in separate but parallel lanes with the motorcycle (TV) riding longitudinally past the cars (SV). The means in radar range for TVs overtaking SVs was between three metres adjacent to the car and at 30 metres behind the car. The BST warning requirements were divided to three, namely (i) Shall Give Blind Spot Warning, (ii) Might Give Blind Spot Warning and (iii) Shall Not Give Blind Spot Warning. Based on the BST warning requirements, the result should be based on Table 4. The SVs must switch on the signal lamp and be driven at 70 km/h. The TVs must be ridden around 80 km/h to 110 km/h to overtake the SVs. All the tests were performed on the left side of SV.

Table 4: BST warning requirements

BST Warning Condition	**Shall Not Give** Blind Spot Warning	**Might Give** Blind Spot Warning	**Shall Give** Blind Spot Warning
BST Warning Lamp or Audible Warning	Must not come on	Might come on	Must come on
Distance Warning	Out of range: 3 metres adjacent and 30 metres behind car	In range: 3 metres adjacent and 30 metres behind car	In range: 3 metres adjacent and 3 metres behind car
Layout	Refer Figure 6	Refer Figure 7	Refer Figure 8

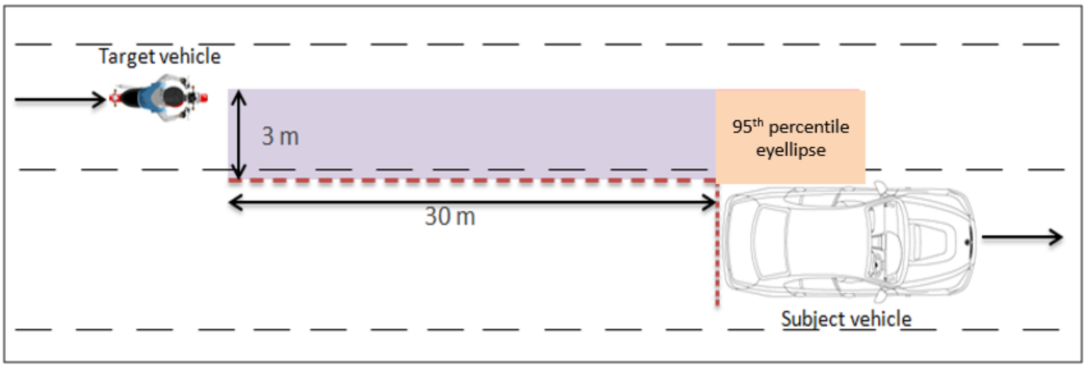


Figure 6: BST Warning Condition – Shall Not Give Blind Spot Warning to the driver

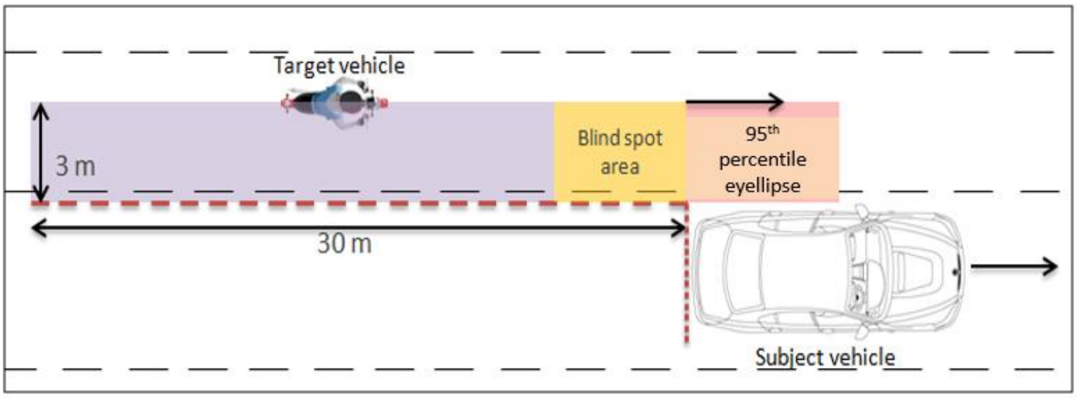


Figure 7: BST Warning Condition – Might Be Give Blind Spot Warning to the driver

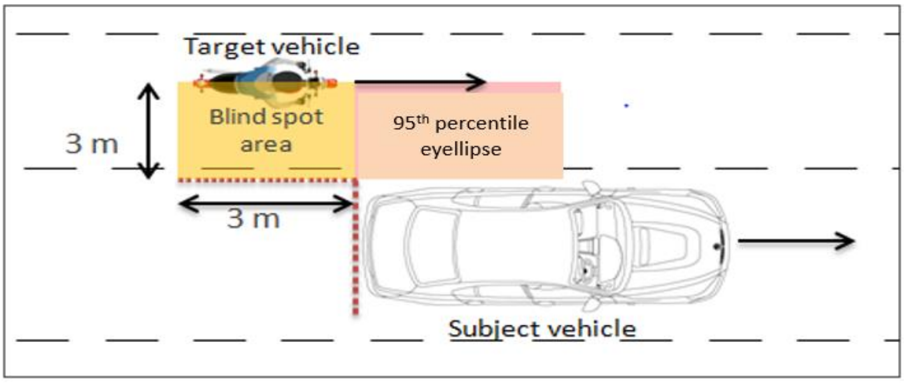


Figure 8: BST Warning Condition – Shall Give Blind Spot Warning to the driver

2.4.2 False Warning Test

The purpose of the false warning test is to determine whether the lane change warning system gives no warning when the TVs is on the lane beyond the adjacent lane. In each test trial, the lateral distance between the outermost edge of the SV body (excluding the exterior mirror) and the centreline of the test TV shall be maintained at six metres. The system shall give no warnings during these test trials. All tests were performed on the left side of the SVs.

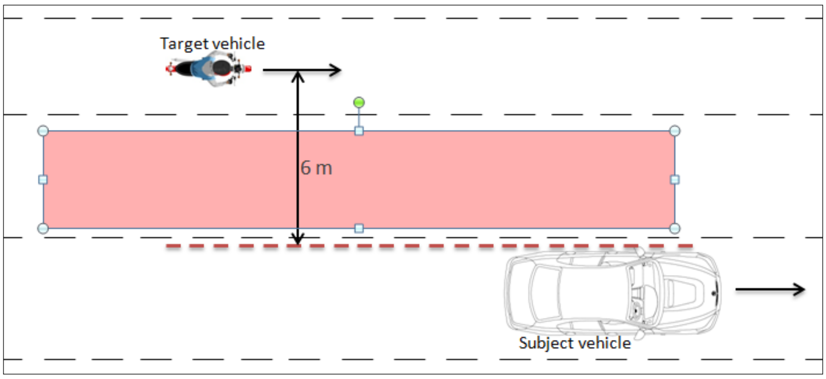


Figure 9: Test target vehicle maintained at six metres in false warning test

2.4.3 Testing Road Layout Procedure

Figure 10 shows the BST testing area layout. The area is 300 metres in length and 20 metres wide, and is adequate for the test. The area layout is divided into three parts, namely A, B and C. Area A formed the starting line for the SVs and TVs. Area B was the bypass area where the TV needed to overtake the SV. Lastly Area C was the braking area and for making U-turns. In the research, both SV and TV started moving from the same time laterally and needed to achieve 70 km/h within 100 metres or before reaching Area B. When the SV got into Area B, the TV needed to achieve speed of around 80 to 110 km/h to approach and overtake the SV. Area B was also known as the critical area, where BST needed to function and give warning to the driver in the range radar testing. After passing Area B, both SV and TV needed to slow down and make a U-turn in Area C. They then must get back to the starting line before the next TV and SV can begin the test.

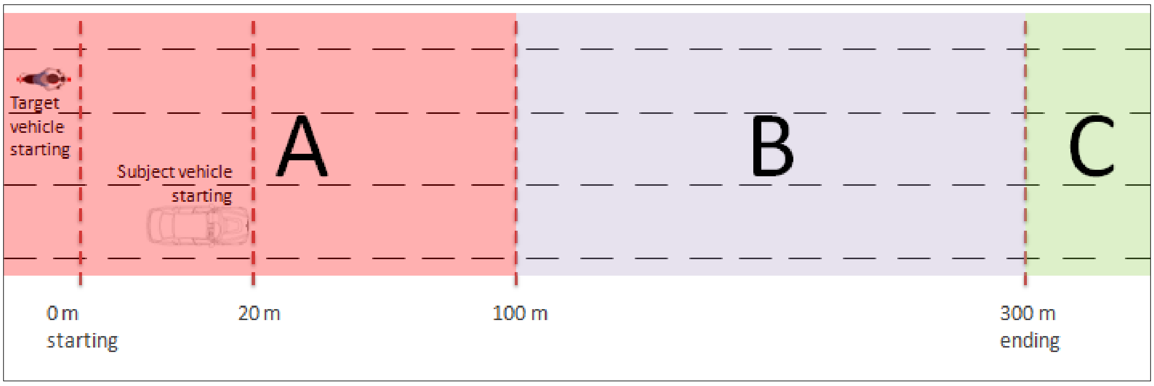


Figure 10: Testing area layout

3.0 RESULTS AND DISCUSSION

The BST was verified using the recording video database taken by VBOX camera containing two viewing display from the top left side of the car and inside the car for the blind spot monitoring warning as shown in Figure 11. The two views in the video recording had the same speed and time, showing the BST warning light or indicator at the same time and indicating the position of TV.

The testing run on the dry road surface at the Putrajaya Recreational Airfield began at 8:00 am and ended at 5:00 pm. Each of eight SVs was tested with all six TVs. Each TV was tested in two situations, namely for true warning and false warning. These represented two different distances of the side of the car (SV). True warning distance was three metres whereas false warning was six metres. All the tests were performed on the left side of SVs.

Figure 11: (a) From inside view; (b) Top left side view

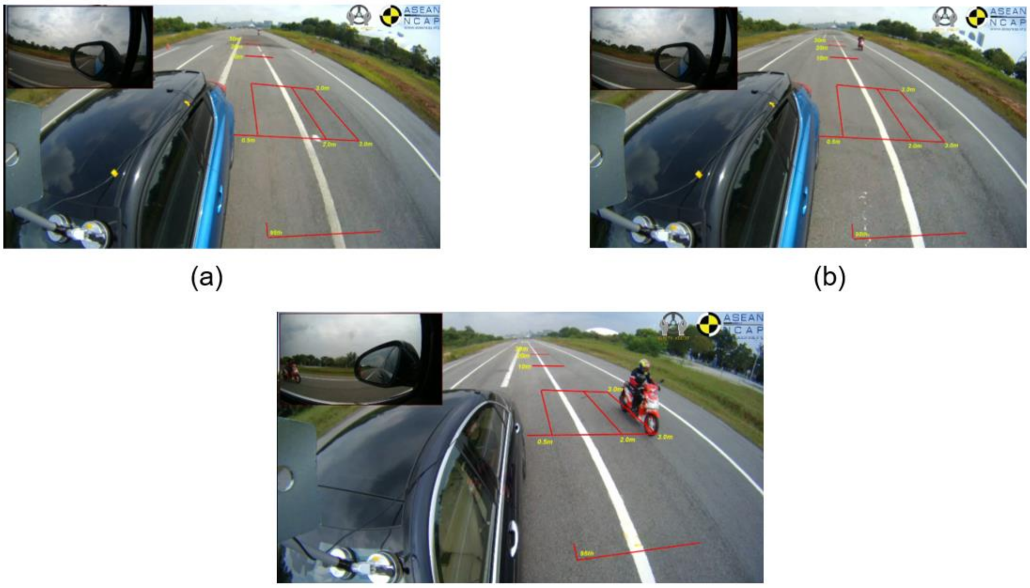
3.1 True Warning Test

This research was to check whether BST gave warnings when required as the TVs overtook the SV. On a straight flat test course, the SVs were driven in a straight line at a minimum steady speed of 70 km/h. The test TVs were ridden in a straight line with the closing speed between 80 km/h and 110 km/h. The test began with the TVs completely behind line 0 metre or the starting lane (see Figure 10).

Every TV was setup three metres to the left side and 20 metres behind the SV for the distance of overtaking the SV. In this research, the warning indicator light will assess based on the lane as setup in video recorded.

The lines in the video recorder were setup based on BST test requirements (Figure 12). BST warning requirements were divided to three, namely (i) Shall Give Blind Spot Warning, (ii) Might Give Blind Spot Warning and (iii) Shall Not Give Blind Spot Warning. The warning lamp must light up at three metres to the side and three metres behind the SV. Figure 12 also shows the position of TVs when overtaking SV.

Each of the SVs needed to turn the signal toggle or button to activate the BST sensor, whereas some SVs must be set-up first before engine ignition to switch on the BST detector through digital meter option.



(a) (b) (c)

Figure 12: Picture from recorded video: (a) Example of Shall Not Give Blind Spot Warning; (b) Example of Might Give Blind Spot Warning; (c) Example of Shall Give Blind Spot Warning

In the true warning test, the Toyota C-HR recorded 100% lights off for the area that Shall Not Give Blind Spot Warning. It got 100% lights on for the area that Might Give Blind Spot Warning, and 100% lights on for area that Shall Give Blind Spot Warning. The result shows the radar sensors were capable for detecting important blind spot area and BST worked in the required range (refer Appendix I).

The Hyundai Ionic Hybrid, on the other hand, had 100% lights off for the area that Shall Not Give Blind Spot Warning. It then had 83.3% lights on and 16.7% lights off for the area that Might Give Blind Spot Warning. The Hyundai Ionic Hybrid also had 100% lights on for area that Shall Give Blind Spot Warning. This indicates that the area may have blind spot warning but 16.7% did not detect TVs at the range of 20 to 30 meters behind (refer Appendix II). Still, the radar sensors were capable of detecting important blind spot area.

The third SV was the Mazda 3. In the true warning test, it had 100% lights off for the area that Shall Not Give Blind Spot Warning. It then had 98.2% lights on and 1.8% lights off for the area Might Give Blind Spot Warning. The Mazda 3 also had 82% lights on and 18% lights off for area that Shall Give Blind Spot Warning. This shows that area that Might Give Blind Spot Warning indicated 1.8% inability to detect TVs at the range of 20-30 metres behind the SV (refer Appendix III). In addition, 18% at critical areas Shall Give Blind Spot Warning for three TVs out of six was not detected at 95% of percentiles eye.

The fourth SV was the Mazda CX-5. In the true warning test, it had 100% lights off for area that Shall Not Give Blind Spot Warning. It had 83.3% lights on and 16.7% lights off for area that Might Give Blind Spot Warning. In addition, the Mazda CX-5 had 100% lights on for area that Shall Give Blind Spot Warning. The result shows the area that Might Give Blind Spot Warning experienced 16.7% inability to detect TVs at the range between 20-30 metres behind SV (refer Appendix IV) but still the sensors were capable for detecting the important blind spot area.

The Honda Accord 2016 was the fifth SV. From the driver's view, the live view display was able to aid the driver to detect motorcycles in all interested situations, i.e. during Shall Not Give Blind Spot Warning, Might Give Blind Spot Warning and Shall Give Blind Spot Warning. This result proves the live view camera on the Honda Accord was capable of detecting the important blind spot area (refer Appendix V).

The next SV was the Toyota Camry Hybrid 2.5. In the true warning test, the Camry Hybrid 2.5 had 100% lights off for the area Shall Not Give Blind Spot Warning. It then recorded 32.3% lights on and 67.7% lights off for the area that Might Give Blind Spot Warning. The Camry Hybrid 2.5 also had 100% lights on for area that Shall Give Blind Spot Warning. This shows the area which Might Give Blind Spot Warning experienced 67.7% inability to detect TVs at the range between 10-30 metres behind SV (refer Appendix VI) but the sensors were still capable of detecting the important blind spot area.

The seventh SV was the Honda Odyssey 2016. In the true warning test, the model indicated 100% lights off for the area that Shall Not Give Blind Spot Warning. It then recorded 100% lights off for the area that Might Give Blind Spot Warning. The Honda Odyssey also recorded 50% lights on and 50% lights off for area marked as Shall Give Blind Spot Warning. This indicates that 18% at the importance areas to Give Blind Spot Warning on six TVs were undetected at 95% of percentiles eye (refer Appendix VII).

The eighth and final SV was the Mercedes S-Class S400. In the true warning test, the Mercedes S400 registered 100% lights off for area that Shall Not Give Blind Spot Warning. Next, it indicated 98.2% lights off and 1.8% lights on for areas which Might Give Blind Spot Warning. Finally, the S Class S400 registered 100% lights on for area that Shall Give Blind Spot Warning. The results points to the fact that for area that might give blind spot warning, the S Class S400 was unable to detect TVs at the range between 10-30 metres behind the SV by 98.2% (refer Appendix VIII), though the sensors were capable of detecting the pertinent blind spot area.

3.2 False Warning Test

The purpose of the false warning test is to check whether the blind spot warning system did not provide warnings when the TVs were in the lane beyond the adjacent lane. In each test run, the lateral distance between the outermost edge of the SV's body (excluding the exterior mirror) and the centreline of the test TVs was maintained at six metres. The systems gave no warnings during these test runs, i.e. all the SVs were not detecting TVs and had lights off for 100% while the TVs were overtaking. The detail results of the false warning test can be found in the appendices (except for the case of Honda Accord's live view display).

4.0 CONCLUSION

In conclusion, the BST testing to detect motorcycles as performed by ASEAN NCAP involved several cars (SVs) and motorcycles (TVs). The results point out to the effectiveness of BST in detecting moped and motorcycle. A video recorder (VBOX camera) was used to record two views at the same time. The video had construct line of critical area comprising three metres to the side and 30 metres behind of the SVs. BST warning requirements were divided into three areas, namely (i) Shall Give Blind Spot Warning, (ii) Might Give Blind Spot Warning and (iii) Shall Not Give Blind Spot Warning. To activate the blind spot warning, the toggle or switch needed to be either on the left or right. In this research, the focus was on the left side.

As for the results, the most important phase according to ISO 17387:2008 was the critical blind spot areas of SV. Seven SVs had 100% lights on BST warning when TVs were in the blind spot area. Only one SV had 50% lights on and another 50% lights off while the area of lights off was 95% percentile. This means, BST warning in the car has failed to detect the TVs. Perhaps the OEM has set a different shape and dimension for TVs in its BST warning. Based on the results, it is predicted that the complexity and various scenarios as exemplified in the research are most likely encountered in everyday driving.

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Appendix I. Full result for Toyota C-HR

Subject Vehicle (SV)	TOYOTA C-HR (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	LF	LO	LO	LO	LO	LO	LF
YAMAHA LC 135	LF	LO	LO	LO	LO	LO	LF
YAMAHA Y 15 ZR	LF	LO	LO	LO	LO	LO	LF
HONDA RS 150 R	LF	LO	LO	LO	LO	LO	LF
BMW G 310 GS	LF	LO	LO	LO	LO	LO	LF
HONDA NC 700 X	LF	LO	LO	LO	LO	LO	LF

* LO - Light On *LF - Light Off

Appendix II. Full result for Hyundai Ioniq

Subject Vehicle (SV)	HYUNDAI IONIQ (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	LF	LF	LO	LO	LO	LO	LF
YAMAHA LC 135	LF	LO	LO	LO	LO	LO	LF
YAMAHA Y 15 ZR	LF	LO	LO	LO	LO	LO	LF
HONDA RS 150 R	LF	LF	LO	LO	LO	LO	LF
BMW G 310 GS	LF	LF	LO	LO	LO	LO	LF
HONDA NC 700 X	LF	LO	LO	LO	LO	LO	LF

* LO - Light On *LF - Light Off

Appendix III. Full result for Mazda 3

Subject Vehicle (SV)	MAZDA 3 (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	LF	LO	LO	LO	LO	LF	LF
YAMAHA LC 135	LF	LO	LO	LO	LO	LO	LF
YAMAHA Y 15 ZR	LF	LO	LO	LO	LO	LF	LF
HONDA RS 150 R	LF	LO	LO	LO	LO	LF	LF
BMW G 310 GS	LF	LF	LO	LO	LO	LO	LF
HONDA NC 700 X	LF	LO	LO	LO	LO	LO	LF

* LO - Light On *LF - Light Off

Appendix IV. Full result for Mazda CX-5

Subject Vehicle (SV)	MAZDA CX-5 (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	LF	LO	LO	LO	LO	LO	LF
YAMAHA LC 135	LF	LO	LO	LO	LO	LO	LF
YAMAHA Y 15 ZR	LF	LF	LO	LO	LO	LO	LF
HONDA RS 150 R	LF	LF	LO	LO	LO	LO	LF
BMW G 310 GS	LF	LF	LO	LO	LO	LO	LF
HONDA NC 700 X	LF	LO	LO	LO	LO	LO	LF

* LO - Light On *LF - Light Off

Appendix V. Full result for Honda Accord

Subject Vehicle (SV)	HONDA ACCORD (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	-	-	-	-	-	-	-
YAMAHA LC 135	-	-	-	-	-	-	-
YAMAHA Y 15 ZR	-	-	-	-	-	-	-
HONDA RS 150 R	-	-	-	-	-	-	-
BMW G 310 GS	-	-	-	-	-	-	-
HONDA NC 700 X	-	-	-	-	-	-	-

* LO - Light On *LF - Light Off

Appendix VI. Full result for Toyota Camry Hybrid 2.5

Subject Vehicle (SV)	TOYOTA CAMRY HYBRID 2.5 (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	LF	LF	LF	LO	LO	LO	LF
YAMAHA LC 135	LF	LF	LF	LO	LO	LO	LF
YAMAHA Y 15 ZR	LF	LF	LF	LO	LO	LO	LF
HONDA RS 150 R	LF	LF	LF	LO	LO	LO	LF
BMW G 310 GS	LF	LF	LF	LO	LO	LO	LF
HONDA NC 700 X	LF	LF	LF	LO	LO	LO	LF

* LO - Light On *LF - Light Off

Appendix VII. Full result for Honda Odyssey

Subject Vehicle (SV)	HONDA ODYSSEY (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	LF	LF	LF	LF	LO	LF	LF
YAMAHA LC 135	LF	LF	LF	LF	LO	LF	LF
YAMAHA Y 15 ZR	LF	LF	LF	LF	LO	LF	LF
HONDA RS 150 R	LF	LF	LF	LF	LO	LF	LF
BMW G 310 GS	LF	LF	LF	LF	LO	LF	LF
HONDA NC 700 X	LF	LF	LF	LF	LO	LF	LF

* LO - Light On *LF - Light Off

Appendix VIII. Full result for Mercedes S400

Subject Vehicle (SV)	MERCEDES S400 (Target Vehicle – TV)						
	Blind Spot Warning Light / Indicator						
	True Warning						False Warning
	Shall Not Give	Maybe Give			Shall Be / Must Be		Shall Not Give
Distance between SV and TV (m)	> 30	30	20	10	3	95% eye	OUT
HONDA BEAT	LF	LF	LF	LO	LO	LO	LF
YAMAHA LC 135	LF	LF	LF	LF	LO	LO	LF
YAMAHA Y 15 ZR	LF	LF	LF	LF	LO	LO	LF
HONDA RS 150 R	LF	LF	LF	LF	LO	LO	LF
BMW G 310 GS	LF	LF	LF	LF	LO	LO	LF
HONDA NC 700 X	LF	LF	LF	LF	LO	LO	LF

* LO - Light On *LF - Light Off