Customer Requirements Specification

**Speed Bump ES**

**ـــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــــ**

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# Document Status:

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| **Version** | V1.2 | |
| **Status** | Proposed | |
| **Author** | MMH | |
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| **Team Approval** | AMA | Approved |
| **Mentor Approval** |  |  |
| **Final Approval** |  |  |

# Document History:

|  |  |  |  |
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| **Version** | **Author** | **Date** | **Change** |
| 1.0 | MMH | 30-10-2022 | Initial Creation |
| 1.0 | MMH | 1-11-2022 | CRS\_REV\_0001 |
| 1.1 | MMH | 22-11-2022 | Update document history |
| 1.1 | AMA | 22-11-2022 | Add sections of CRS Requirements |
| 1.1 | AMA | 22-11-2022 | Update section of configuration |
| 1.1 | AMA | 2-12-2022 | Update format |
| 1.2 | MMH | 3-12-2022 | Requirements refactoring |

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# Reference Document:

|  |  |  |  |
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| **Ref.number** | **Doc.Name** | **Version** | **Status** |
| 1 | PO\_SB\_CR\_ES | V1.2 | Released |

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# Project Description:

## Definition:

* The device detects speed bumps.

## Features:

* The device can capture images.
* ECU protection and maintenance.
* ECU will communicate with the mobile application via Bluetooth.

## Key Elements:

* The ECU shall connect to a camera that supports real-time capturing.
* The ECU shall monitor the battery’s voltage level.
* The ECU shall enable/disable power saving mode.
* The ECU shall monitor its heat level.
* ECU shall communicate with mobile app through BLE (Bluetooth Low Energy )‏.
* ECU shall send the detected bump information to the mobile app via Bluetooth.
* ECU shall notify the mobile app with battery issues (under/over voltage range )‏.
* ECU shall notify the mobile app when the ECU is over/under normal heat level‏.
* The ECU shall be connected to a DC fan to decrease heat

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# System Context:



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# CRS Requirements:

## General Requirements:

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| **Req\_ID** | PO\_SB\_CRS\_***001***-V1.1 | **Covers** | PO\_SB\_CR\_***002***-V1.0 |
| **Description** | The ECU shall get Input\_battaryVoltLevel from voltSensor. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***002***-V1.1 | **Covers** | PO\_SB\_CR\_***007***-V1.0 |
| **Description** | ECU shall send Output\_battaryVoltWarning to mobileApp through BLE, when the Input\_battaryVoltLevel is under INN\_voltageRange. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***003***-V1.0 | **Covers** | PO\_SB\_CR\_***007***-V1.0 |
| **Description** | ECU shall send Output\_battaryVoltWarning to mobileApp through BLE, when the Input\_battaryVoltLevel is over INN\_voltageRange. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***004***-V1.1 | **Covers** | PO\_SB\_CR\_***004***-V1.0 |
| **Description** | The ECU shall get Input\_heatLevel from tempSensor. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***005***-V1.1 | **Covers** | PO\_SB\_CR\_***008***-V1.0 |
| **Description** | ECU shall send Output\_heatLevelWarning to mobileApp through BLE, when the Input\_heatLevel is under INN\_heatRange. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***006***-V1.0 | **Covers** | PO\_SB\_CR\_***008***-V1.0 |
| **Description** | ECU shall send Output\_heatLevelWarning to mobileApp through BLE, when the Input\_heatLevel is over INN\_heatRange. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***007***-V1.1 | **Covers** | PO\_SB\_CR\_***009***-V1.0 |
| **Description** | Depends on the Input\_heatLevel,the ECU shall determine the Output\_fanSpeedLevel. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***008***-V1.0 | **Covers** | PO\_SB\_CR\_***009***-V1.0 |
| **Description** | The ECU shall send the Output\_fanSpeedLevel to the dcFan. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***009***-V1.0 | **Covers** | PO\_SB\_CR\_***003***-V1.0 |
| **Description** | The INN\_sleepMode is the ECU default mode. | | |

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| **Info\_ID** | PO\_SB\_CRS\_***001***-V1.0 |
| **Description** | The INN\_sleepMode means that the power saving mode is enabled. | |

## Active Mood:

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| **Req\_ID** | PO\_SB\_CRS\_***010***-V1.1 | **Covers** | PO\_SB\_CR\_***005***-V1.0 |
| **Description** | The ECU shall be connected with a mobile through Bluetooth | | |

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| **Req\_ID** | PO\_SB\_CRS\_***011***-V1.1 | **Covers** | PO\_SB\_CR\_***003***-V1.0 |
| **Description** | The ECU shall receive Input\_wakeUpSignal to enter the INN\_activeMode. | | |

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| **Info\_ID** | PO\_SB\_CRS\_***002***-V1.0 |
| **Description** | The INN\_activeMode means that the power saving mode is disabled. | |

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| **Req\_ID** | PO\_SB\_CRS\_***012***-V1.1 | **Covers** | PO\_SB\_CR\_***001***-V1.0 |
| **Description** | The ECU shall start receiving Input\_imgFrame from the camera. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***013***-V1.1 | **Covers** | PO\_SB\_CR\_***001***-V1.0 |
| **Description** | The ECU shall send Input\_imgFrame to the ML. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***014***-V1.1 | **Covers** | PO\_SB\_CR\_***006***-V1.0 |
| **Description** | If the ML detected any bumps, the ECU shall receive Output\_detectBumpInfo. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***015***-V1.0 | **Covers** | PO\_SB\_CR\_***006***-V1.0 |
| **Description** | The ECU shall send Output\_detectBumpInfo to the mobileApp through BLE. | | |

## Sleep Mood:

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| **Req\_ID** | PO\_SB\_CRS\_***016***-V1.0 | **Covers** | PO\_SB\_CR\_***005***-V1.0 |
| **Description** | The ECU shall be connected with the mobileApp through Bluetooth | | |

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| **Req\_ID** | PO\_SB\_CRS\_***017***-V1.1 | **Covers** | PO\_SB\_CR\_***003***-V1.0 |
| **Description** | The ECU shall receive Input\_sleepSignal to enter the INN\_sleepMode. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***018***-V1.0 | **Covers** | PO\_SB\_CR\_***003***-V1.0 |
| **Description** | The ECU shall enter the INN\_sleepMode if the BLE’s connection with mobileApp is lost. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***019***-V1.1 | **Covers** | PO\_SB\_CR\_***003***-V1.0 |
| **Description** | The ECU shall disable the camera, to save energy. | | |

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| **Req\_ID** | PO\_SB\_CRS\_***020***-V1.0 | **Covers** | PO\_SB\_CR\_***003***-V1.0 |
| **Description** | The ECU shall end the ML task. | | |