Blind Spot Detector Test Plan

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Revision History: BSD Test Plan 1.1

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1. Blind Spot Detector (BSD)
   1. Design Documentation
      1. BSD System Specifications
      2. BSD System Requirements
      3. BSD Block Level Diagram
      4. BSD Schematic
      5. BSD PCB Layout
      6. BSD Software
2. Equipment and materials required
   1. Blind Spot Detector
   2. Vehicle
   3. Person
   4. Bicycle
   5. Multimeter
   6. Environmental chamber
   7. Measuring tape
   8. Protractor
   9. Thermometer
   10. Oscilloscope
   11. Mechanic to Install Blind Spot Detector
3. Installation Test
   1. Mechanic required for installation
4. Environmental Test
   1. Temperature
   2. Humidity
   3. Rain
   4. Snow
   5. Hail
   6. Altitude
5. Use Test
   1. Object detection while stationary
      1. Vehicle
      2. Biker
      3. Pedestrian
   2. Object detection while moving
      1. Vehicle
      2. Biker
      3. Pedestrian
6. Stress Testing
   1. Accuracy in extreme weather conditions
      1. Heat
      2. Cold
      3. Rain
      4. Snow
      5. Hail
   2. Accuracy at freeway speeds
   3. Accuracy in a noisy environment
7. Module Tests
   1. Maxbotix Ultrasonic Sensor
   2. BSD Processor
8. Parametric Test
   1. Detection time
   2. Power Consumption
9. Exhaustive Testing
   1. With turn signal off
      1. Object within 7 feet of sensor
      2. No object within 7 feet of sensor
   2. With turn signal on
      1. Object within 7 feet of sensor
      2. No object within 7 feet of sensor
10. Object Detection Tests
    1. Range of Detection
       1. Maxbotix Ultrasonic Sensor: Max/min distance object can be detected
          1. Various size of object at room temperature in ideal condition
             1. Vehicle
             2. Biker
             3. Person
          2. Various outdoor temperatures
             1. 35 degrees Celsius
             2. -40 degrees Celsius
          3. Various levels of humidity
             1. High humidity
             2. Low humidity
          4. During rain
             1. Light rain
             2. Heavy rain
          5. Snowy conditions
             1. Snowing

With snow on ground

Without snow on ground

* + - * 1. Not snowing with snow on ground
    1. Maxbotix Ultrasonic Sensor: Width of beam width
       1. Various outdoor temperatures
          1. 35 degrees Celsius
          2. -20 degrees Celsius
       2. Various levels of humidity
          1. High humidity
          2. Low humidity
       3. During rain
          1. Light rain
          2. Heavy rain
       4. Snowing
    2. Software (AVR ATtiny85): Determine accuracy of distance measurement with set distance on ATtiny 85)
       1. Various size of object at room temperature in ideal condition
          1. Vehicle
          2. Biker
          3. Person
       2. Various outdoor temperatures
          1. 35 degrees Celsius
          2. -40 degrees Celsius
       3. Various levels of humidity
          1. High humidity
          2. Low humidity
       4. During rain
          1. Light rain
          2. Heavy rain
       5. Snowy conditions
          1. Snowing

With snow on ground

Without snow on ground

* + - * 1. Not snowing with snow on ground
      1. Software (AVR ATtiny85): Stability of detection indication
         1. Object near max detection
         2. Object near min detection
    1. Detection time of Blind Spot Detector (whole system)
       1. When turn signal is on
       2. When turn signal is off

1. Durability Tests
   1. Operating temperature
      1. Max temperature
         1. 85 degrees Celsius
      2. Min temperature
         1. -40 degrees Celsius
      3. Degree of humidity
         1. High humidity
         2. Low humidity
      4. Rain
      5. Snow
      6. Hail
      7. Collisions
         1. Small object projectiles/collisions
         2. Larger object projectiles/collisions
      8. Input voltage variations due to car battery inconsistencies
         1. Test functional range of 14V < Voltage In < 6V
2. System power requirements measurements
   1. Power consumption
      1. Sensor
      2. AVR ATtiny
      3. LED
      4. Voltage regulator
      5. NMOS switch
      6. Resistors
      7. Capacitors
      8. System as a whole
   2. Current consumption
      1. No object detected
      2. Object detected
         1. Outside of set max distance (no user alert)
         2. Within set max distance (user alert)