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# SYSTEM TEST PLAN FOR ASG SYSTEM

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## 1. System Test Plan

In order to ensure the system will execute properly, the system test plan has to be setup. This session demonstrates that the system testing will not only cover individual modules testing, but also combined modules testing. Both testing methodologies will carry out from different levels with an emphasis on the requirements of the proof-of-concept version. All possible situations will be discussed in this session.

### 1.1 Individual Module Testing

Individual module testing consists of three main aspects: mobile system testing, data transmit testing and robotic car testing.

#### 1.1.1 Mobile System Testing

The mobile system contains the user interface and the database server. There are three main purposes of mobile system testing. The first test objective is to ensure that the database server is able to properly store and be updated all items' information. The second test objective is that all user interface functions behave as expected. The third test objective is to check if the route is calculated correctly in the database server.

##### 1.1.1.1 Database Server Testing

Database is an organized collection of data. It stores all items details such as, items' names, price and location. When tester launches the database, the database should clearly show the details. Also, database shall allow tester add items and update the data on database server.

##### 1.1.1.2 User Interface Functions Testing

The user interface is an effective operation and control of the machine between user and the machine. The tester shall confirm that all interface functions work as expected.

1. Text-editing box: Tester shall type an item in the box.
2. Confirm button: One of the main functions of this button is checking if there is the item from the database. If the item cannot be found from database, error message shall be popped up. Otherwise, another function of the confirm button will be run that is listing the item on the right side of the user interface. A command route calculation is delivered to database server is another important

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function of this button. As a result, tester will need open the code to check if the calculation function is working or not.

3. Reset button: The major function of “Reset” is reset or clear the user interface so that user can start another shopping trip. Also, the user operation section should be empty when click on the Reset button.
4. User operation section: It shows the items that user already input and confirm on the text-editing box.

The following table 1. User Interface Testing shows the test cases of User Interface Functions Testing:

Test Cases	Steps	Expected Results	Actual Results
1. Text-editing box	<ol style="list-style-type: none"> <li>1. Type any words in the box</li> <li>2. Delete the words in the box</li> <li>3. Type words in the box again</li> </ol>	<ol style="list-style-type: none"> <li>1. Able to type words, and shown properly in the box.</li> <li>2. Able to delete the words in the box</li> <li>3. Able to type words, and shown properly in the box.</li> </ol>	Pass / Fail
2. Confirm button	<ol style="list-style-type: none"> <li>1. Type “Apple” in the Text-editing box.</li> <li>2. Click on “Confirm” button</li> <li>3. Type an item that is not in database, such</li> </ol>	<ol style="list-style-type: none"> <li>1. Able to type Apple in the box</li> <li>2. Item “Apple” and its details are listed on user operation section</li> <li>3. Able to type</li> </ol>	Pass / Fail

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	<p>as “photo, fish” in the Text-editing box.</p> <p>4. Click on “Confirm” button</p> <p>5. Click on “Confirm” button from error message</p>	<p>words in the box</p> <p>4. Error message “We do not have this item, please enter your item”.</p> <p>5. The user interface is shown. The Text-editing box is blank.</p>	
3. Reset button	<p>1. Input and confirm “Apple” in the Text-editing box.</p> <p>2. 1. Input and confirm “Chocolate” in the Text-editing box.</p> <p>3. Click on “Reset” button</p>	<p>1. “Apple” and its information are shown.</p> <p>2. “Chocolate” and its information are shown.</p> <p>3. The “Apple” and “Chocolate” information is removed from user operation section. The user interface is clear.</p>	Pass / Fail

Table 1 User Interface Testing

### 1.1.1.3 Route Calculation Function Testing

Route Calculation function plays an important role in the whole system. It calculates and gives a result how to reach the item from one point. Tester shall check the calculation result from the code if the result is same as expected.

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### 1.1.2 Data Transmit Testing

Data transmit is established based on the wireless communication between Mobile system and the receiver of robotic car. The major purpose of Data Transmit testing is to ensure the result of route calculation can be delivered from user interface and received by robotic car successfully within certain range. The Data Transmit Testing Table shows the possible situations during the communication between Mobile system and Robotic car. In order to execute the following test cases properly, the prerequisite has to be completed first in each test case. The prerequisite is there is a valuable route file in Mobile system.

Test Cases	Steps	Expected Result	Actual Results
Test Case 1. Data Transmit within 10CM	<ol style="list-style-type: none"> <li>1. Place mobile system and robotic car in 10 CM</li> <li>2. Allow the route data transmitted from Mobile system to robotic car</li> <li>3. Wait until the route data transmitted completed.</li> </ol>	<ol style="list-style-type: none"> <li>2. When the data is being transmitted, the LED light shall be lighted up constantly in orange.</li> <li>3. The LED light shall be lighted up constantly in green instead of orange.</li> </ol>	Pass/ Fail
Test Case 2. Data Transmit out of range 10CM	<ol style="list-style-type: none"> <li>1. Place Robotic car far away from mobile system out of range 10CM</li> <li>2. Allow mobile system transmit the data to Robotic car</li> </ol>	<ol style="list-style-type: none"> <li>2. There is no any signal or feedback shown from Robotic car or user interface. The supposed result is the user interface shows message "detecting the target". If the user interface is unable to detect the robotic car in 10 seconds, the data transmit request shall be paused. And the</li> </ol>	Pass/ Fail

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		user interface will be back to previous status.	
Test Case 3. Data Transmit get interrupted	<ol style="list-style-type: none"> <li>1. Place mobile system and robotic car in 10 CM</li> <li>2. Allow the route data transmitted from Mobile system to robotic car.</li> <li>3. During the route data is being transmitted, put the robotic car away Mobile system</li> </ol>	<ol style="list-style-type: none"> <li>2. The LED is lighted up in orange during the data transmitted.</li> <li>3. The data transmitted process shall get paused. And user interface will be back to previous status.</li> </ol> <p>However, the supposed result is the process gets paused. And a message "data transmitted is interrupted" is popped up on user interface. And there are two options for user. A. continue B. cancel. If user A. choose continue option, the rest of the data shall be transmitted when the robotic car is placed to mobile system in 50CM. Otherwise, if user chooses B. cancel, the user interface will be back to previous status.</p>	Pass/ Fail

Table 2 Data Transmit Testing

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### 1.1.3 Robotic Car Testing

Significant testing shall be performed on the Robotic Car testing of the project. Tester will conduct unit tests on the following functional blocks, with the pass criteria specified below:

- **Left and Right Engines:** tester shall load the motor test file to the robotic car. And tester shall hold the robotic car and observant both sides wheels when running the engine testing. First, the left motor is started in forward direction from zero speed to maximum speed and it will run in back direction with maximum speed to zero. Also, the right motor shall be test the same way. After the single engines checked, tester shall test both engines together. Both motors are started in forward direction with speed, then in back direction from maximum speed to zero speed.
- **Sensors:** tester shall load the sensor test file to the robotic car. The file will order the car to keep running. When it is running, put the hand in front of the robotic car, both engines shall stop running until the hand is removed.
- **LED display-elements:** there three LED lights were assembled on the robotic car. Two of them are located next to the left and right engines. So when the engine is working, the corresponding LED shall be lighted. The other LED shall signal that the robotic car is receiving data or has completed data receiving.

### 1.2 Combined Modules Testing

The combined modules testing will ensure the whole system works properly.

Steps	Expected Results	Actual Results
1. Tester will input and confirm an item on the user interface.  2. Then transmit the route calculation data to the robotic car through IR interface. The LED signal shall be lighted in green once the robotic car has received the data	1. Able to input and confirm the item on the UI  2. Able to transmit the route calculation data to the robotic car. And the robotic car shall receive the data completely.  4. The robotic car shall detect the barriers. Also, it should guide tester to	Pass/ Fail

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<p>completely.</p> <ol style="list-style-type: none"> <li>3. Tester shall place the robotic car at the starting point (0, 0)</li> <li>4. When the robotic car is guiding user to one point, tester shall put some barriers in front of the robotic car.</li> <li>5. Repeat step 1 and step 2.</li> <li>6. Tester shall input and confirm the destination "0" in the text-editing box to complete the shopping trip.</li> <li>7. Tester shall click on "Reset" button to clear the user interface</li> </ol>	<p>expected location.</p> <ol style="list-style-type: none"> <li>5. Same as expected #1 and #2 result</li> <li>6. Robotic car shall lead tester back to Starting and Finishing point.</li> <li>7. The user operation section is empty. The user interface is reset and ready to start next shipping trip.</li> </ol>	
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