How to use C code
Objectives

- To understand the CoSpace Rescue GUI and C correlation
- To load C code in CoSpace Rescue

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1. Write a code using GUI - A robot stops when it approaches a wall

Program a robot to move forward (both wheel speed = 3) in WORLD_1. The robot will stop if it detects an obstacle 20cm away.

Flowchart:

Analysis:
The robot has two actions – Moving forward and Stop. Therefore, two statements need to be added:

- **1st statement**: The robot will stop if the front ultrasonic sensor reading is less than 20 cm
- **2nd statement**: The robot moves forward if the 1st statement is not executed.
**Procedure:**

1. Launch CSR-Rescue (Primary).
2. Launch “AI” and select “WORLD_1.”
3. Define a new project: **MovingNStop**.
4. Add a team name: “CSRobot”.
5. Add two statements: Stop & Forward

6. Save the project.
7. Build the project.
8. Load the "MoveNStop.dll" to the RED robot and monitor its performance.

2. CoSpace Rescue GUI and C correlation

You can read the respective C code after programming in GUI.

1. Launch CSR-Rescue (Primary).
2. Open project: MoveNStop.
3. You can open the C code using any one of the following methods:
   - Click on and open the C code with Notepad.
   - Alternatively, you can open the C code with other tools, such as notepad++, c compiler, etc.

   The C code is in the following directory:

   C:\Microsoft Robotics Dev Studio 4\CS\User\Rescue\CsBot\MoveNStop
4. Check out the last segment (Game 0) of the ai.c file, we will see

```c
void Game0()
{
    if(SuperDuration>0)
    {
        SuperDuration--;
    }
    else if(Duration>0)
    {
        Duration--;
    } else if(US_Front>=0 && US_Front<=20) /*Case 1*/
    {
        Duration = 0;
        CurAction =1;
    }
    else if(US_Front>=21 && US_Front<=255) /*Case 2*/
    {
        Duration = 0;
        CurAction =2;
    }
    switch(CurAction)
    {
    case 1:
        WheelLeft=0;
        WheelRight=0;
        LED_1=0;
        MyState=0;
        break;
    case 2:
        WheelLeft=3;
        WheelRight=3;
        LED_1=0;
        MyState=0;
        break;
    default:
        break;
    }
}
```

Case 1 is related to the statement “Stop”

Case 2 is related to the statement “Forward”
3. My first C programme

Send a message in the command window

1. Open the ai.c in the “MoveNStop” folder (using notepad, notepad++, etc)

2. Modify the following segment accordingly (add the highlighted sentences).

```c
void Game0()
{
    if(SuperDuration>0)
    {
        SuperDuration--;
    }
    else if(Duration>0)
    {
        Duration--;
    }
    else if(U"
```
3. Save the file as "MoveNStop_C_1.c". (note that the file type must be .c)

4. Launch CSR-Rescue (Primary).

5. Launch the AI panel and click on “Upload” icon.

![Image of CSR-Rescue interface]

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How to use C code
6. Load “MoveNStop_C_1.DLL” to a BLUE or RED virtual robot.

7. Start the simulator and monitor the robot’s performance.

You will notice that the following message will be displayed as robot moves.

<table>
<thead>
<tr>
<th>CsBot Rescue 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward: Wheel_Left = 3 Wheel_Right = 3</td>
</tr>
<tr>
<td>Forward: Wheel_Left = 3 Wheel_Right = 3</td>
</tr>
<tr>
<td>Forward: Wheel_Left = 3 Wheel_Right = 3</td>
</tr>
<tr>
<td>Forward: Wheel_Left = 3 Wheel_Right = 3</td>
</tr>
<tr>
<td>Forward: Wheel_Left = 3 Wheel_Right = 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop: Wheel_Left = 0 Wheel_Right = 0</td>
</tr>
<tr>
<td>Stop: Wheel_Left = 0 Wheel_Right = 0</td>
</tr>
<tr>
<td>Stop: Wheel_Left = 0 Wheel_Right = 0</td>
</tr>
<tr>
<td>Stop: Wheel_Left = 0 Wheel_Right = 0</td>
</tr>
</tbody>
</table>

4. **Code editor**

You can use the following tools to edit the C code:

NotePad, NotePad ++, WordPad, Sublime Text 3, etc

5. **Compiler**

The C code **has to be** built into .DLL type using build-in compiler in CoSpace Rescue program. All other compiler cannot be used.

6. **Sample Code**

A sample program “**C Code Sample**” is attached for your reference