ME729 Advanced Robotics - Lab #3

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❑ Objectives

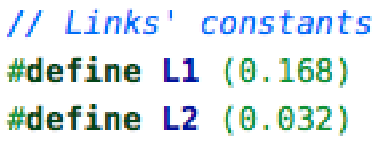
- To understand inverse kinematics and implement a closed-form solution of inverse kinematics for the 2-link planar manipulator.
- To verify that the robot moves toward a desired position.

❑ Tasks

- Write a subroutine to compute a closed-form solution of the 2-link planar manipulator.

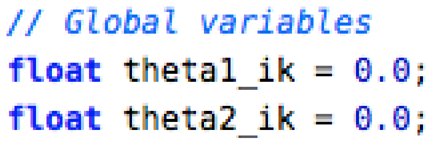
❑ Sample source code

- Download “Inv_Kine_closed_form_blanks.nxc” from class web page.
- A breakdown of the code.



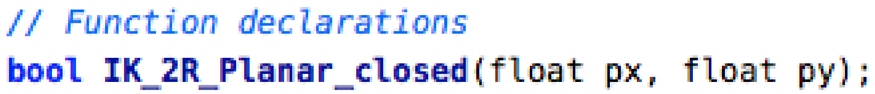
```
// Links' constants
#define L1 (0.168)
#define L2 (0.032)
```

Link lengths.



```
// Global variables
float theta1_ik = 0.0;
float theta2_ik = 0.0;
```

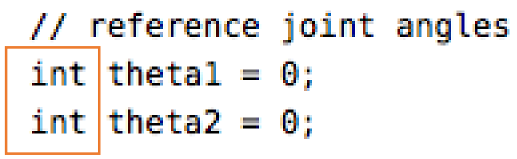
Global variables for saving the result angles computed by the subroutine.



```
// Function declarations
bool IK_2R_Planar_closed(float px, float py);
```

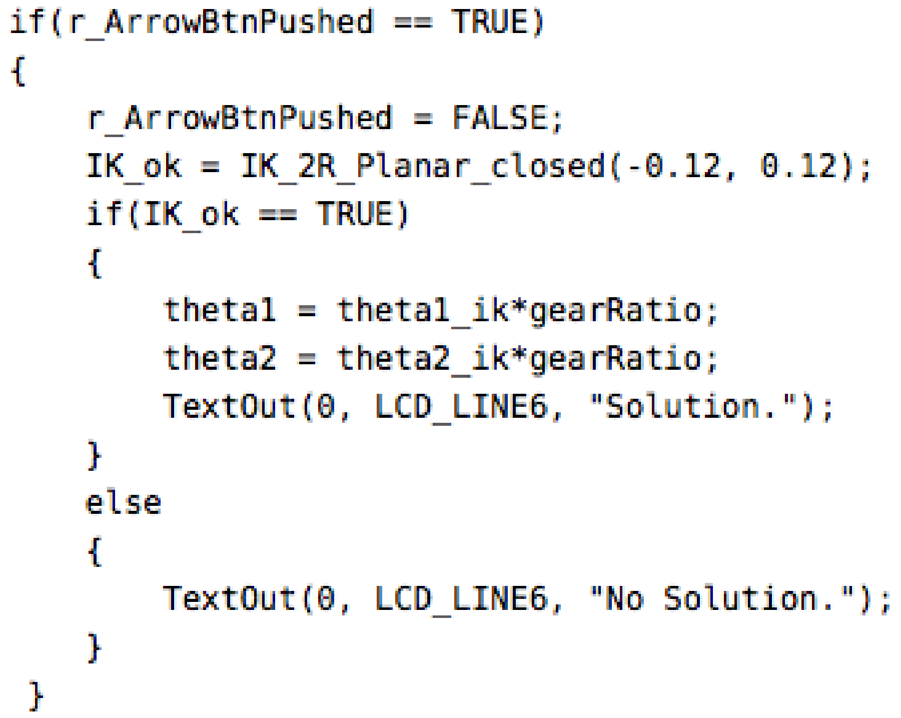
The subroutine declaration.

- A breakdown of the code – continued.



```
// reference joint angles
int theta1 = 0;
int theta2 = 0;
```

Switch “long” to “int”.

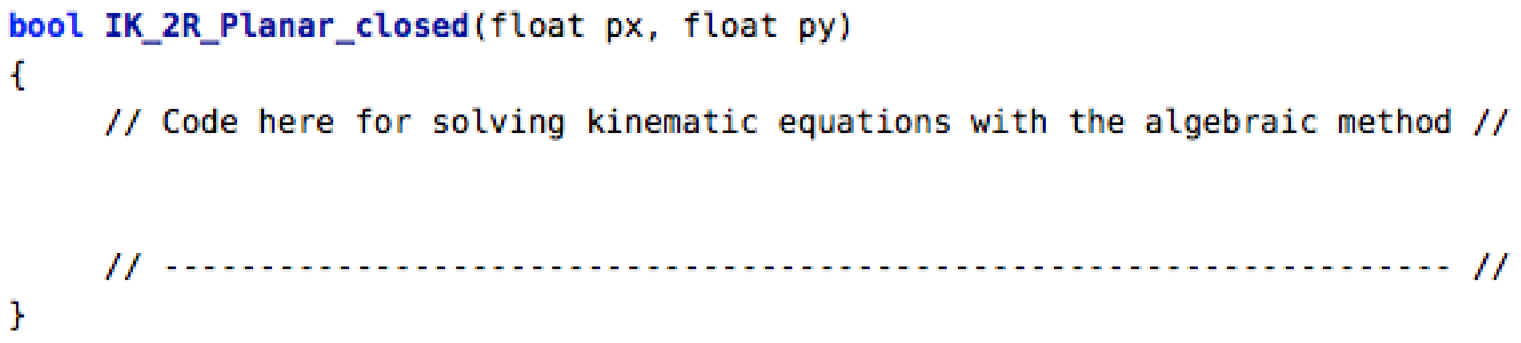


```
if(r_ArrowBtnPushed == TRUE)
{
    r_ArrowBtnPushed = FALSE;
    IK_ok = IK_2R_Planar_closed(-0.12, 0.12);
    if(IK_ok == TRUE)
    {
        theta1 = theta1_ik*gearRatio;
        theta2 = theta2_ik*gearRatio;
        TextOut(0, LCD_LINE6, "Solution.");
    }
    else
    {
        TextOut(0, LCD_LINE6, "No Solution.");
    }
 }
```

Use a closed-form method to find a solution of a given position .

Check the result of inverse kinematics.

- A breakdown of the code – continued.



```
bool IK_2R_Planar_closed(float px, float py)
{
    // Code here for solving kinematic equations with the algebraic method //


    // ------------------------------------------------------------------ //
}
```

Here is your work.

  - Two inputs: a desired position (p_x, p_y).
  - One output: the result of inverse kinematics.
    e.g. if true, exist a solution, but if false, no solution.