Sheridan Institute of Technology and Advanced Learning Faculty of Applied Science and Technology

ENGI30172: Robotic Applications

Work Object Project #1

Class Section #: 1175_78890

Station # 4

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Task Description

For this Project, the main task was to use create subroutines in a program on the flex-pendent that would enable the robot to move along the desired path with respect to the TCP reference points and the location of the work object. These positions of the work-object in the program were called wobj 1 and wobj 0 in the program. By changing In this lab, the work-cell consisted of the robot, the flex-pendent and an IRC5 controller, a tool, and a work-object. Before the procedure was conducted, all electronic devices and other objects are cleared from the work-cell to ensure that the robot has enough space to move around. During the experiment, the intended outcome was for the robot to create a square path on the work-object based on move L commands made in the flex-pendent, and then after setting the work-object's position from wobj 1 to wobj0, the robot would be able to recognize and adjust to the new coordinates of the work-object and replicate the same desired path on the paper.

List of Equipment

- Robot Model: ABB IRB 120 Robot
- Grid Paper
- Pencil (Tool)
- Masking tape
- Robot studio (Computer in the lab)

Layout Diagram

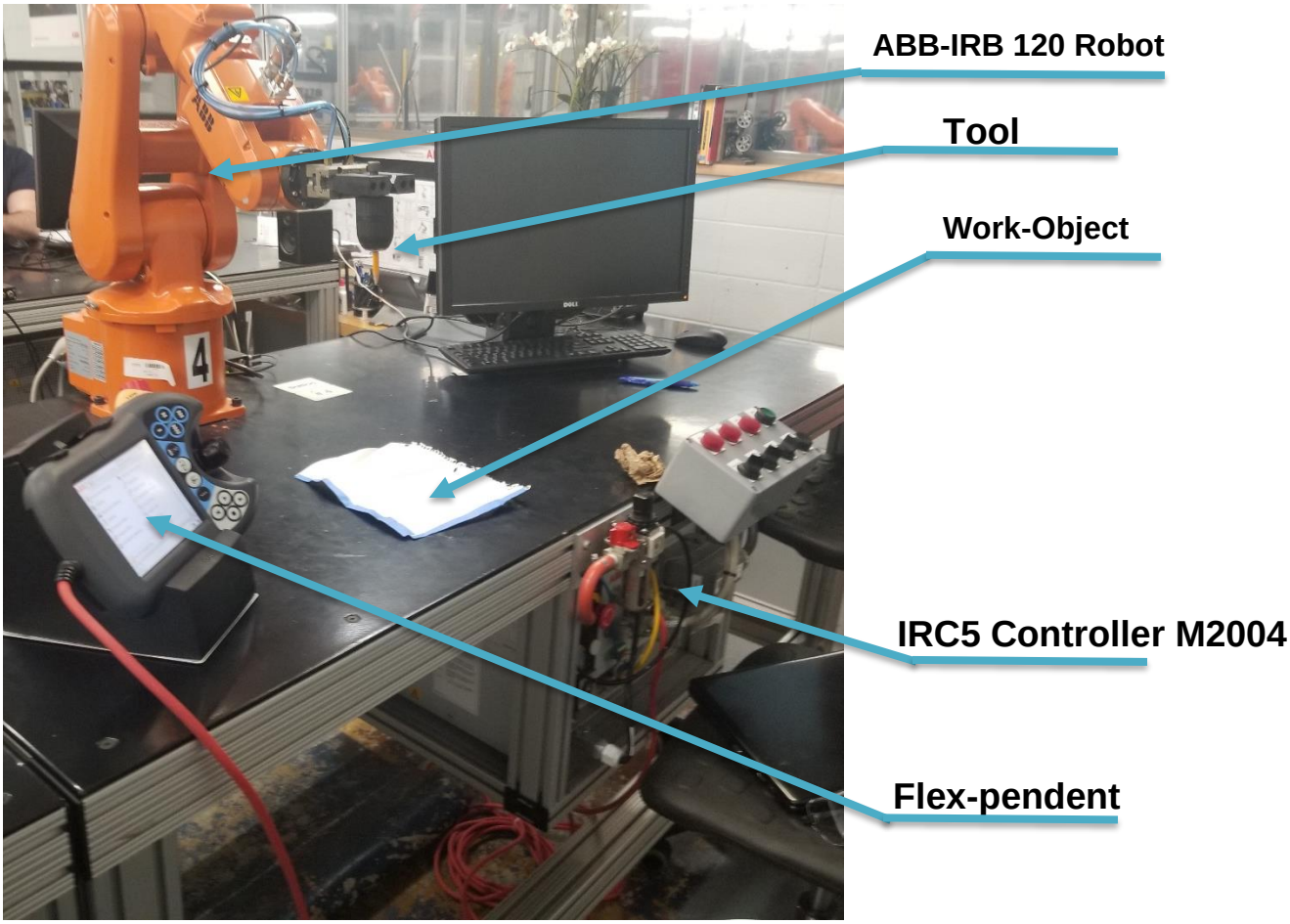

Figure 1: Work-cell project 1 layout

System Setup

The lab was completed in the following steps

Step 1: Setup the work-cell (Turn on IRC5 controller & Flex-pendant)

Step 2: Attach the tool to the mechanical pneumatic gripper

Step 3: Place the Work-object (paper) in the desired position and use masking tape to secure the paper

Step 4: Plot desired points on the grid paper.

Control Program

```
MODULE MainModule
     TASK PERS tooldata
tool1:=[TRUE,[[128.783,3.3978,120.938],[1,0,0,0]],[0.5,[0.5,0,0]
,[1,0,0,0],0,0,0]];
     TASK PERS wobjdata
wobj1:=[FALSE,TRUE,"",[[0,0,0],[1,0,0,0]],[[472.088,117.355,-
30.9741],[0.999766,-0.00399332,0.00719533,0.0200184]]];
     TASK PERS wobjdata
wobj0:=[FALSE,TRUE,"",[[0,0,0],[1,0,0,0]],[[0,0,0],[1,0,0,0]]];
     CONST robtarget p10:=[[-0.09,-
0.13,1.20],[0.717311,0.0153363,0.695628,-0.0364971],[0,0,-
1,1],[9E+09,9E+09,9E+09,9E+09,9E+09,9E+09]];
     CONST robtarget
p20:=[[191.41,0.31,2.94],[0.717319,0.0153564,0.69562,-
0.036484],[0,0,-1,1],[9E+09,9E+09,9E+09,9E+09,9E+09,9E+09]];
     CONST robtarget
p30:=[[188.50,152.89,3.05],[0.717303,0.0153705,0.695636,-
0.0364932],[0,0,-1,1],[9E+09,9E+09,9E+09,9E+09,9E+09,9E+09]];
     CONST robtarget p40:=[[-
2.09,157.37,5.30],[0.717278,0.0153628,0.695661,-
0.0365001],[0,0,-1,1],[9E+09,9E+09,9E+09,9E+09,9E+09,9E+09]];
     CONST robtarget p50:=[[-
2.09,157.37,5.30],[0.717277,0.0153633,0.695661,-
0.0365007],[0,0,-1,1],[9E+09,9E+09,9E+09,9E+09,9E+09,9E+09]];
     PROC main()
          MoveL p10, v1000, fine, tool1\WObj:=wobj1;

          MoveL p20, v1000, fine, tool1\WObj:=wobj1;
          MoveL p30, v1000, fine, tool1\WObj:=wobj1;
          MoveL p40, v1000, fine, tool1\WObj:=wobj1;
          MoveL p10, v1000, fine, tool1\WObj:=wobj1;
     ENDPROC
ENDMODULE
```

Observations

For this project, the main objective was to create a program using the flex-pendant that would always allow the robot to follow a desired path on the work-object, despite the change in the work-object's location. After the experiment was conducted however, the results showed that when the location of the work-object had changed, the robot was either unable to follow the desired path on the work-object or the robot would nearly crash the floor of the work-cell.

Safety

Some safety precautions that were taken before the experiment had started, was to ensure the work-cell is free of materials that was in the work space parameter. Also, during the experiment when the robot was in motion, various increments in the flex-pendant were used to control the speed of the robot to prevent the robot from crashing while ensuring proper precision.

Discussion

Originally, using 2 subroutines with respect to the work object's coordinates on the work-cell, the robot would have successfully completed the task of drawing a square pattern in the same location on the work object, despite the paper's change in position. However, in the lab the robot was unable to repeat the desired path in the 2nd sub routine. Some reasons behind this could due to slight deviations in the coordinates of the 2nd routine which may have caused inaccurate measurements in the program and causing the robot to miss the desired location on the paper.