CIS 375
Prof. Abou - Nasr
Adeept Robot Arm

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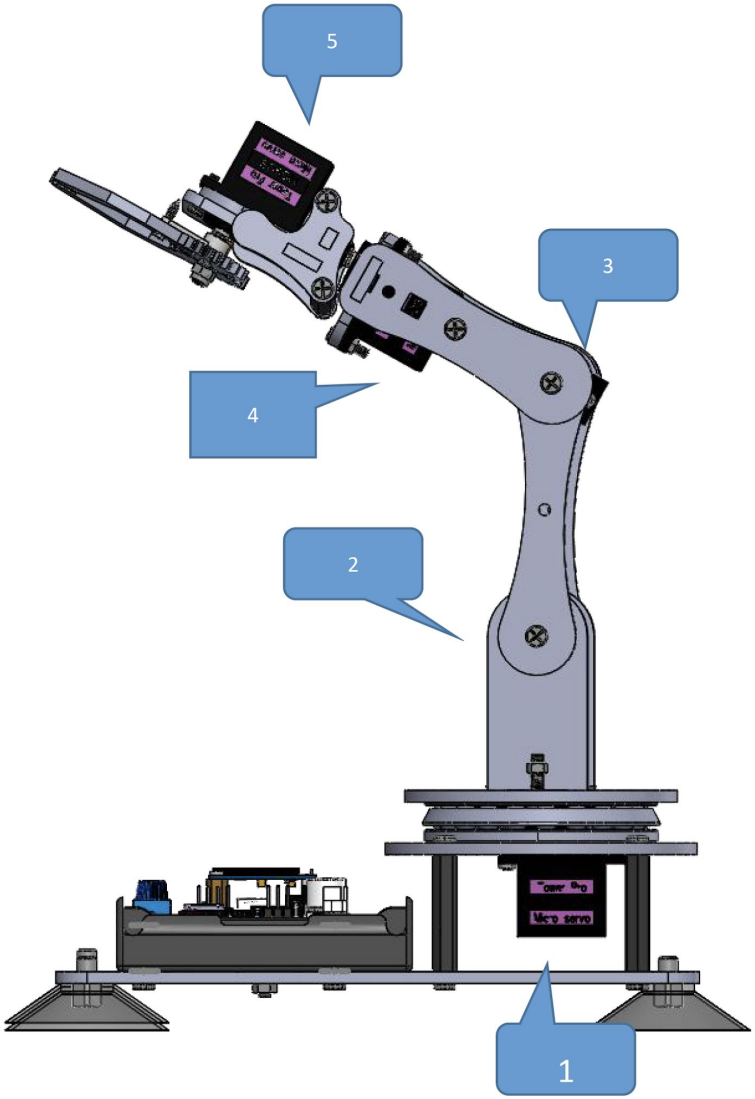
Introduction

- **What is Adeept Robotic Arm?:** Programming Robot Arm Kit with handle PC software and App control.

- **The difference between robotic and human arm:** is flexibility and strength which it can repeat the same motion without feeling tired.

- **The advantage of this robotic learning kit:** that we learned how to assemble a robotic arm, how to write the code to control the arm to perform the specific motion, how to write PC software and send motion commands to the robotic arm with Processing and how to write the motion of the servo of the robotic arm with Arduino



Standardization of Adeept Robot Arm

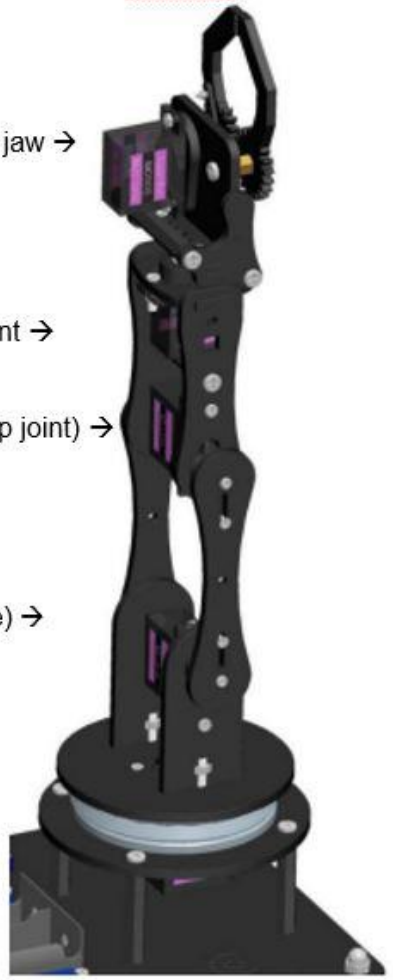
Pin 11 end of arm tooling – jaw →

Pin 3 wrist joint →

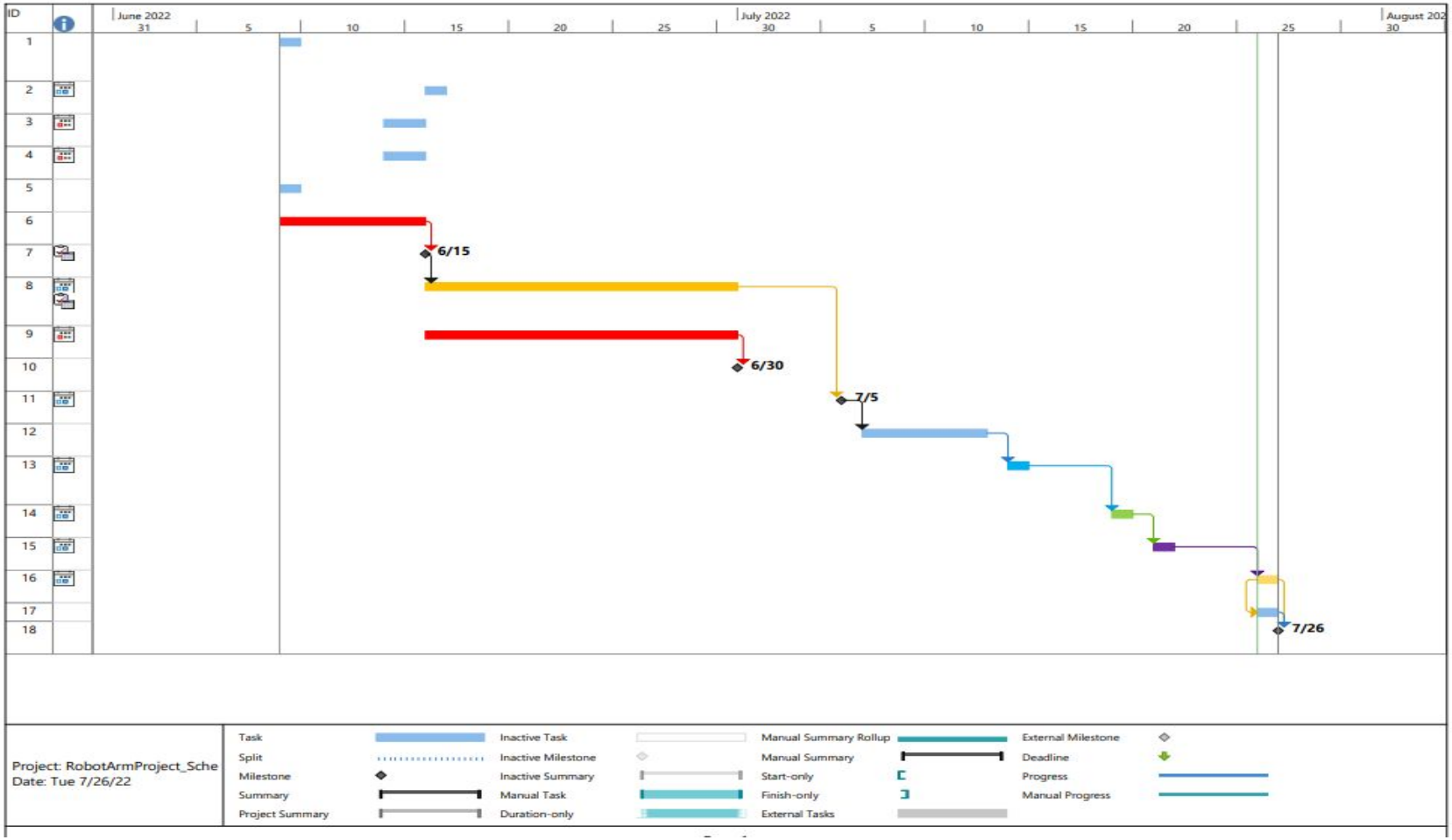
Pin 5 middle joint (above hip joint) →

Pin 6 Hip Joint (above base) →

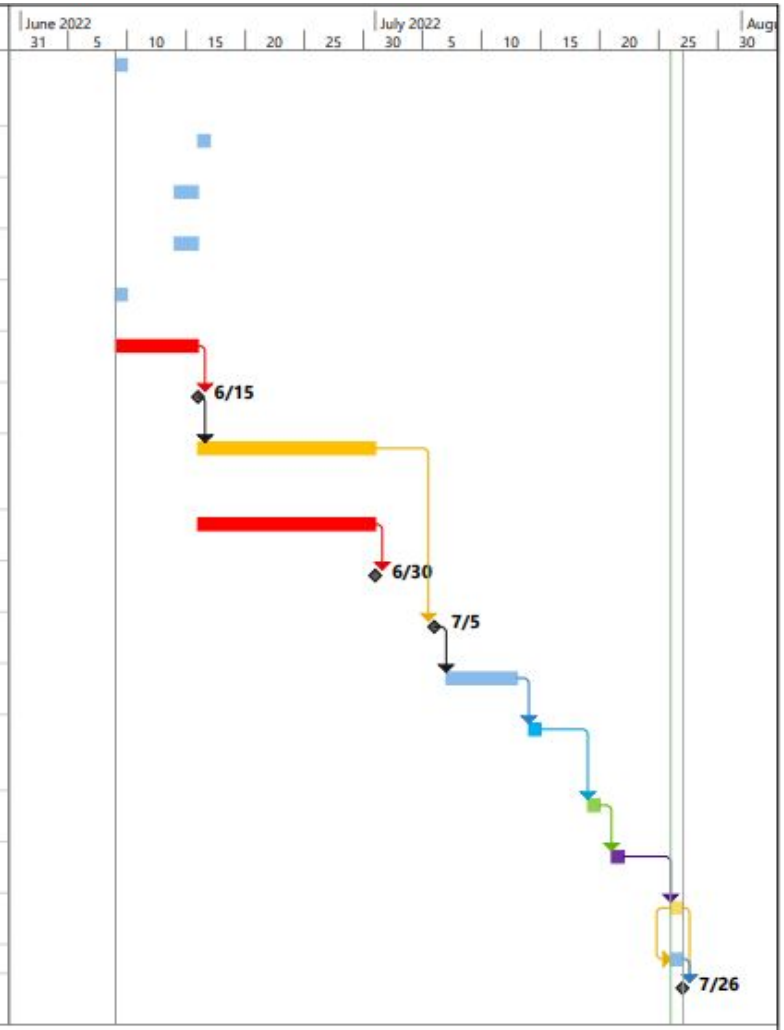
Pin 9 rotating BASE →



Project Management and Timeline (using MS Project)



ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		Build The Arduino Development Environment	1 day	Thu 6/9/22	Thu 6/9/22		
2		Read Data from Potentiometer	1 day	Thu 6/16/22	Thu 6/16/22		
3		Establish How to Control the Servo	2 days	Tue 6/14/22	Wed 6/15/22		
4		Display Text on OLED Screen	2 days	Tue 6/14/22	Wed 6/15/22		
5		Save Data with EEPROM	1 day	Thu 6/9/22	Thu 6/9/22		
6		Assemble Robot Arm 1	5 days	Thu 6/9/22	Wed 6/15/22		
7		Robot 1 Assembled + controls tested	0 days	Wed 6/15/22	Wed 6/15/22	6	
8		Program Standardization of Robot Joints	4 days	Thu 6/16/22	Thu 6/30/22	7	
9		Assemble Robot Arm 2	4 days	Thu 6/16/22	Thu 6/30/22		
10		Robot 2 Assembled + controls tested	0 days	Thu 6/30/22	Thu 6/30/22	9	
11		Complete Robot Standardization	0 days	Tue 7/5/22	Tue 7/5/22	8	
12		Controlling the Robotic with GUI	2 days	Thu 7/7/22	Tue 7/12/22	11	
13		Decide on a set of basic robot programs	1 day	Thu 7/14/22	Thu 7/14/22	12	
14		Design Robot Programs	1 day	Tue 7/19/22	Tue 7/19/22	13	
15		Implement Robot Programs	1 day	Thu 7/21/22	Thu 7/21/22	14	
16		Work on Project Presentation	1 day	Tue 7/26/22	Tue 7/26/22	15	
17		Edit Video Footage	1 day	Tue 7/26/22	Tue 7/26/22	16SS	
18		Project Complete - Present Project	0 days	Tue 7/26/22	Tue 7/26/22	16,17	



Project: RobotArmProject_Sche
Date: Tue 7/26/22

Task	Inactive Task	Manual Summary Rollup	External Milestone
Split	Inactive Milestone	Manual Summary	Deadline
Milestone	Inactive Summary	Start-only	Progress
Summary	Manual Task	Finish-only	Manual Progress
Project Summary	Duration-only	External Tasks	

Page 1

Building the Robot

Controlling the Robot via Knobs

Controlling the Robot via Software

Some Source Code Explanations

```
//SET UP SERVOS //servo.attach(int pin) or servo.attach(pin, minPulseVal, maxPulseVal)
base_d9.attach(9, pulse_width_min, pulse_width_max);//base rotator / rotator cuff!
shoulder_d6.attach(6);//bottom joint / shoulder!
elbow_d5.attach(5);//middle joint / elbow!
wrist_d3.attach(3);//top rotator / wrist
claw_d11.attach(11);//claw / fingers!
```

```
//SETUP OLED SCREEN
display.begin(SSD1306_SWITCHCAPVCC, 0x3C);
display.setTextColor(WHITE);//Sets the font display color
display.clearDisplay();//cls
//Set the font size
display.setTextSize(2);
//Set the display location
display.setCursor(30,30);
//String displayed
display.print("TEST");
//Began to show
display.display();
```

```
void reset()
{
  write_set_speed(base_d9, 180, delay_val_resetfx);//180
 // delay(delay_val_resetfx);
  write_set_speed(shoulder_d6, 0, delay_val_resetfx);//0
  //delay(delay_val_resetfx);
  write_set_speed(elbow_d5, 15, delay_val_resetfx);;//15
  //delay(delay_val_resetfx);
  write_set_speed(wrist_d3, 90, delay_val_resetfx);;//90
  //delay(delay_val_resetfx);
  write_set_speed(claw_d11, 180, delay_val_resetfx);//180 to

}
```

Some Source Code Explanations

```
,
//joint == name of the servo you want to move,
//angle == the angle you want to move the servo to,
//execSpeed_ms == total time (in ms)
//the move should take to complete
//written by Demetrius Johnson
void write_set_speed(Servo &joint, int angle, int execSpeed_ms)
{
  //read(); function gives current angle of the motor (0 to 180).
  int angle_difference = angle - joint.read();
  if(angle_difference == 0) //divide by 0 case and no need to do this function since no motion required.
    return;
  int pulse_ms = execSpeed_ms / angle_difference;
  if(pulse_ms < 0)
    pulse_ms *= -1; //make sure pulse time is positive or else delay() function will fail.
  //if difference > 0, we need to use addition to get to goal;
  //if difference < 0, we need to use subtraction to get to goal.

  if(angle_difference > 0)
  {
    for(int i = joint.read(); i < angle; i++)
    {
      joint.write(i);  //write one degree
      delay(pulse_ms); //delay for necessary ms so that when loop finally exits: speed of move == execSpeed_ms
    }
   }
  else if(angle_difference < 0)
  {
    for(int i = joint.read(); i > angle; i--)
    {
      joint.write(i);
      delay(pulse_ms);
    }
  }
}

void reset()
```

Some Source Code Explanations

```
//display a timer on the OLED screen.
//Time_seconds == the amount of time (in seconds)
//you want on the countdown timer.
void OLED_timer_countdownDelay(int time_seconds)
{

  for(int i = time_seconds; i >= 0; i--)
  {

  //Set the display location
  display.setCursor(30,30);
  //String displayed
  display.print("TEST");
  display.print(i);
  //Began to show
  display.display();
  delay(1000);
  display.clearDisplay();
  count--;
  }
}
```

Source Code (Program) Live Demonstration

1. Showing the countdown timer.

2. Showing the angle and speed of execution function.

The Team

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Any Questions?