

Daffodil International University
Summer 2021

Teacher Initial:
FR

Department of Computer Science and Engineering
Midterm Open Book Examination Answer Script

Full Marks: 25 Allowed, Time: 2:30 hrs.

Date: Sunday 4, July 2021

General Information (must be filled by the student)

COURSE CODE:

SECTION:

PROGRAM:

STUDENT ID:

TIME STARTED:

TIME ENDED:

[Student must either TYPE or HAND WRITE the answers in this template; In case needed just write your detail on the paper using hand]

Answer to the question no: 01

My Id 171-15-8640.

So diameter $X = 40 + 3 = 43$

1. Circumference = $3.1415 * 43 = 135.08$

Distance travel = $5 * 135.08 = 6.75$ meter

2. 6.75 meter required for 5 encoder

so 1.76 meter need for $1.76 * 5 / 6.75 = 1.30$ or 2 encoder

3. Here $Y = 675$ cm

So $X/Y = 675/43$

$c = 1$ count = 15.7 cm

We know $c = \pi * d$

$\Rightarrow d = c/\pi = 15.7 / 3.1415 = 5$ cm

So, here required 5cm diameter

Answer to the question no: 02**Necessary sensor for creating Helper-X robot:**

Ultrasonic Sensor: It detects obstacles. Mainly it finds distance between an obstacle and itself. If the distance is larger than a certain distance then it's warn for obstacles.

TouchSensor: It's used for sense touch. When something touches this sensor then it detects it.

Passive Infrared (PIR) sensor: It is used for detecting human presence.

Grid-EYE sensor: Every human radiates the infrared energy of a specific wavelength range. The Grid-EYE sensor detects the human using the infrared radiation radiated by the human body.

Necessary actuators for creating Helper-X robot:

Electric motors: Electric motors is the most common actuators in mobile robots, used both to provide location by powering wheels or legs, and for manipulation by actuating robot arms.

Artificial muscles: Artificial muscles of various types, none of which are very good approximations of living muscles.

Pneumatic and hydraulic: Pneumatic and hydraulic actuators, used in industry for large manipulation tasks but seldom for mobile robots

Helper-X's accuracy: Accuracy is the error between measurement result and the actual or true result being measured.

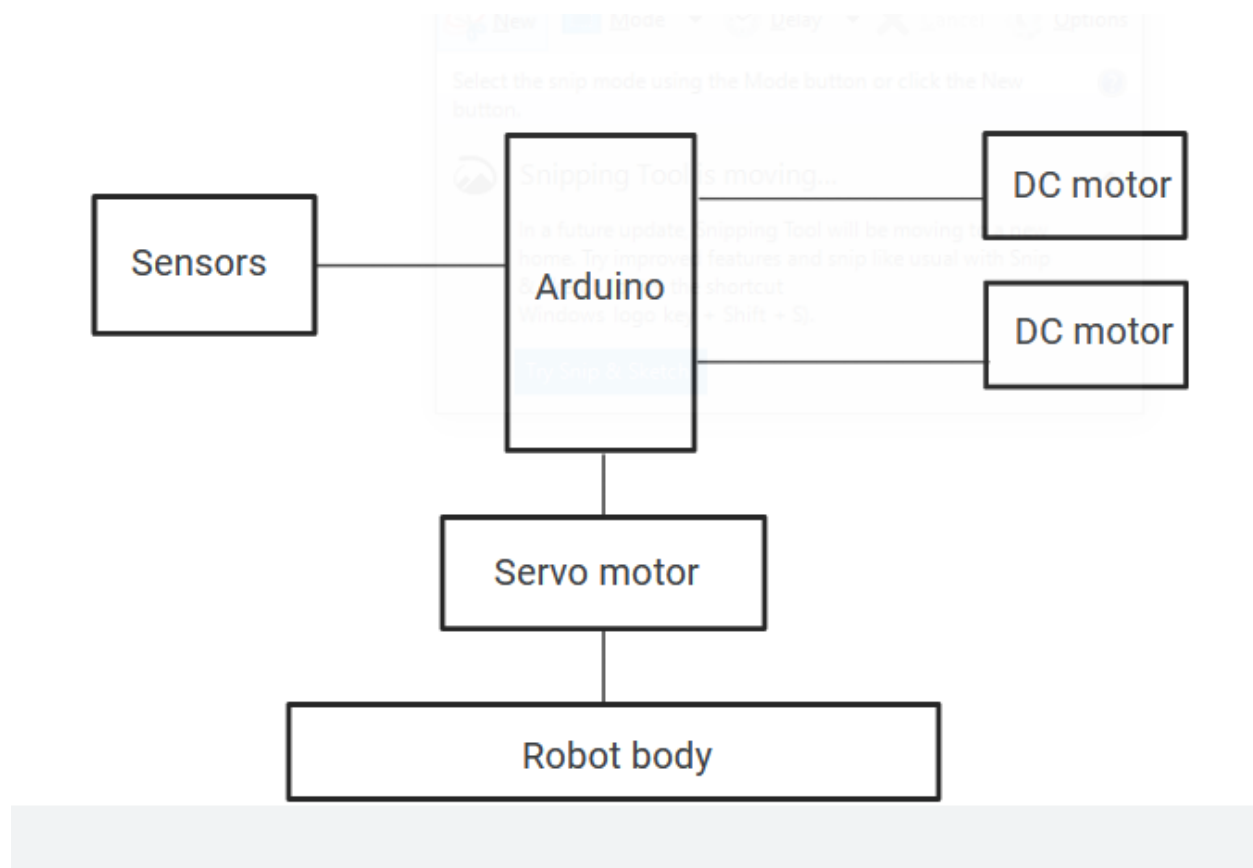
Helper-X's precision: Precision is the ability of the sensor to output the same value for the same input over a number of trials. For finding precision, for example I will try detect obstacle many times.

Helper-X's resolution: Resolution is the smallest increment of measure that a device can be made.

answer to the question no: 03**A.**

Servo Motor: Servo motor is a rotary actuator or linear actuator. It rotates an object at some specific angles or distance. For our project when the sensor found obstacle or need to change direction the we used servo motor.

DC Motor: A DC motor or direct current motor is an electrical machine that transforms electrical energy into mechanical energy by creating a magnetic field that is powered by direct current. When a DC motor is powered, a magnetic field is created in its stator. The field attracts and repels magnets on the rotor; this causes the rotor to rotate. To keep the rotor continually rotating, the commutator that is attached to brushes connected to the power source supplies current to the motors wire windings.



Workflow: Initial robot at point B. Sensors collect data and check if $B(x)$ is larger than current position $C(x)$ then the DC motor starts moving right and another motor remains stopped. Else servo motor changes direction by 180 degree and DC motor starts and robot goes to left side. Then it's check

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B(y) is larger than C(y) then another DC motor starts and the robot moves upward. Else servo motors change direction 180 degree and start moving downward and other motor remains stop. This way the robot will reach position B from A.

B.

Robot laws:

First Law: A robot may not injure a human being, or, through inaction, allow a human being to come to harm.

Second Law: A robot must obey orders given it by human beings, except where such orders would conflict with the First Law.

Third Law: A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

No, it's not the perfect robot for cut tree.

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