



AUTOMATION & ROBOTICS

eSERIES "GRADE SHEET"

NAME: _____
Partner: _____
Period: _____
Rotation #: _____

MODULE GRADE: COURSE GR. _____
 POST TEST _____ } MODULE AVE.= _____

A. & ROBOTICS "WORKSHEET" WORKSHEET TOTAL= _____

LAB PERFORMANCE: _____
 (If you are absent, write ABS on the line for the day you miss and **DISCUSS** what you need to make up with the teacher)
LAB PERFORMANCE TOTAL= _____

Extra Credit—Discuss this with the instructor before beginning!!!
 WORD SEARCH _____(5) CHALLENGES _____(5)
 MODULE REPORT _____(5) Make your own "Program" (discuss with teacher first) _____
 MODULE NOTES _____(0-10)
TOTAL EXTRA CREDIT= _____
 BONUS POINTS *** = _____

AUTOMATION & ROBOTICS WORKSHEET

STUDENTS SHOULD NEVER MOVE THE ROBOT. LET THE TEACHER DO IT!!!!

LESSON 1 - "Getting to know the Lab Volt Robotic Arm". Have the teacher demonstrate using the robot. T.I.: _____

Write the "Extremes of the Armdroid Robot": _____

_____ (use back if needed).
USING THE ROBOT. Demonstrate to the teacher the "Extremes" of the robot. **T.I.:** _____

LESSON 2 –Save your "Getting with the Program (used in Lesson 4).

LESSON 3 – Did your program hit the obstacle (before editing)? Yes or No (circle one)

Why is it necessary to avoid obstacles: _____.(5)

Show your instructor the program Lesson 3A, An Obstacle-First Part (Skip the second part of An Obstacle). **T.I.:** _____(5)

LESSON 4 -Write three reasons why you change speeds on the worksheet.

“Write two reasons why you change speeds:” 1) _____,

2) _____. 3)_____.

Environmental Impacts—Write notes from video clips.

Env. Impacts Paper: _____.(5)

LESSON 5 –

Write the “Five Components of a Robotic System”: _____

_____.(5)

Show the program “A Complete Automated System” to the instructor.

T.I.: _____

LESSON 6 – Using RoboCim-Show the teacher you can move the robot using RoboCim.

T.I.: _____

LESSON 7- Methods of Programming-Show the teacher the program you created using RoboCim software and then execute the program with the real robot in “Control” mode.

T.I.: _____

LESSON 12-

Career Guidance Report-

C.G. Notes: _____.(10)

Study Guide--Turn in

STUDY GUIDE: _____.(5)

Worksheet Total: _____



Automation & Robotics Study Guide for Post Test

1. 1-A Brief History of Robotics was the first real, programmable robot that brought together machine and electronic technologies.

Unimate ENIAC RUR Lab-Volt Robot Arm

2. All of these items were precursors to the invention of the robot except: (1-A Brief History of Robotics)

Jacquet-Droz's writing doll Egyptian water-powered clocks Mars rover Greek mechanical birds

3. The 2-A Robotics System (also 6-Components of a Robotics System) tells the robot what to do. controller end effector teach pendant program

4. The robot's 2-A Robotics System was the cause of robots replacing a lot of the old hard automation, the heavy machinery that was the heart of the Industrial Revolution.

flexibility speed accuracy patience

5. What criteria should you use when programming the robot's speed? (3-An Obstacle)

The speed must always be as high as possible.

The speed must be adjusted according to the weight of the objects being moved.

The speed does not need to be programmed.

The robot will work best at very slow speeds.

6. What is the best way of testing a new program? (2-Getting with the Program Screen 13 & 14)

Run a computer simulation.

Test the robot by placing lots of obstacles in the work envelope.

Test the robot with no obstacles in the work envelope.

Step through the program a point at a time.

7. The upper and lower limits allowed in manufacturing a part is also called 4-Speed Need.

work envelope tolerance synchronization standards

8. Length of time to complete a process can be important, especially if the operation must be run in _____ with other automated procedures.

tolerance the same building synchronization agreement

9. The Lab-Volt Robot Arm is a(n) _____ system, which means it doesn't know when it has gone too far.

closed-loop open-loop limited Impolite

10. Capabilities and limitations of robots can be examined in terms of accuracy, repeatability, and 5-Advantages and Limitations of Robots: Video.

expense absenteeism tax credits payload

11. *RoboCIM* is a software application that allows you to 6-Using RoboCIM.

create programs perform simulation tests test the operation of the real system

All of the above are correct.

12. Essentially, if a robot's work envelope is a rectangle, that robot is the 6-Four Types of Robots type.

Cartesian Spherical Cylindrical Revolute

13. The robot used in this course is a 6-Four Types of Robots robot.

Cartesian Spherical Cylindrical Revolute

14. With this method of programming a robot, the operator uses a teach pendant to lead the robot through the desired positions. (7-Methods of Programming)

manual walk-through lead-through programming software programming

15. Examples of applications for this method of programming are robots used for painting with a spray gun or for arc welding. (7-Methods of Programming)

manual walk-through lead-through programming software programming

16. You can edit a program if you need to 8-Program Editing.

change commands delete commands. insert commands All of the above are correct.

17. Whenever a point is saved with new coordinates, you must enter the point's name exactly as it is recorded in the Point Recorder panel using the _____.

same font same case same typeface None of the above is correct.

18. Spot welding robots are used to move a 9-Spot Welding Robots to several welding positions.

gripper spot welding gun metal sheet All of the above are correct.

19. Usually the spot welding robot has several 9-Spot Welding Robots that allow it to approach points of its working envelope from any angle.

arms cables axes of motion None of the above is correct.

20. A gravity feeder works on the following principle – when the robot picks a part from the feeder, the next part in the feeder will 10-Lab Volt Gravity Feeder down to where the robot can grasp it.

be forced slide by gravity hold the part All of the above are correct.

21. When using a gravity feeder, the feeder 10-Lab Volt Gravity Feeder with the type of parts you are using.

will detect must be compatible does not need to know All of the above are correct

22. A stepper motor is a special type of electric motor that _____.

moves in increments turns smoothly turns very quickly None of the above is correct.

23. A rotary carousel is often used to move an object from one 11-Lab Volt Rotary Carousel to another in small areas.

robot conveyor feeder None of the above is correct.

24. What is meant by payback period? (12-Justifying a Robotics System)

The period where the cost of personnel equals the cost of the robot.

The period where the difference between labor savings and expenses equals the investment.

The period where the difference between the expenses and the investment equals the labor savings.

25. The period where the difference between the expenses and labor savings exceeds the d. investment.

What is the most common way of evaluating an investment? (12-Justifying a Robotics System)

Calculate the cost of investment.

Estimate the savings in operating costs.

Calculate the return on investment.

Calculate the return on expenses.

“SAVING YOUR PROGRAM” Activity

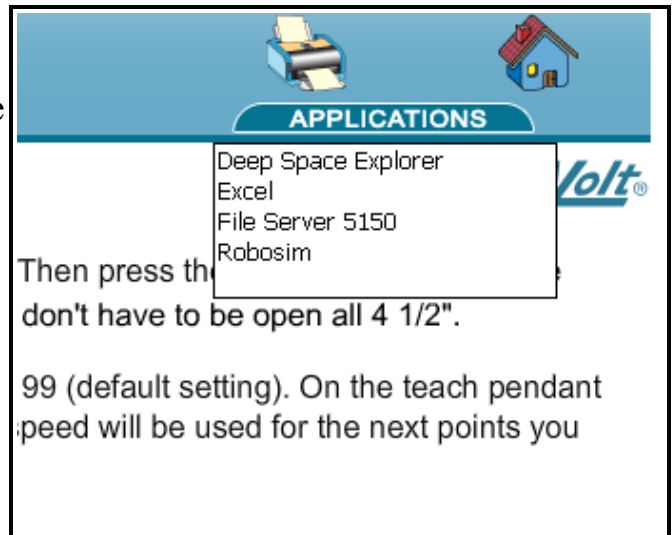
To Use The 5100/5150 File Server Software

TO SAVE:

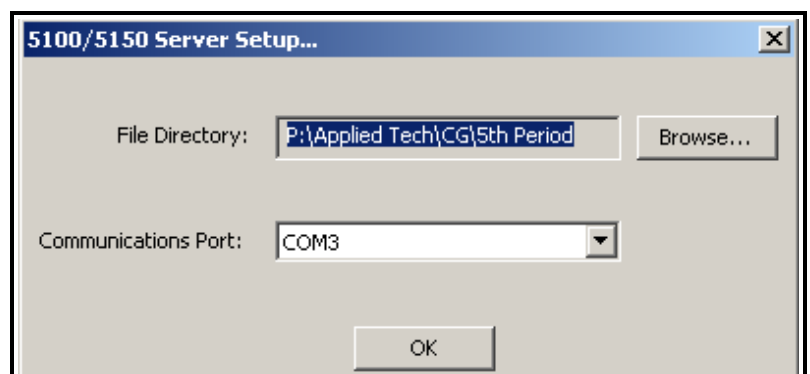
1. Be sure the gray USB plug is plugged into the back of the robot.
2. Be sure the Green “FS” icon is not on the running programs on the bottom right part of the windows list.



3. In the MINDSIGHT software on the upper right, click on “Applications” button and select “File Server 5100/5150” software. Have the teacher help you the first time with the following steps.

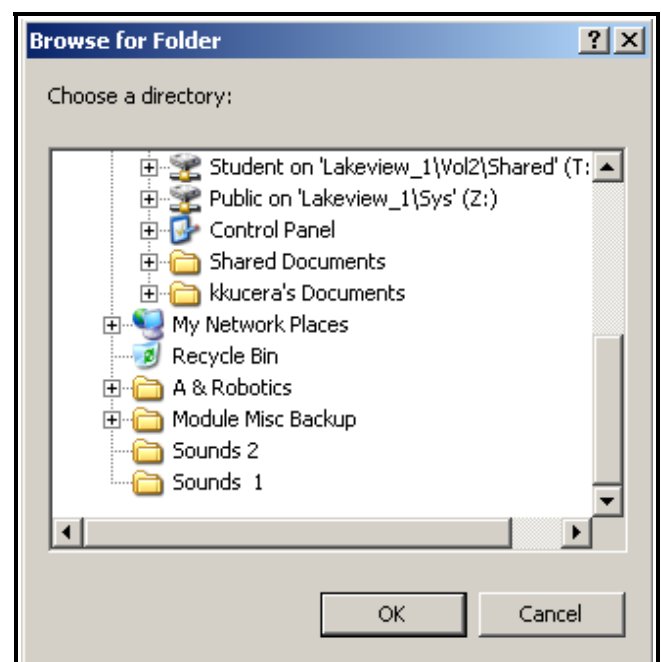


4. On the computer screen, you should see a “5100/5150 Server Set Up” box.



5. Click on the “Browse” button.

6. Go to the desktop folder called “A & Robotics”. Click the plus (+) sign to the left of the name.



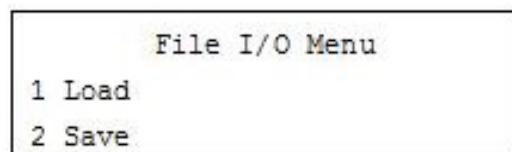
7. Find your class period folder and click on it. Click “OK” at the bottom of the box. This box will seem to disappear (but it really doesn't).

8. You should now see a green square with “FS” in it at the bottom right.

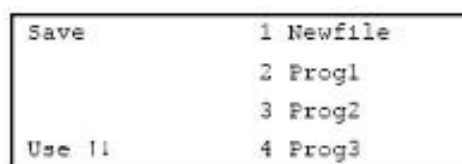


9. On the “Teach Pendant” box, be sure to press the “Main Menu” key. Then click button 5 for the “File I/O” choice. The teach pendant will then check to see if it can find the computer (Server).

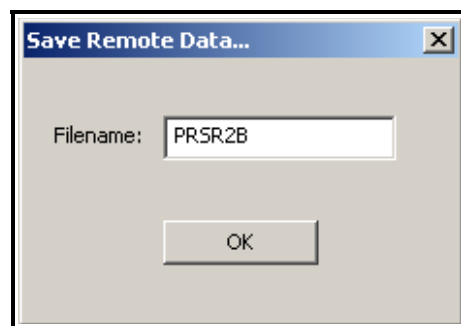
10. On the “Teach Pendant” you will press “2” for SAVE.



11. On the “Teach Pendant”, you will click “1” for Newfile.



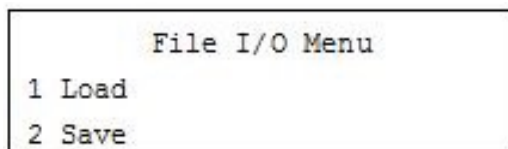
12. On the computer screen you will see a box titled: “Save Remote Data”. Type in the file name with your initials, your partners initials and the number of the lesson. (Example: PRSR2B). Click “OK”. Minimize the 5100/5150 File Server box. You will need to close this at the end of the period.



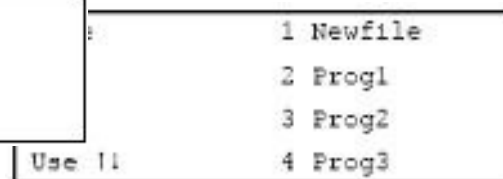
TO OPEN A FILE:

1. Be sure the USB plug is plugged into the robot.
2. Turn on the Robot.
3. Go to the “Main Menu” when it is ready and press “3” Initial.
4. Do a “1”, “Hard Home”.
5. Open the “File Server 5100/5150” software as you did before.
6. Browse for the class period folder you saved to before (Desktop, A& Robotics, and your class period folder). Click “OK”
7. From the Main Menu, Select “5” File I/O.

8. Press “1” for “Load”.



9. Using the up and down arrows find the file you saved.



10. Press the button for the file you saved from the list. (Example above: #3, Program 2).

11. Your program should be loaded and ready to be run or edit.

AUTOMATION & ROBOTICS

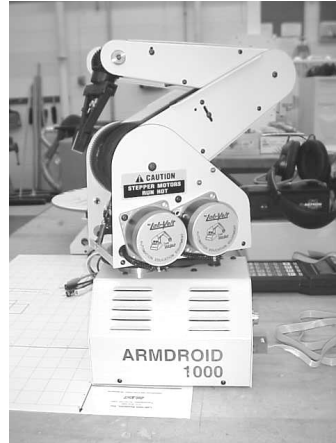
E	R	L	D	E	M	S	P	E	B	M	R	S	S	S
N	E	T	I	L	W	K	S	F	A	E	H	P	Y	T
V	P	R	O	B	G	A	Z	R	T	O	E	N	N	W
E	P	O	R	O	B	N	G	S	U	E	C	V	Y	B
L	I	O	D	W	F	O	I	L	D	H	T	U	F	F
O	R	F	M	H	R	N	D	Y	R	M	L	T	G	B
P	G	I	R	P	A	E	K	O	F	R	Y	O	L	U
E	U	C	A	C	R	T	N	F	P	I	M	M	K	N
F	N	M	M	N	O	I	T	A	M	O	T	U	A	E
B	R	G	R	K	Z	G	C	V	I	Z	B	S	G	M
J	L	O	I	A	M	R	A	R	E	P	P	U	U	J
R	K	O	T	N	E	S	T	E	P	P	E	R	K	J
Y	Z	I	C	O	E	R	C	Y	L	I	N	D	E	R
M	O	G	M	K	M	E	O	O	T	S	I	R	W	O
N	Y	S	Z	H	Y	P	R	F	A	R	M	C	V	W

ARM
ARMDROID
AUTOMATION
BASE
BLOCK
CANISTER
CYLINDER
ELBOW

ENGINEER
ENVELOPE
FOREARM
GRIPPER
JUSTIFYING
MENU
MOTOR
PROGRAM

SHOULDER
SPEED
STEPPER
SYNCHRONIZATION
UPPERARM
WRIST

EXTREMES OF THE ARMDROID 1000



To Set a “Hard Home”: Go to the “**Main Menu**” (the red dot should be on main menu), press “3” for **Initial**, press “1” for **Hard Home**, press “1” for **Yes**.

WORK ENVELOPE

From the Base to the Shoulder: The shoulder moves from R3,C0 to R3C11 (or from the green panel at Automation & Robotics to the green panel at Fluid Power). It rotates about 180 degrees.

From the Shoulder to the Upper Arm: the Upper Arm can go straight up and down 90 degrees (which is straight out).

From the Upper Arm to the Forearm: the Forearm can go straight out and down 90 degrees.

From the Forearm to the Grippers: the grippers can go straight out and down 90 degrees.

The **wrist** can turn the grippers 180 degrees around right and left.

The **grippers** can open up to about 3 1/2” and go all the way closed.

Automation & Robotics “BBBBBB”

Study Guide V6.0

Circle the correct answers to these questions as you come upon them during your next seven lessons. This study guide can then be used as a resource for your final test!

1. Module Introduction is the machine control or operation of equipment used in a process.
automation - robotics - application - mobilization
2. Module Introduction is the study of the design, theory, and application of robots.
Mechanics - Automation - Manufacturing - Robotics
3. The Industrial Revolution started in the mid-late Lesson 1-A Brief History of Robotics century.
18th - 20th - 17th - 16th
4. The Industrial Revolution took hold in North America Lesson 1-A Brief History of Robotics (Hot Word “Industrial Revolution”.
after the American Revolution - in the Mid-1800s - the Civil War - in the early 1700s
5. The Industrial Revolution started in Lesson 1-A Brief History of Robotics (Hot Word “Industrial Revolution”.
America - Asia - Africa - England
6. A natural ancestor to Lab Volt Robot Arm is the Lesson 1-A Brief History of Robotics, a hand device developed by Seiko.
manipulator - ENIAC - Unimate - Gog
7. The invention of the transistor by Lesson 1-A Brief History of Robotics greatly reduced the size of electronic equipment.
Bell Laboratories - Seiko - Henry Ford - Eckert and Mauchly
8. In 1801, one of the first machines programmed with punched paper tape was (the) Lesson 1-A Brief History of Robotics.
assembly line - ENIAC - Scribe - automatic weaving loom
9. Lesson 1-A Brief History of Robotics innovated the assembly line.
George Devol - Henry Ford - Seiko - John Mauchly
10. Lesson 1-A Brief History of Robotics was the first example of a programmable robot that brought machine and electronics technologies together.
Unimate - ENIAC - Magog - R2D2
11. Lesson 1-Here’s the Armdroid motors, used to control the joints on your robot arm, generate movement in short, measured bursts.
Progressive - Regressive - Stepper - Hydraulic
12. Lesson 1- Lesson Review, achieved with robots, plays a major role in the manufacturing industry.
Just-in-time inventory - Improved customer service - Automation - Manual ineptitude
13. Lesson 2-Reading Assignment (p. 185) is an application that a robot can perform.
Spray-painting - Industrial editing - Decision-making - Administration

14. Robots Lesson 2- A Robotic System understand anything they do.
do not think or - are programmed to - always - try to
15. The robot arm is operated electronically from the Lesson 2-A Robotic System Video.
voltmeter - dashboard - controller - monitor
16. The robot is an excellent tool for use in an automated industrial environment because of its ability to perform tasks that are Lesson 2- A Robotic System Video.
too skilled - too expensive - highly repetitive or boring - regenerative
17. The robot arm must be moved to a home position called the Lesson 2- Playing with Blocks (step 5) before you run any program.
start point - calibration point - reference tag - default position
18. You can operate Lab Volt Robot arm with the keys on the Teach Pendant from the Lesson 2- Getting with the program menu.
Main - Points - Teach - Initialize
19. The maximum distance a robot can move in all directions is its Lesson 2- Getting with the Program.
territory - realm - work envelope - home ground
20. The 1-A Brief History of Robotics created water-powered clocks and statues in 3000 B.C.
Greeks -- Romans -- Egyptians -- Phoenicians
21. The 2-A Robotics System capabilities of programmed robots allow change and make the robot adaptable.
re-do -- editing -- replacement -- learning
22. Robots are most productive when they do 2-Review & 6-Some Pluses and Minuses jobs
repetitive -- decision intensive -- specialized -- highly skilled
23. Setting a starting point is called 2-Playing with Blocks & 2-Review.
realization -- initialization -- recapitulation -- stabilization
24. An advantage of computer-controlled, industrial robots is that they can be 6-Review to do different jobs.
rebuilt -- reprogrammed -- manually controlled -- rewired
25. ??? is the manner, style, or method in which something is done.
Application -- Mode -- Initialization -- Alignment
26. A 2- A Robotics System Playing with Blocks is used to program some robots.
monitor -- controller -- voltmeter -- magnet
27. Hard Automation refers to 2-A Robotics System & 6-Video.
difficult tasks -- heavy machinery -- big robots -- heavy metal products
28. Automation and robotics have increased the demand for 7- Lesson Review.
engineers -- chemists -- assembly line workers -- biologists
29. Training as a (or an) 7-Video is excellent preparation for entering the field of robotics.
biologist -- historian -- programmer -- auto mechanic

30. A knowledge of 7-Review is necessary for a career in automation and robotics.
philosophy -- computers -- consumerism -- liberal arts