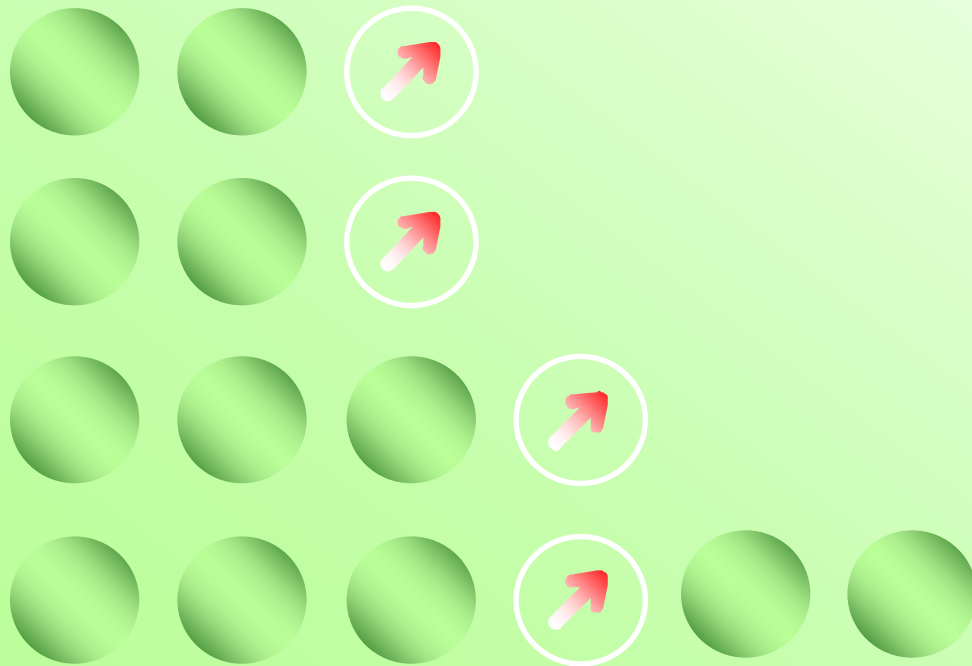# Interfacing the Microbot TeachMover
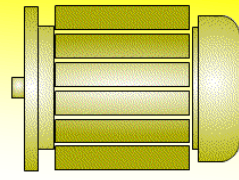# with a Personal Computer

05/07/2014

TARYUDI

**Department of Electrical Engineering
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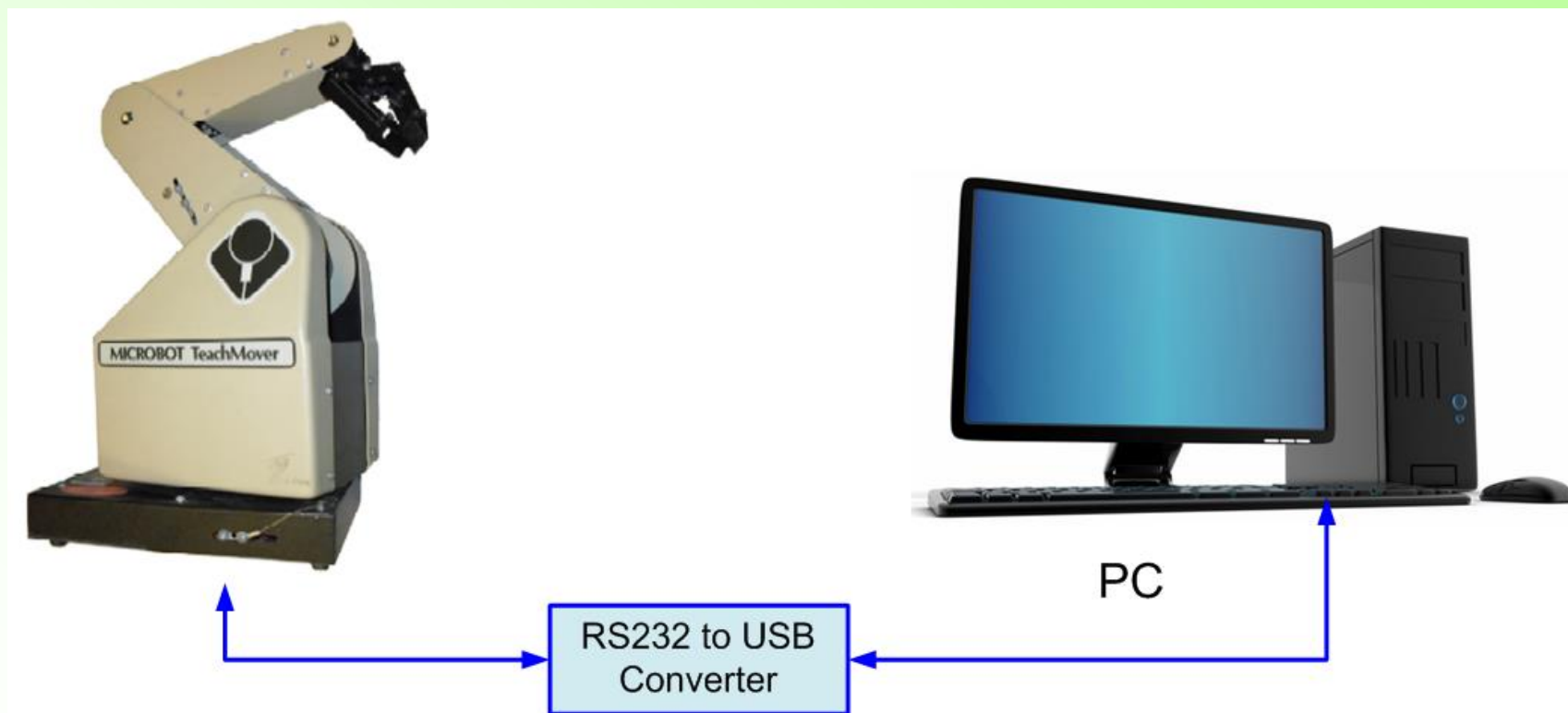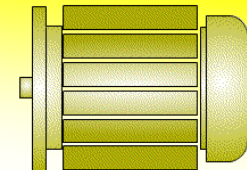Technology**

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MICROBOT TeachMover

PC

RS232 to USB Converter

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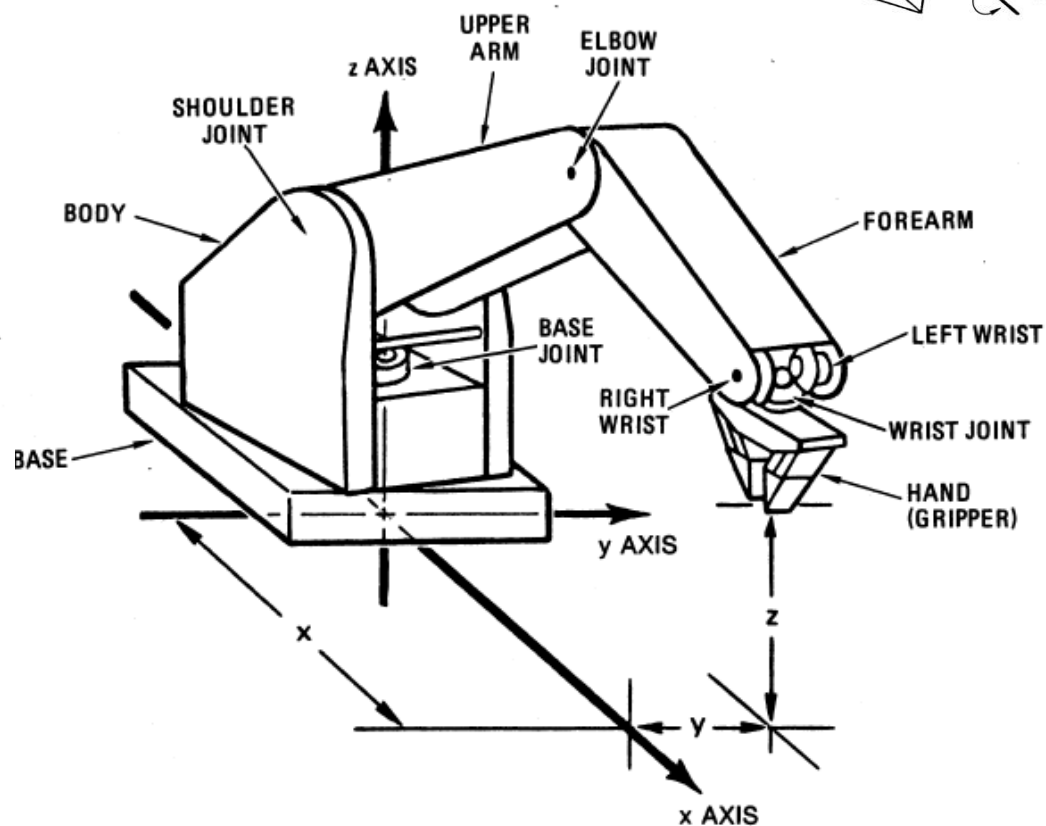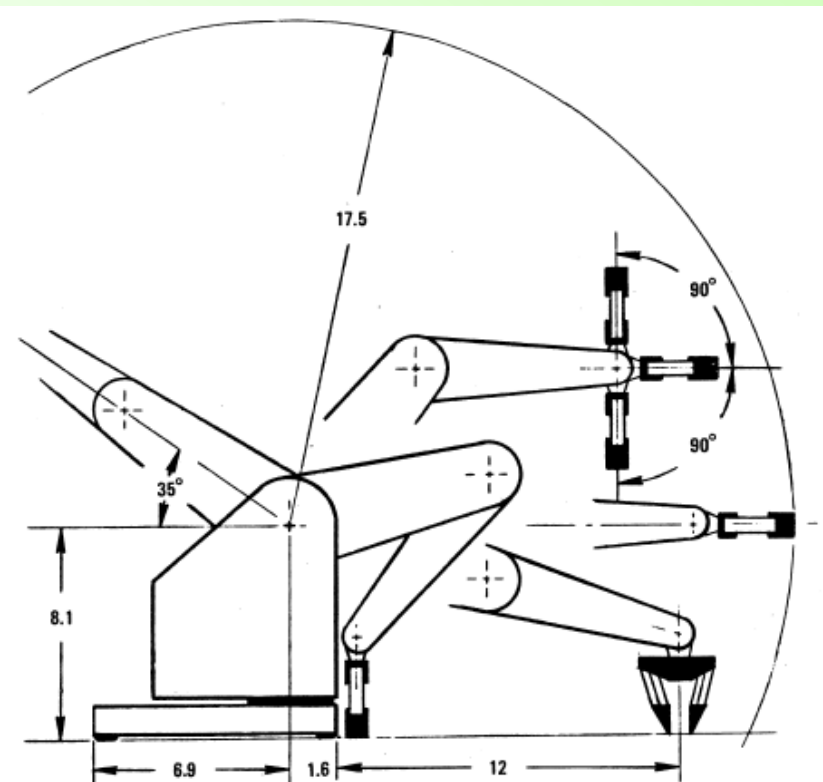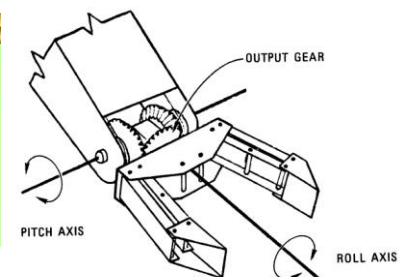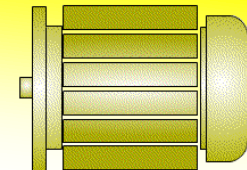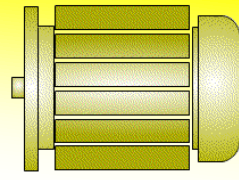- Software Design
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Microbot Mechanical Construction

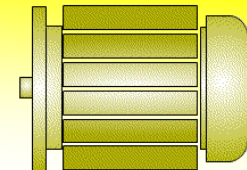**Department of Electrical Engineering**
Southern Taiwan University
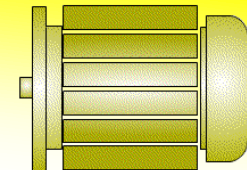
General Specification of Microbot

- Configuration : 5 revolution axes and integral hand
- Drive : Electric stepper motor
- Controller : 6502A Microprocesor with 4K bytes of EPROM and 1 K bytes of RAM located in base of unit.
- Interface : Dual RS-232C asynchronous serial communications interfaces (baudrate is switch-selectable between 110, 150, 300, 600, 1200, 2400, 4800, and 9600 bps)
- Teach control : 14 key 13 function keyboard; 5 output and 7 input bits under computer control
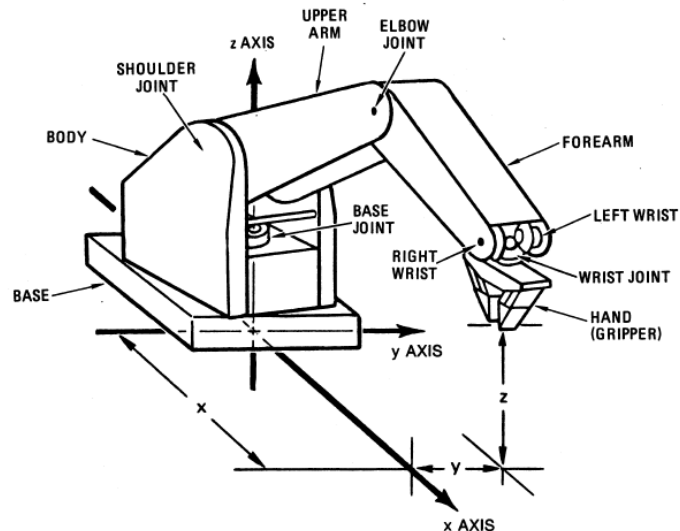
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Microbot Specification

MOTOR STEPS AND JOINT ROTATIONS

MOTOR	JOINT	STEPS PER DEGREE	STEPS PER RADIAN
1	Base	19.64	1125
2	Shoulder	19.64	1125
3	Elbow	11.55	672
4	Right wrist	4.27	241
5	Left wrist	4.27	241

Motion	Max range of motion	Speed(full load)	Speed (No load)
Base	± 90 °	0.37 rad/sec	0.42 rad/sec
Shoulder	+144 ° , -35 °	0.15 rad/sec	0.36 rad/sec
Elbow	+0 ° , -149 °	0.23 rad/sec	0.82 rad/sec
Wrist Roll	± 360 °	1.31 rad/sec	2.02 rad/sec
Wrist Pitch	± 90 °	1.31 rad/sec	2.02 rad/sec
Hand	0-3 in	8 lb/sec* (35n/sec)	(20mm/sec)

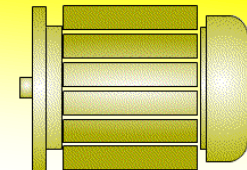# Contents

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Serial Communication

- Electrical Connections
- Baud rate   = 9600 bps
- Parity   = None
- Data bits   = 8 bit
- Stop bit   = 1

Null modem with loopback handshaking.

RS-232 or EIA 232 Standard Signal
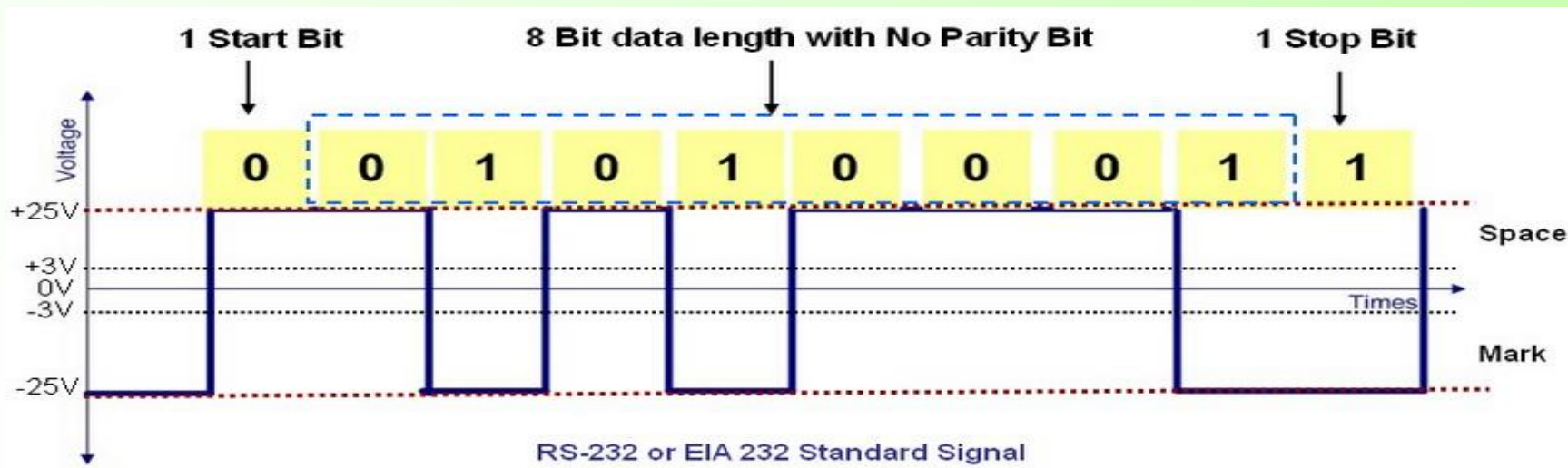
- **EXAMPLE**

@ = 40 (Hexadecimal)

= 64 (Decimal)

SPACE= 20 H

= 32 D

CR= 0D HEXA

= 13 D

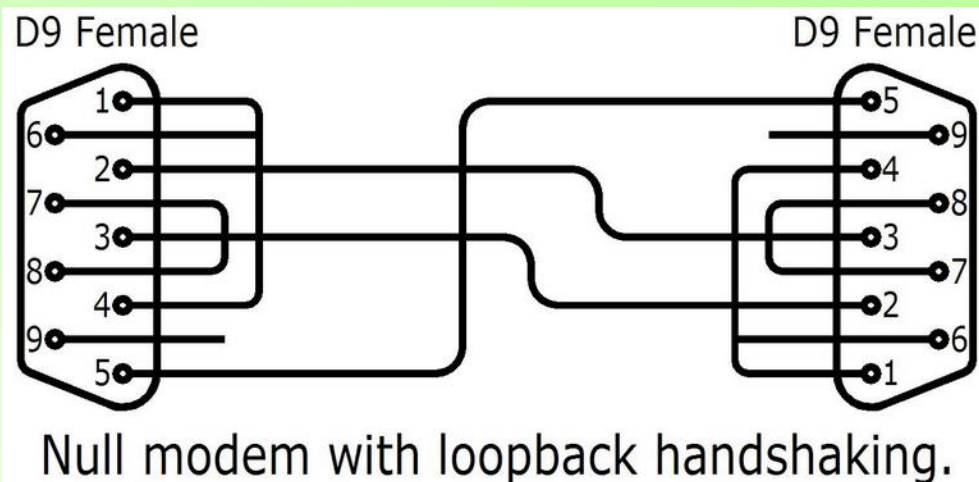|	0	1	2	3	4	5	6	7
0	NUL	DLE	space	0	@	P	`	p
1	SOH	DC1 XON	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3 XOFF	#	3	C	S	c	s
4	EOT	DC4	$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	del

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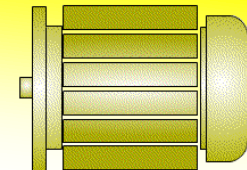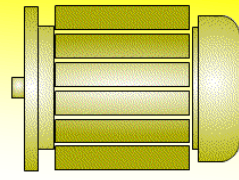
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- Algorithm

  - Initialization port

  - Open serial port

  - Read command

  - Setup command format

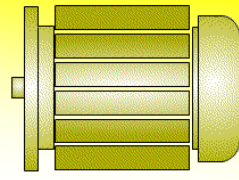 - Send command

  - Read feedback

Command Format

- **@STEP**

- The @STEP command causes all six of stepper motors to move simultaneously. The syntax of this command is:

- @STEP <SP>,<J1>,<J2>,<J3>,<J4>,<J5>,<J6>,<OUT>,<CR>

- Where:
    - <SP> gives the speed of motion (the value : 0 – 245)
    - <J1> to <J6> are the number of half- steps that each of the six motors is to be moved
    - <OUT> specifies the bit pattern to go to the user outputs
    - <CR> signifies carriage return

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- **@READ**

  This command is used to read the actual values of the internal position register. The syntax is:

  @READ<CR>

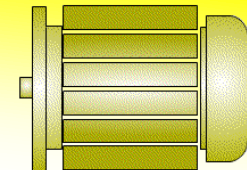 The arm responds with [0<CR>] or [1<CR>] followed by a string of numbers:

  <K1>, <K2>,<K3>,<K4>,<K5>,<K6>,<I><CR>

  Where:

- <K1> to <K6> are the actual value of each register for stepper motor 1 to 6, <I> is the output value

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Graphic User Interface Design
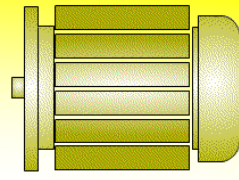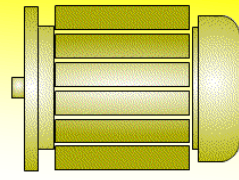
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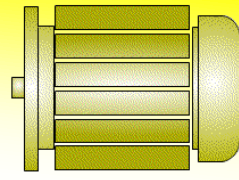
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- Video

- Hardware and Software

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- Manual book Microbot TeachMover 1984

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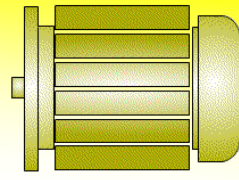**Southern Taiwan University**

Contents
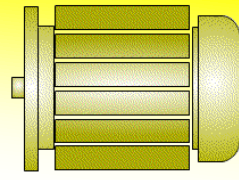
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- Interfacing Microbot teachmover with a PC using serial communication interface has been succeed.

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Thank you very much for your attention ..

Any Question
or
Suggestion ?

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