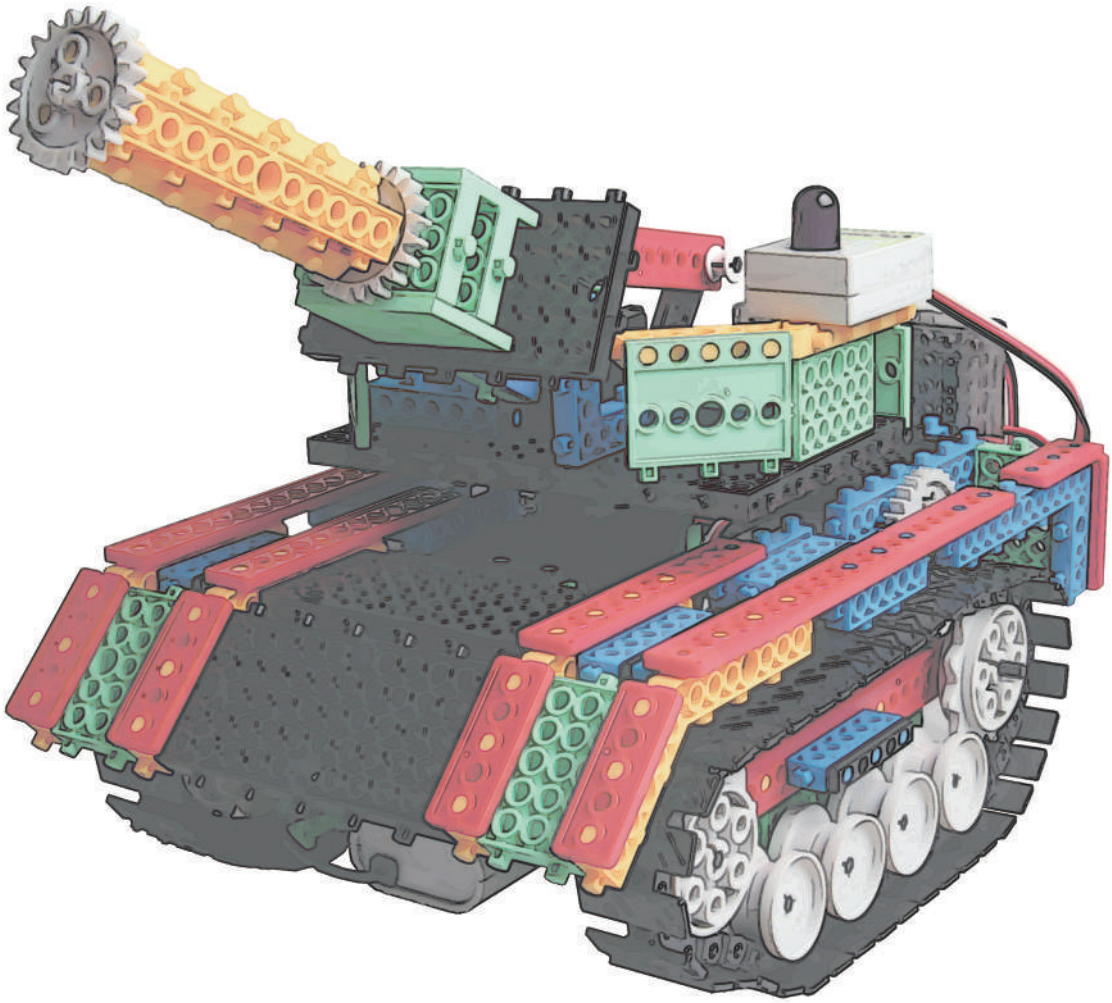
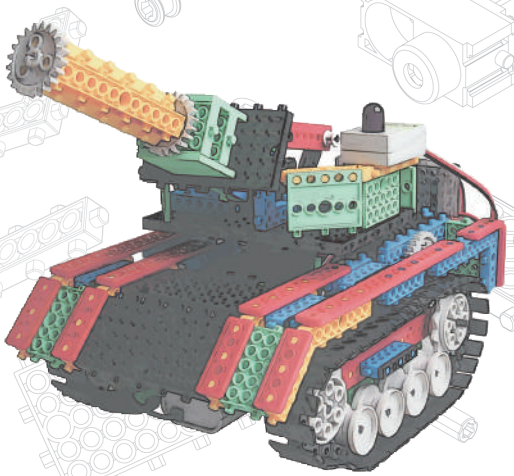
HUNAROBO

Advanced Course VOL.2



HUNAROBO SCIENCE CLASS ADVANCED COURSE

CONTENTS



What we are going to learn? (Robot Story)

Let's Make it!

HUNAROBO 3 Education Program

Educational Development Program

- The whole programs focus on the development of scientific,robotic and other technological skills.
- Development of basic scientific knowledge and creative thinking skills, to solve complex problems and program development to raise problem solution-oriented abilities and to create novel solutions.

Training Features

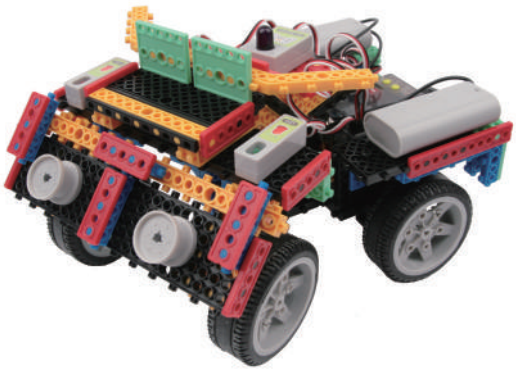
- Challenges and promotes problem-solving skills and improve concentration.
- Improve leadership and communication skills through small group activities.
- Education linked to kindergarten and elementary school science curriculum
- Under the guidance of a teacher, the goal will be achieved through self-assembly to promote a good learning environment.

HUNAROBO 3 (Advanced Course)

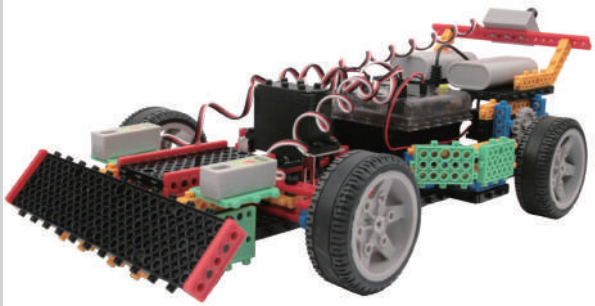
In this advanced Course for HUNAROBO 3, we will learn the following;

Division	The objects of study/Theme	The contents of study/Activities
1 Power	Gear	Understanding the principle of gears and making a racing motor bike (MOTOR BIKE) : [remote control/game]
	What's conveyor?	Making a robot that moves along with caterpillar tracks (HUNA-E 2) : [IR sensor/Mic sensor]
	Light Energy	Making a light sensing robot (HOT-DOG) : [CdS/ IR sensor]
	Cam	Making my own robot that uses the principle of cams [Creative assembly]
2 Energy 2	Thermal Energy	Making a robot that can move in any dimension using caterpillar tracks (OFF-ROADER) : [remote control]
	Use of thermal energy	Understanding heat(thermal) energy and making your own robot [Creative assembly]
	Electric Energy	Making a robot you can play dice with (DICE-BOT) : [remote control/Buzzer sensor/game]
	Servo motor and AI 1 (Artificial Intelligence)	Making a four -wheel motor bike that uses servo motors and DC motors (Four-wheel Motor bike(ATV)) : [remote control/LED sensor]
3 High-tech Robot	Link	Making a racing car that uses the principle of links (FORMULA CAR) : [remote control/LED sensor]
	Link2	Understanding link ,servo motors and making your own robot [Creative assembly]
	AI 2(Artificial Intelligence)	Making a robot that can make directional changes by itself using two servo motors (PTEROSAURS) : [remote control]
	Ethics of robot	Making a robot that uses two DC motors and two servo motors (DUKE TANK) : [remote control]

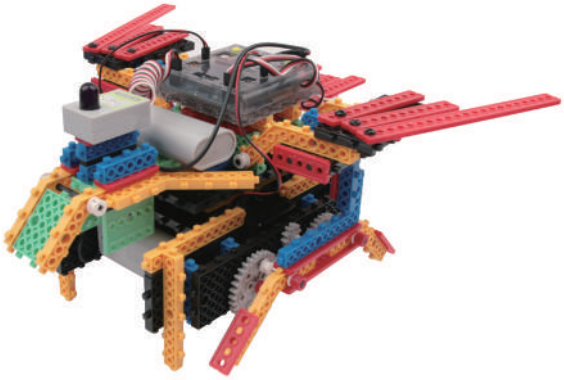
What robots are we going to assemble?



< FOUR-WHEEL Motor Bike >



< F1(FORMULA1) >

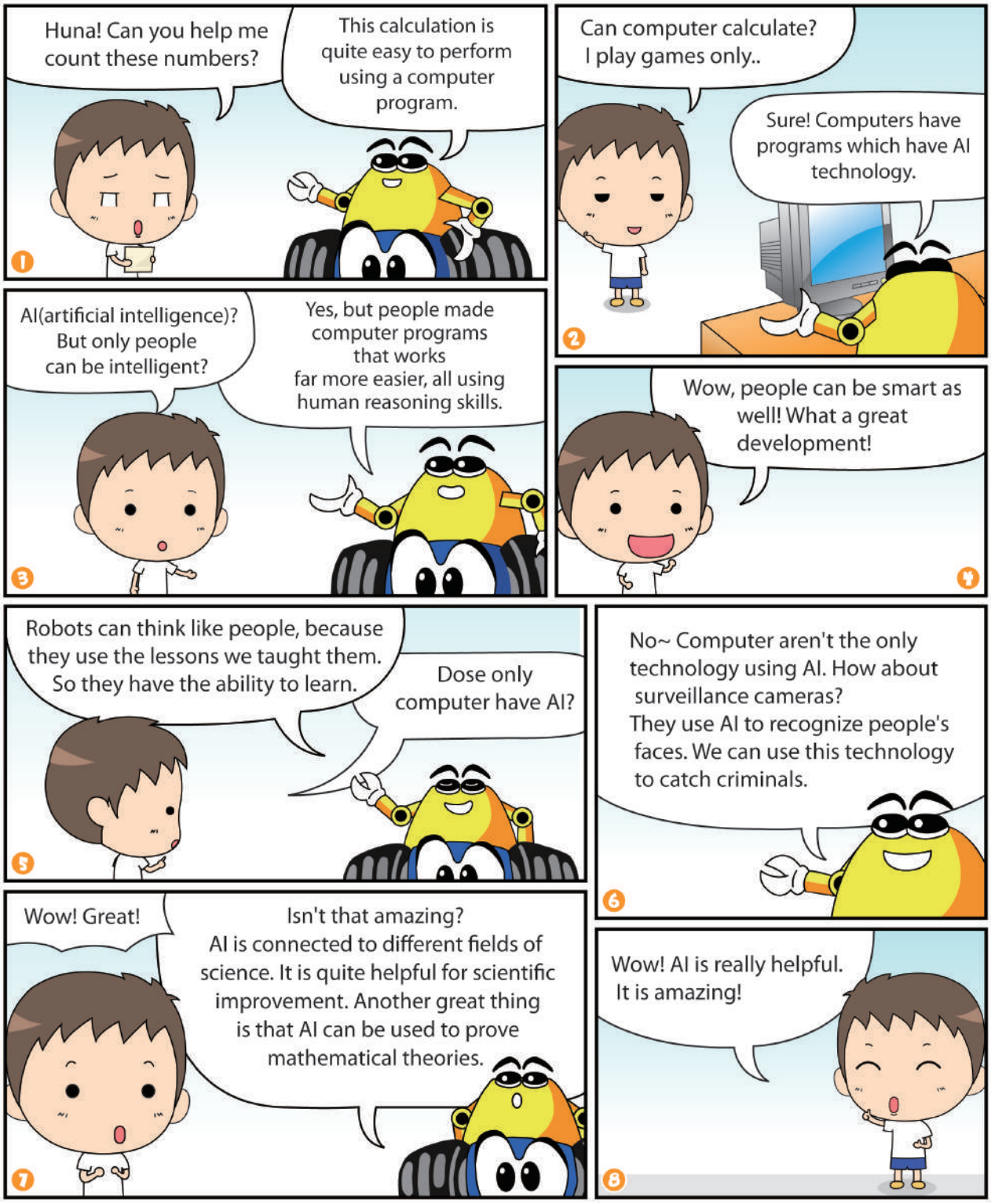


< PTEROSAURS >

< DUKE TANK >

Robot story 1

Intelligent robots acting like human - AI 1



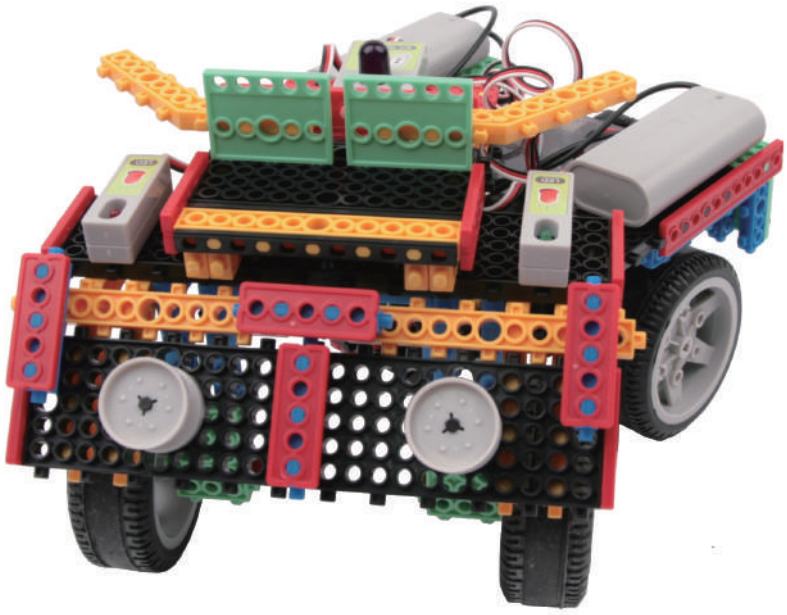
Q **1. What is the name of the computer system that has the same reasoning and learning capabilities as humans?**

Let's Make it 1

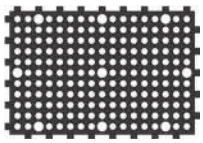
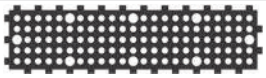
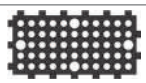
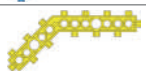
Using robotic principles to make a robot that is controlled by wire communication

FOUR-WHEEL Motor Bike(ATV)

ATV stands for All Terrain Vehicle. It is used in trasportation.
It looks like a motorcycle but it has 4 wheels.

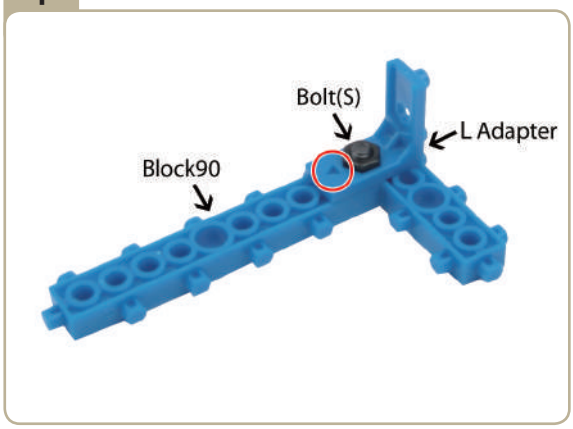


Prepare parts for assembly

	Block1117	×1		Frame11	×12	 Mainboard ×1
				Frame5	×10	
				Adapter2	×3	
				Adapter1	×2	
	Block523	×2		L Adapter	×8	
				Shaft(S)	×2	 RC Receiver ×1
	Block511	×8		Shaft(M)	×2	
				Bush	×4	
	Block90	×8		Red Bush	×4	 LED board ×2
				Guide Wheel	×2	
	Block135	×14		Wheel(L)	×4	 Remote Control ×1
	Block111	×5				
	Block15	×6		DC Motor	×2	 Battery Case ×1
	Block35	×6				
	Motor Mount	×6		Servo Motor	×1	
				Bolt(S)	×14	
	Nut	×18		Bolt(M)	×4	

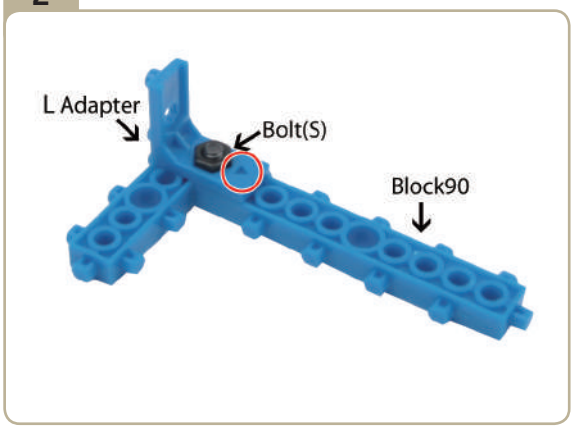
A 1. (Artificial Intelligence) AI

1



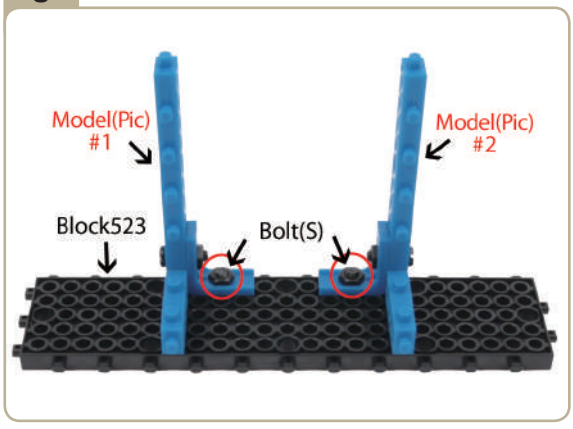
Attach a 'L' adapter to 「block90」with a short bolt. Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

2



Assemble using the same method as model(pic)#1, but in reverse.

3



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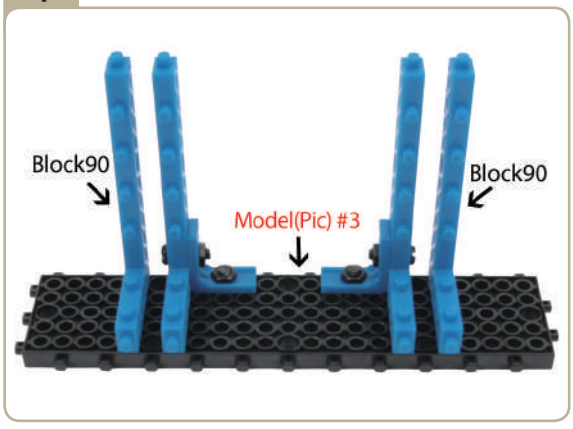

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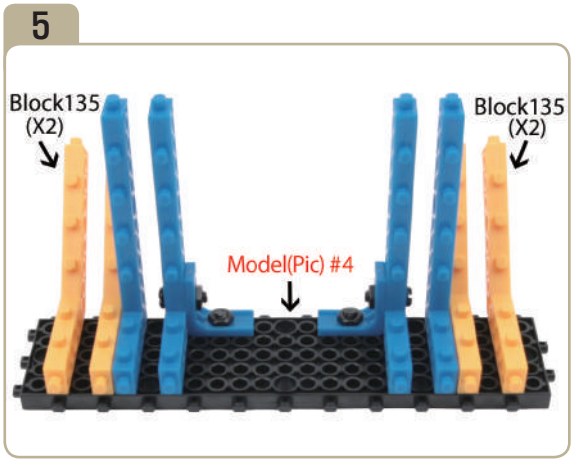

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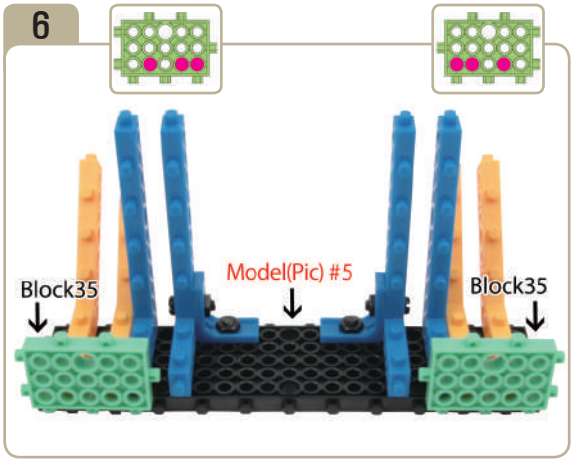
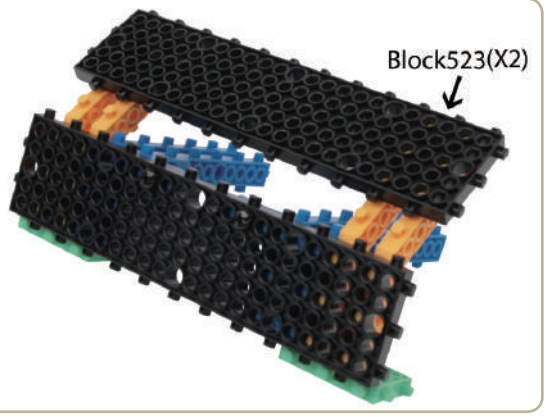


7 (*Opposite of model(pic)#6*)



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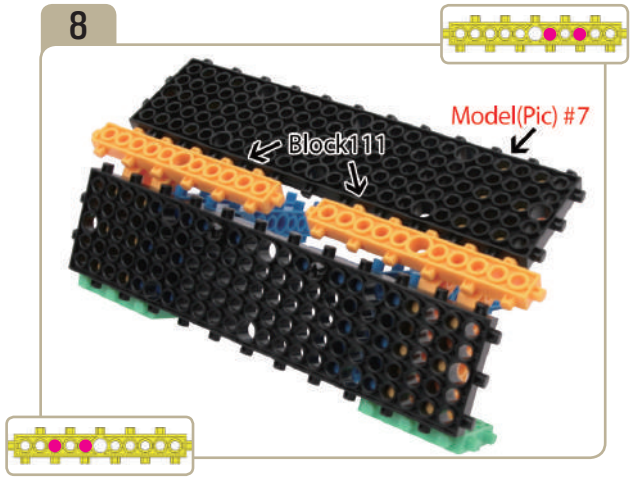

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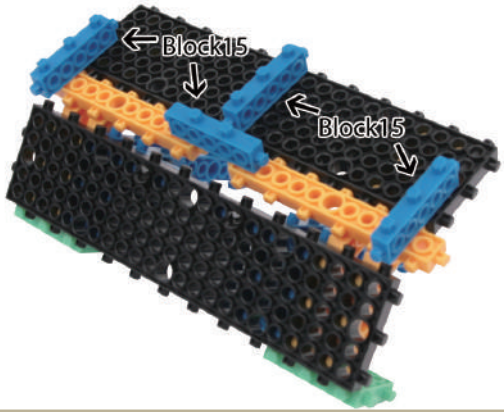

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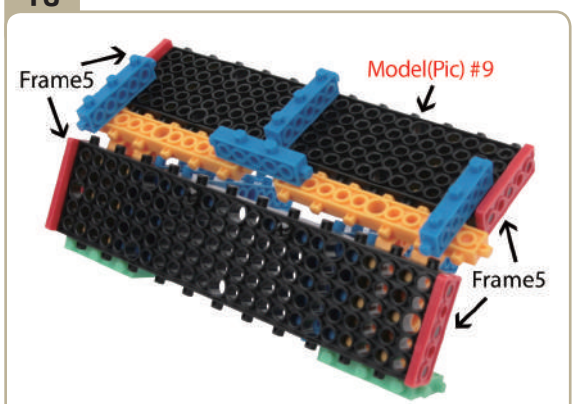

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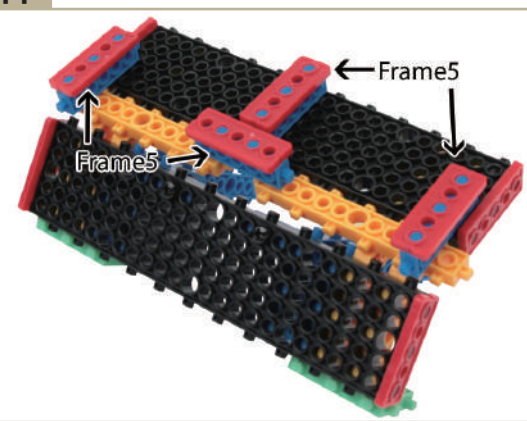

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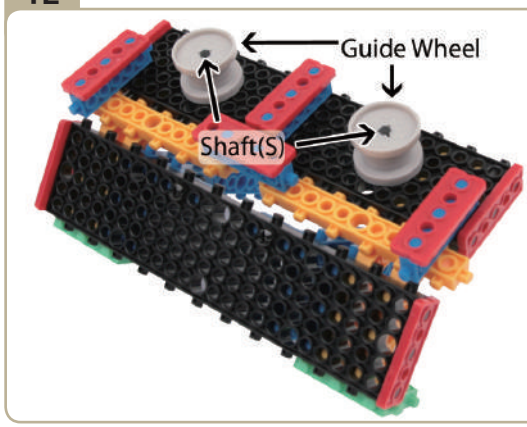
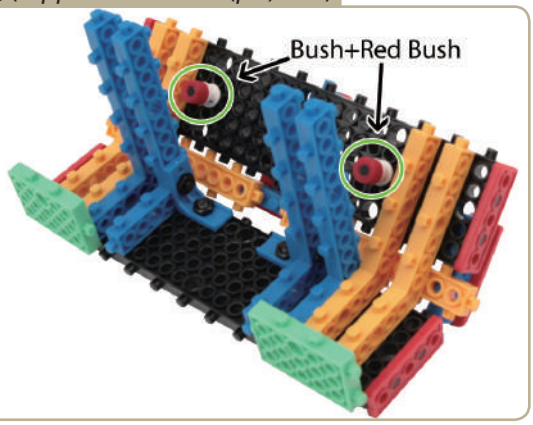
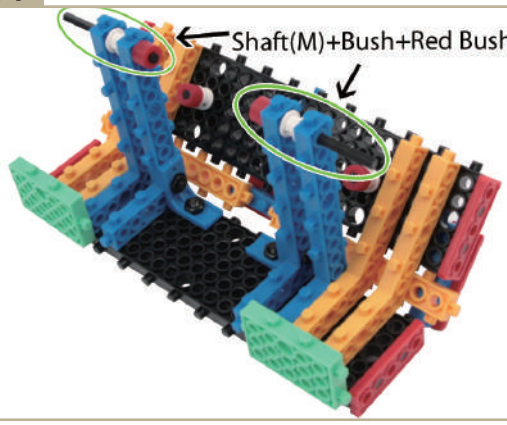


13 (*Opposite of model(pic)#12*)



Turn model(pic)#12 upside down, then attach a bush and a red bush.

14



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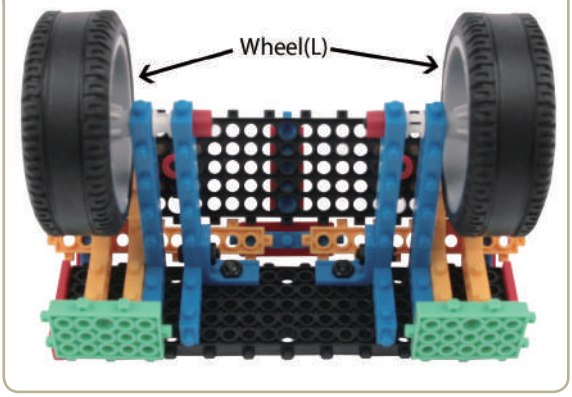
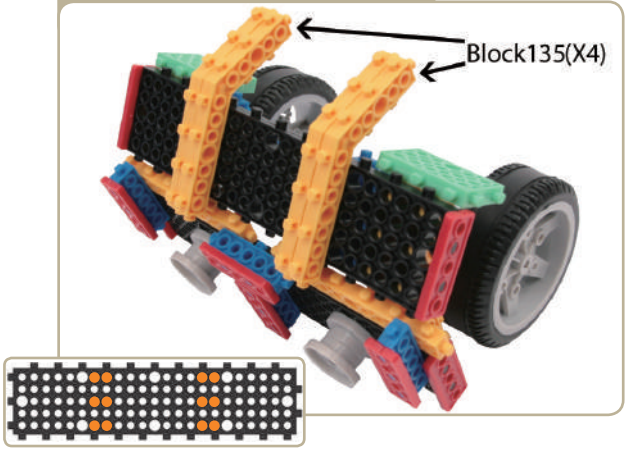


16 (*Opposite of model(pic)#15*)



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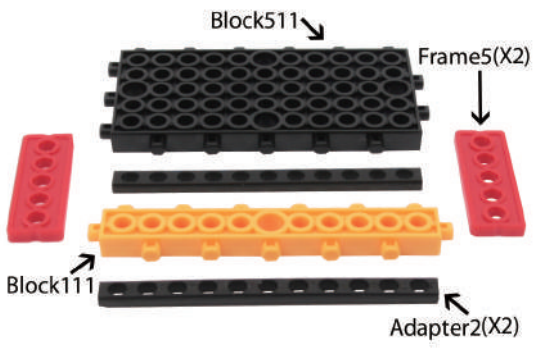

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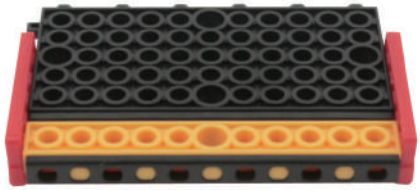
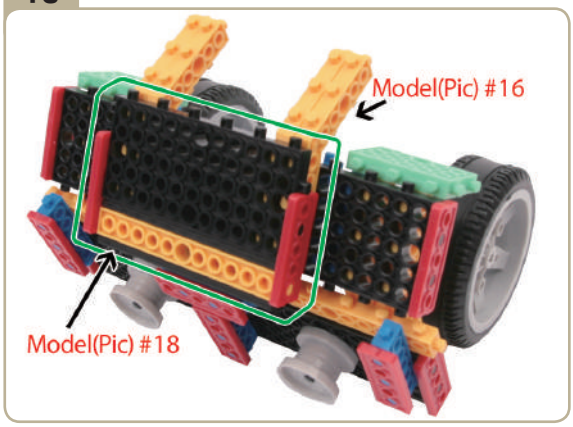


Q 3. What is the name of robot that looks like a human-being?

19



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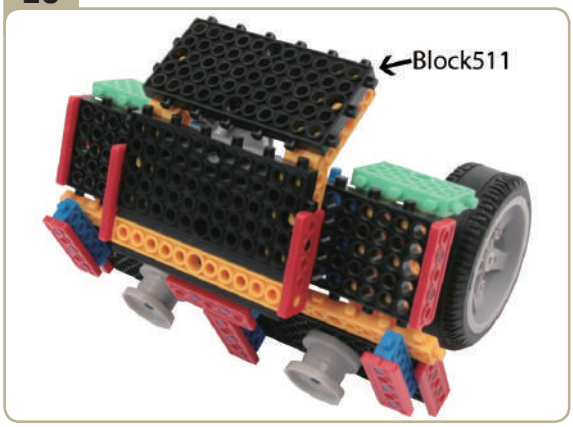

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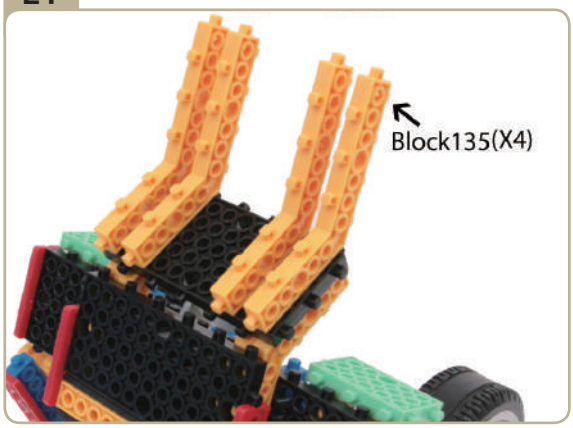

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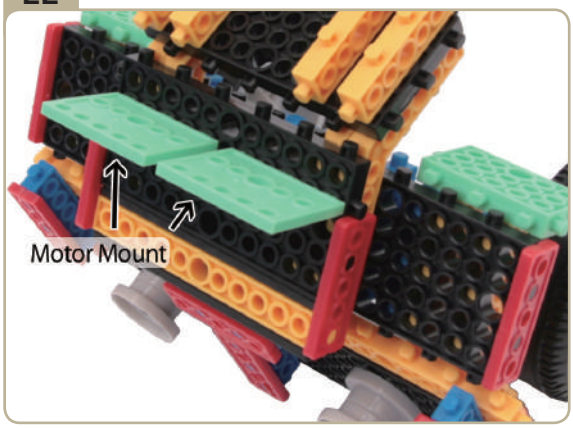

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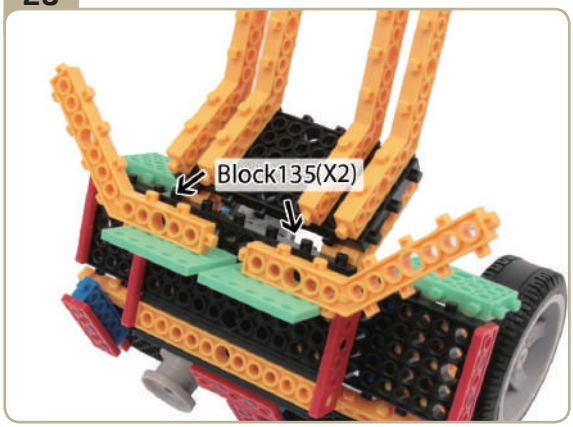

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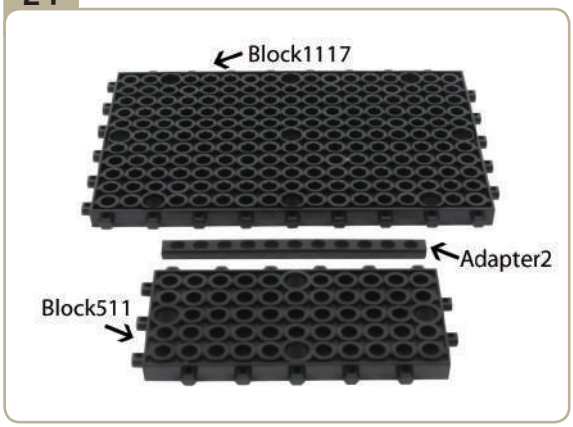

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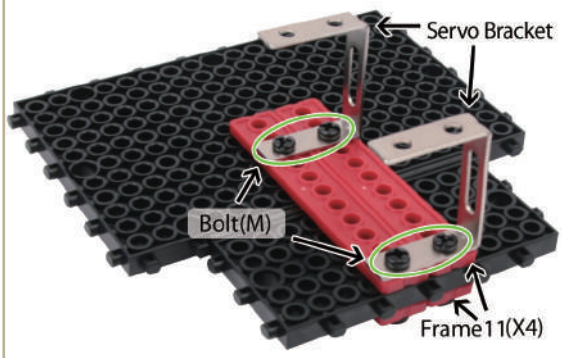
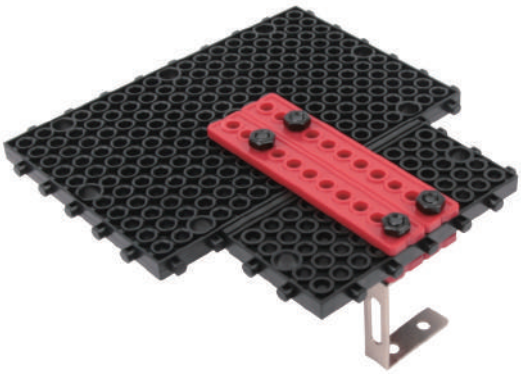


27 (*Opposite of model(pic)#26*)



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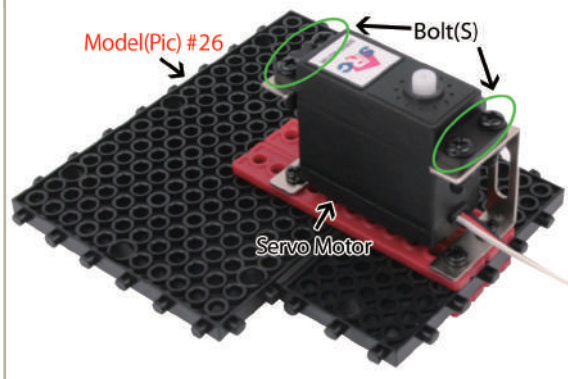

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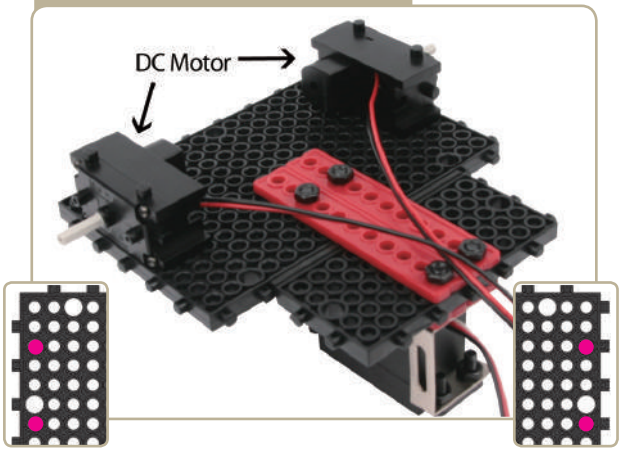

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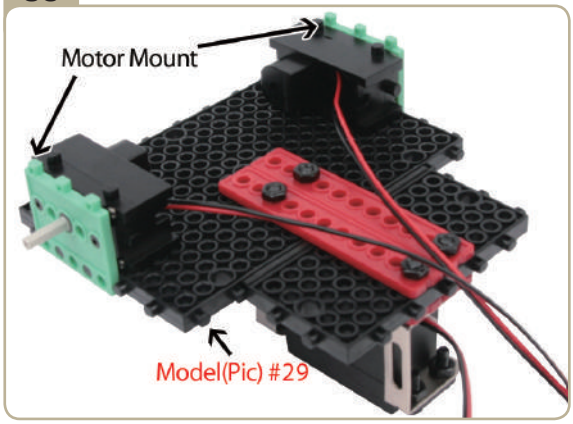
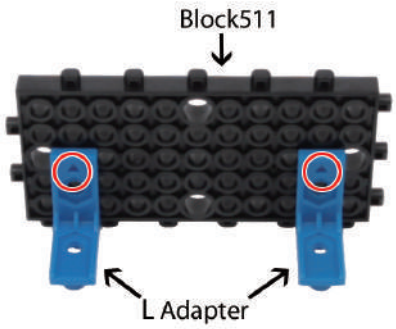


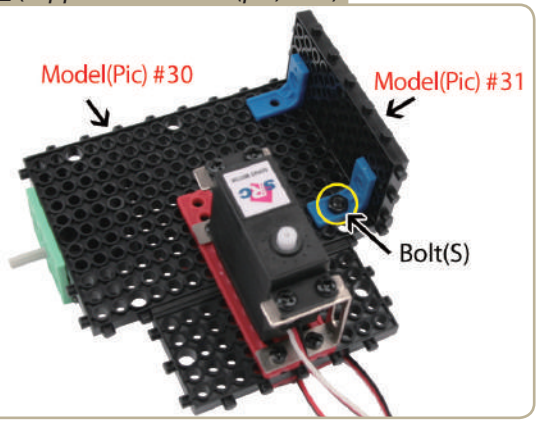
Q 4. What is the name of the first humanoid robot that was designed in Korea?

31



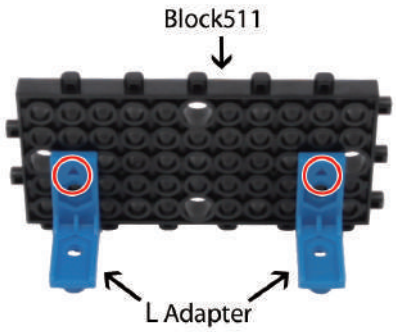
Attach 'L' adapters to 「block511」. Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

32 (*Opposite of model(pic)#30*)



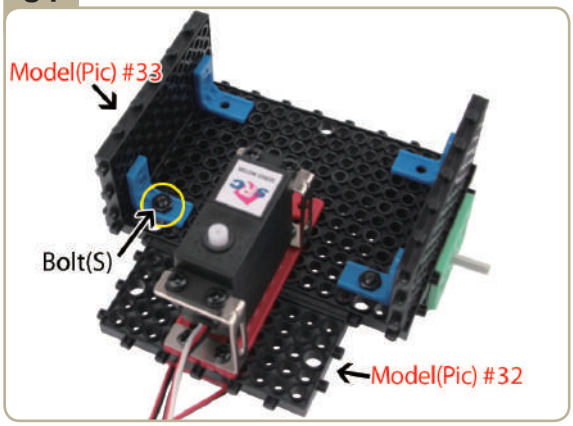
Turn model(pic)#30 upside down, then connect model(pic)#31 to it with a short bolt.

33



Attach 'L' adapters to 「block511」. Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

34



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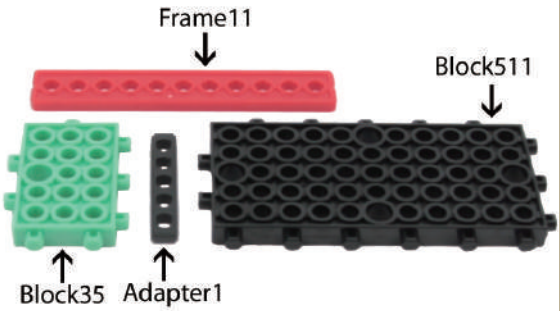

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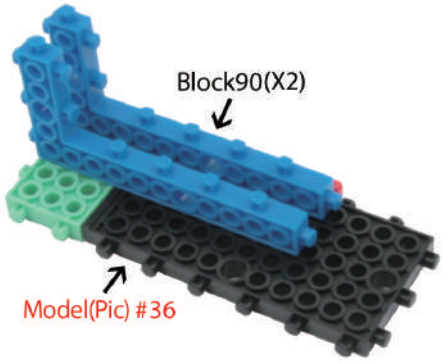

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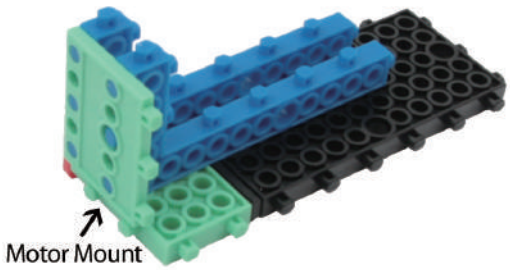

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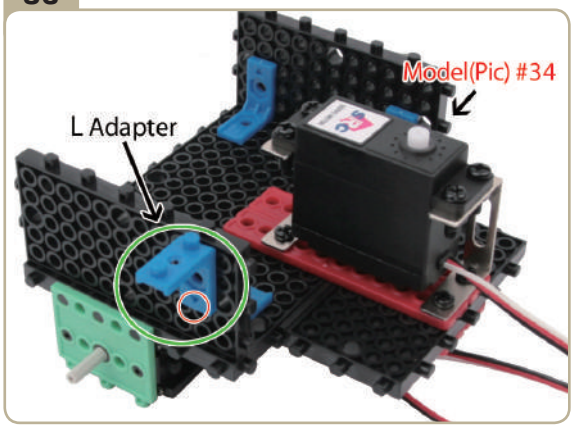
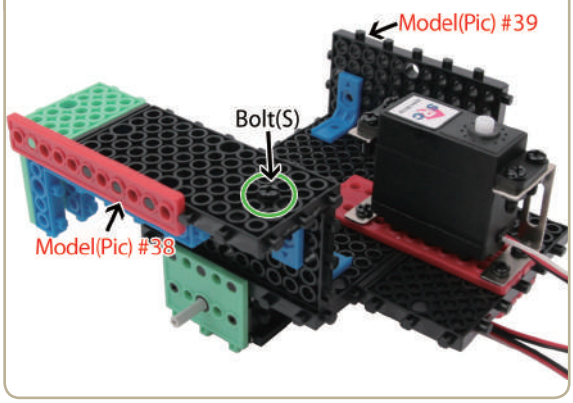


Attach a 'L' adapter to model(pic)#34. Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

40



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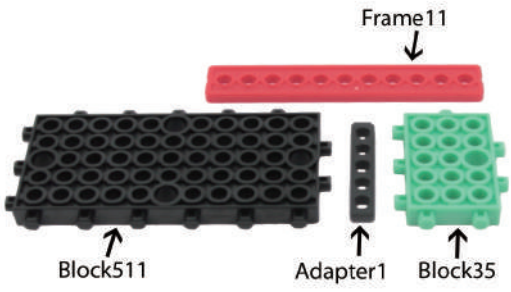
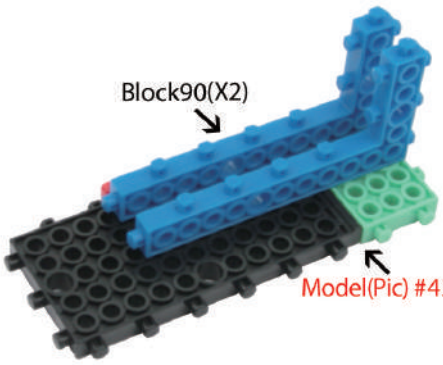


42

Q 5. What is the name of high speed auto-calculator that uses a electronic circuit?

43



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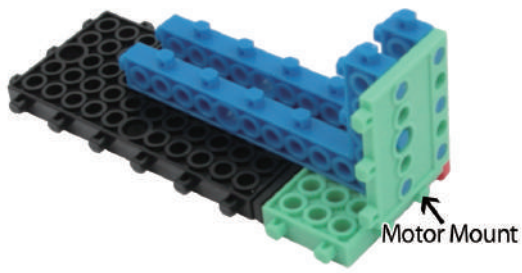

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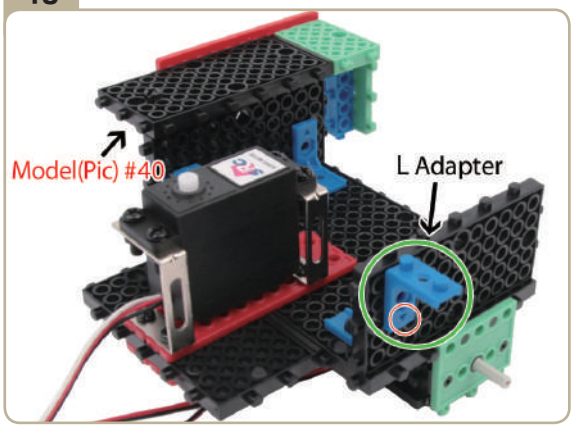
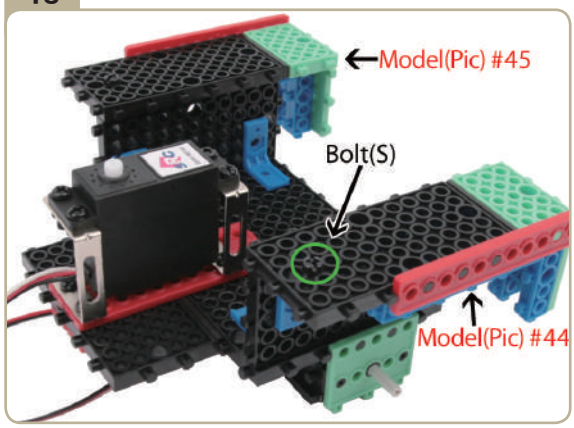
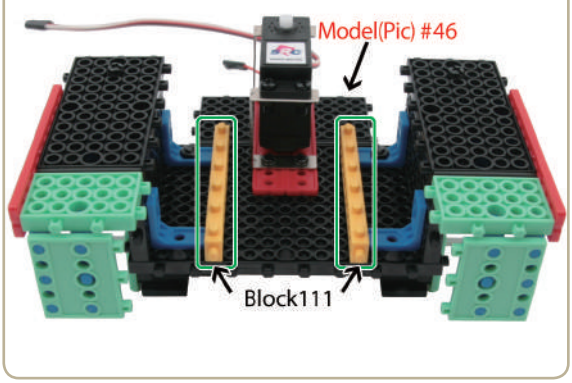


Attach a 'L' adapter to model(pic)#40. Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

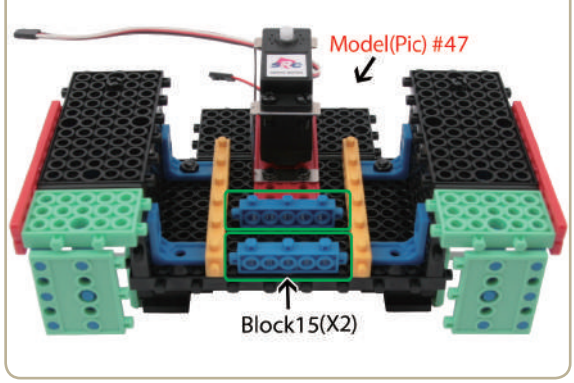
46



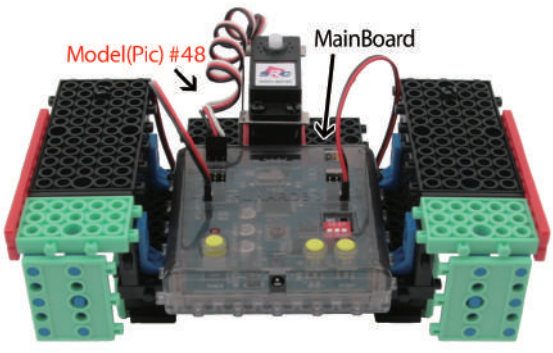
47 (*Back of model(Pic)#46*)



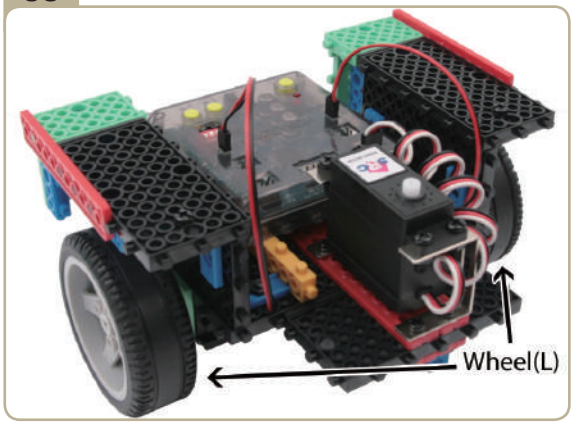
48



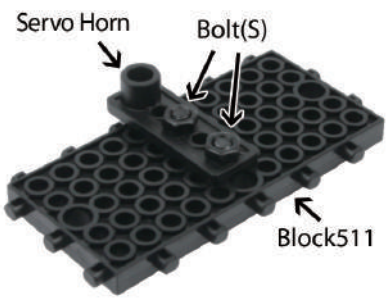
49



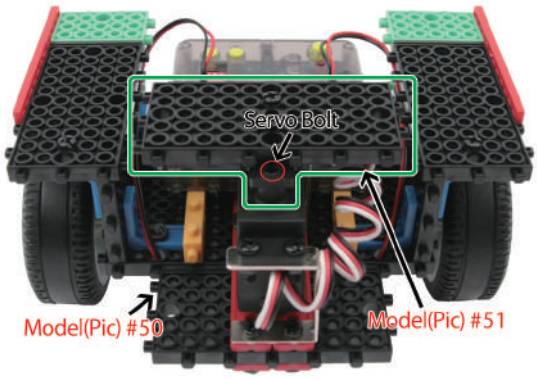
50



51

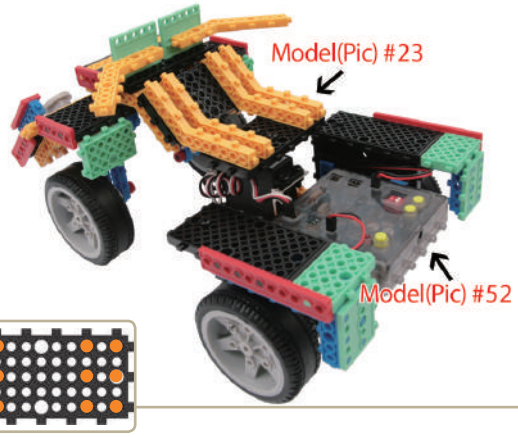


52

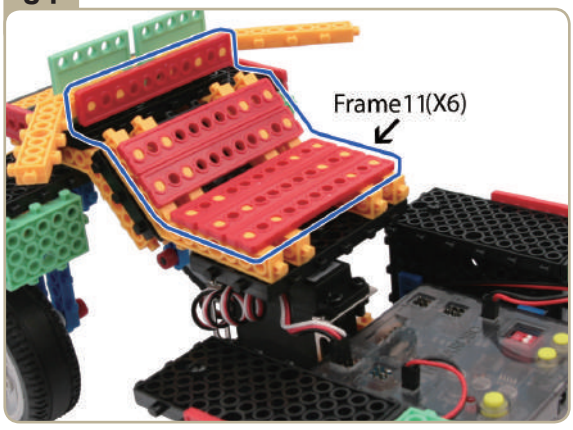


After adjusting zero point of servo motor, fix model(pic)#51 to model(pic)#50 with a small servo bolt.

53

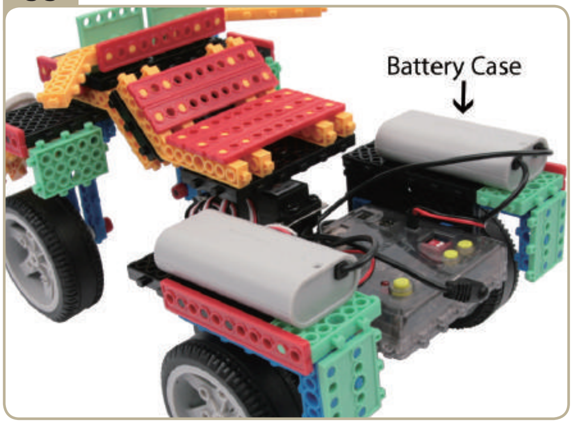


54

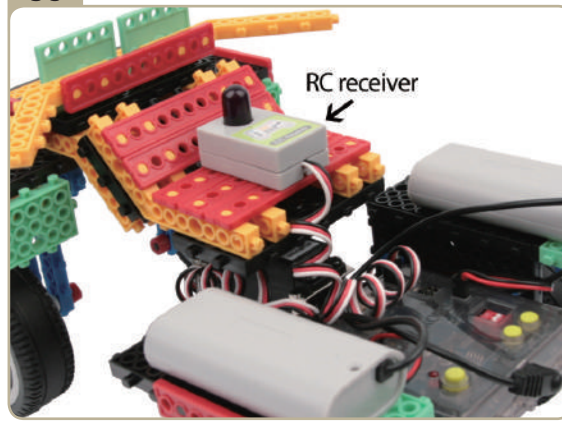


Q 6. What is the equipment called that we use make quick and accurate calculations with?

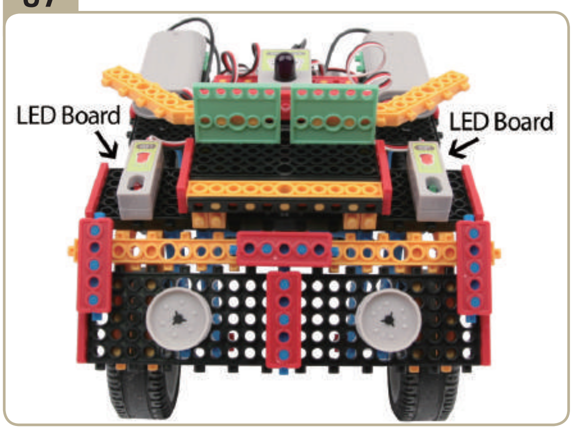
55



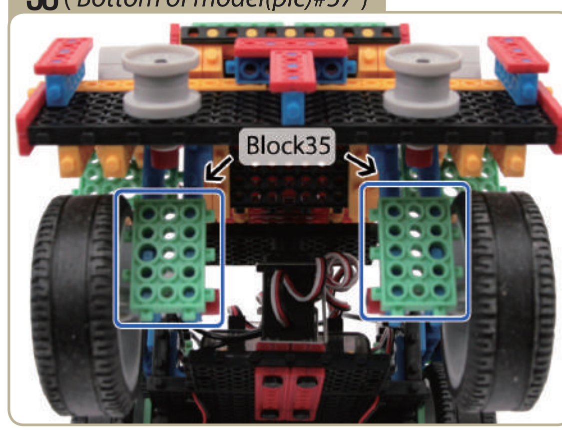
56



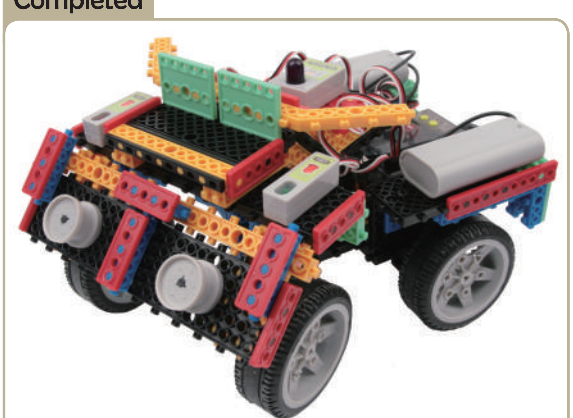
57



58 (*Bottom of model(pic)#57*)

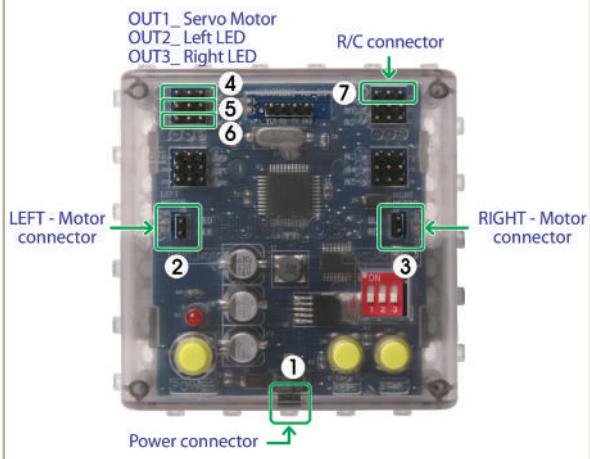


Completed



How to prepare the FOUR-WHEEL Motor Bike(ATV)

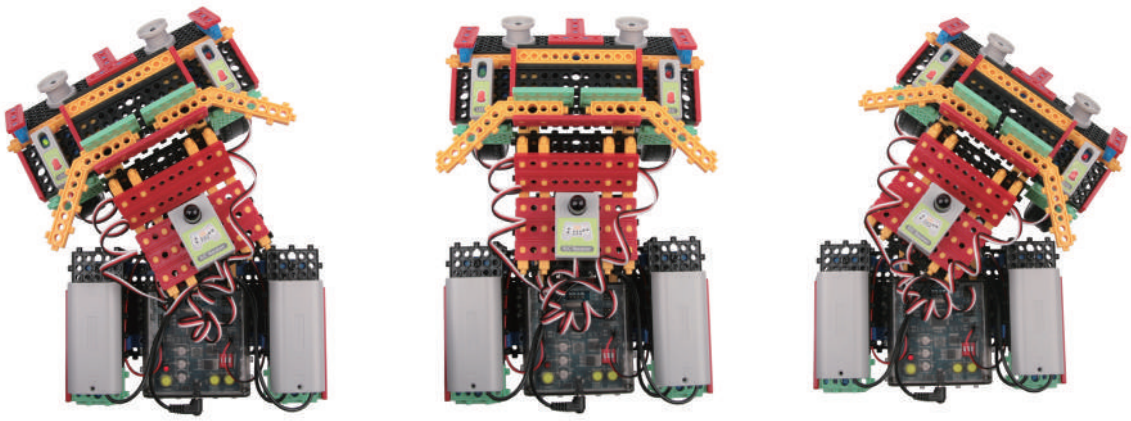
Connecting the mainboard



Connect in this order.

1. Connect Battery case to POWER connector.
2. Connect Left DC motor to LEFT-Motor connector.
3. Connect Right DC motor to RIGHT-Motor connector.
4. Connect Servo motor to OUT1 of OUTPUT connector.
5. Connect Left LED board to OUT2 of OUTPUT connector.
6. Connect Right LED board to OUT3 of OUTPUT connector.
7. Connect RC receiver to Remote Control connector.

Motion Pattern



- Using the motion patterns as reference, let's create the program.

**** For more program examples, visit our reference room. (HunaRobo on our web site, www.hunarobo.com)***

Program Download

1. Create the program.
2. Make sure Power / DC Motor connector and sensor's connector are well connected.
3. Check the power OFF state, then insert the download cable.
4. 'SAVE' and click the 'DOWNLOAD' button on the program window.
5. Turn on the power when 'DOWNLOAD' window opens. (Power ON)
6. Once the download is completed, remove the download cable and then turn the power off and on.
   (Power OFF → Power ON)

*** Refer to 「HunaRobo Compiler Manual」 on how to create more detailed programs and how to download them.**

Q 7. What is the equipment called that makes use of a electronic circuit to calculate problems?

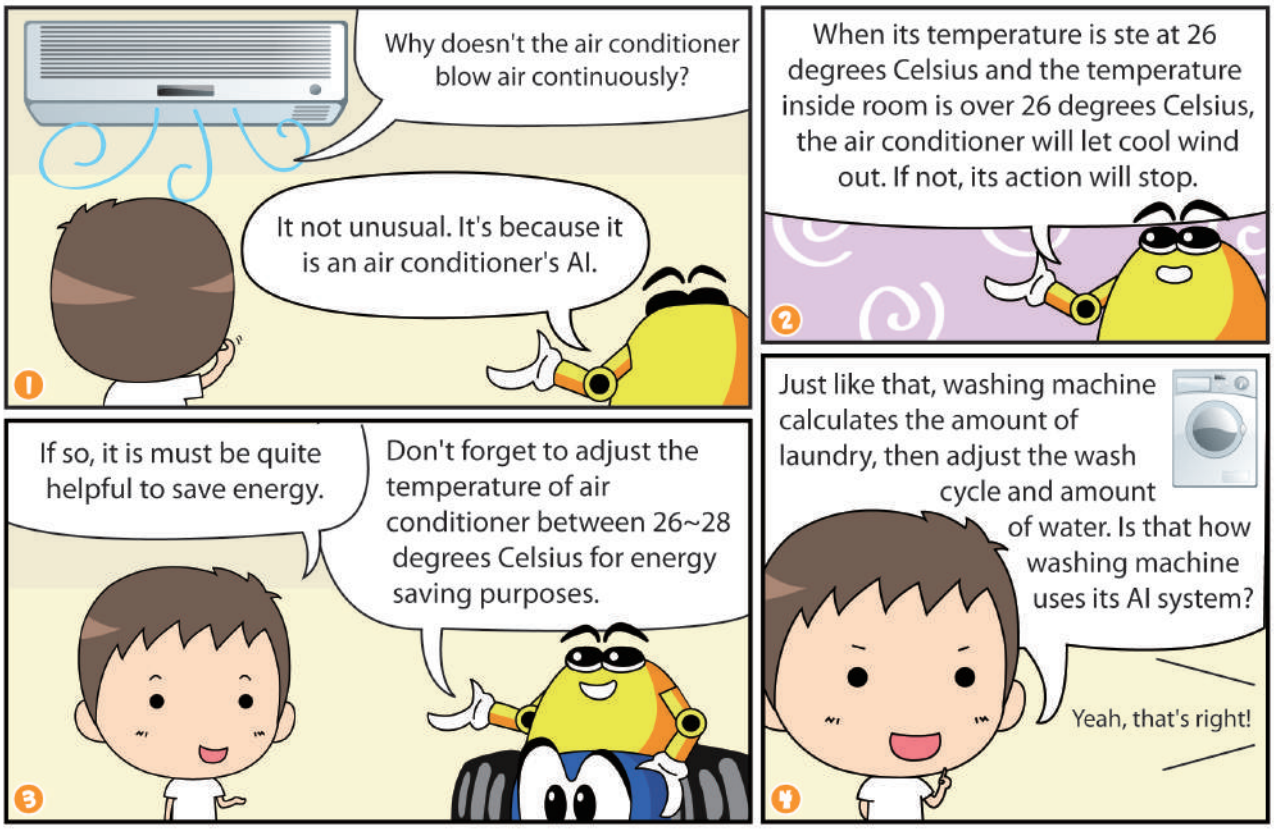
Program Example

Action	No
Program Start	0
Remocon : [Up] {	1
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	2
END }	3
Remocon : [Down] {	4
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	5
END }	6
Remocon : [Up + Left] {	7
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	8
Servo : [OUT1]=[-30]	9
LED : [OUT2]=[ON]	10
END }	11
Remocon : [Up + Right] {	12
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	13
Servo : [OUT1]=[30]	14
LED : [OUT3]=[ON]	15
END }	16
Remocon : [Left] {	17
DC motor 1 : [R-MOTOR1]=[Forward],[Speed=10]	18
Servo : [OUT1]=[-30]	19
LED : [OUT2]=[ON]	20
END }	21
Remocon : [Right] {	22
DC motor 1 : [L-MOTOR1]=[Forward],[Speed=10]	23
Servo : [OUT1]=[30]	24
LED : [OUT3]=[ON]	25
END }	26
Remocon : [Down + Left] {	27
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	28
Servo : [OUT1]=[-30]	29
LED : [OUT2]=[ON]	30
END }	31
Remocon : [Down + Right] {	32
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	33
Servo : [OUT1]=[30]	34
LED : [OUT3]=[ON]	35
END }	36
Remocon : [KEY OFF] {	37
DC motor 1 : [Both MOTOR1]=[Stop]	38
Servo : [OUT1]=[0]	39
LED : [OUT2]=[OFF], [OUT3]=[OFF]	40
END }	41
Program End	42

A. Computer or Electronic calculator 7.

Robot story 2

Systems that use AI!



You can easily find things using AI systems in your surrounding areas. Let's have a look!

Q 8. What is name of the world's first electronic computer that was build in Pennsylvania University of USA in1946 ?

Making my own robot

♣ Let's make my own model using the principle of AI!

Draw a model what you want to make!

"HUNAROBO" Dictionary

★ **Brain-machine interface**

It is the potential ability of human's brain that can accept computer equipment as one part of body from AI(artificial intelligence). People with having sense motor function compensate for the lost abilities by controlling AI equipment with their brain. And the disabled person can control a wheel chair and artificial-limb just with their thinking using computer technology and high-tech technology.
Due to this technology, it became possible from meal experiment using robot's arm to transmission of nerve data in real time.

★ **Chip Cap**

Chip cap is technology that sends absorbed heat from memory chip to other places.
This is an innovative technology that can increase caloric value ten times than until now which was developed by imitating plant roots and leaves circulatory system for human by IBM.

★ **Walkie-talkie**

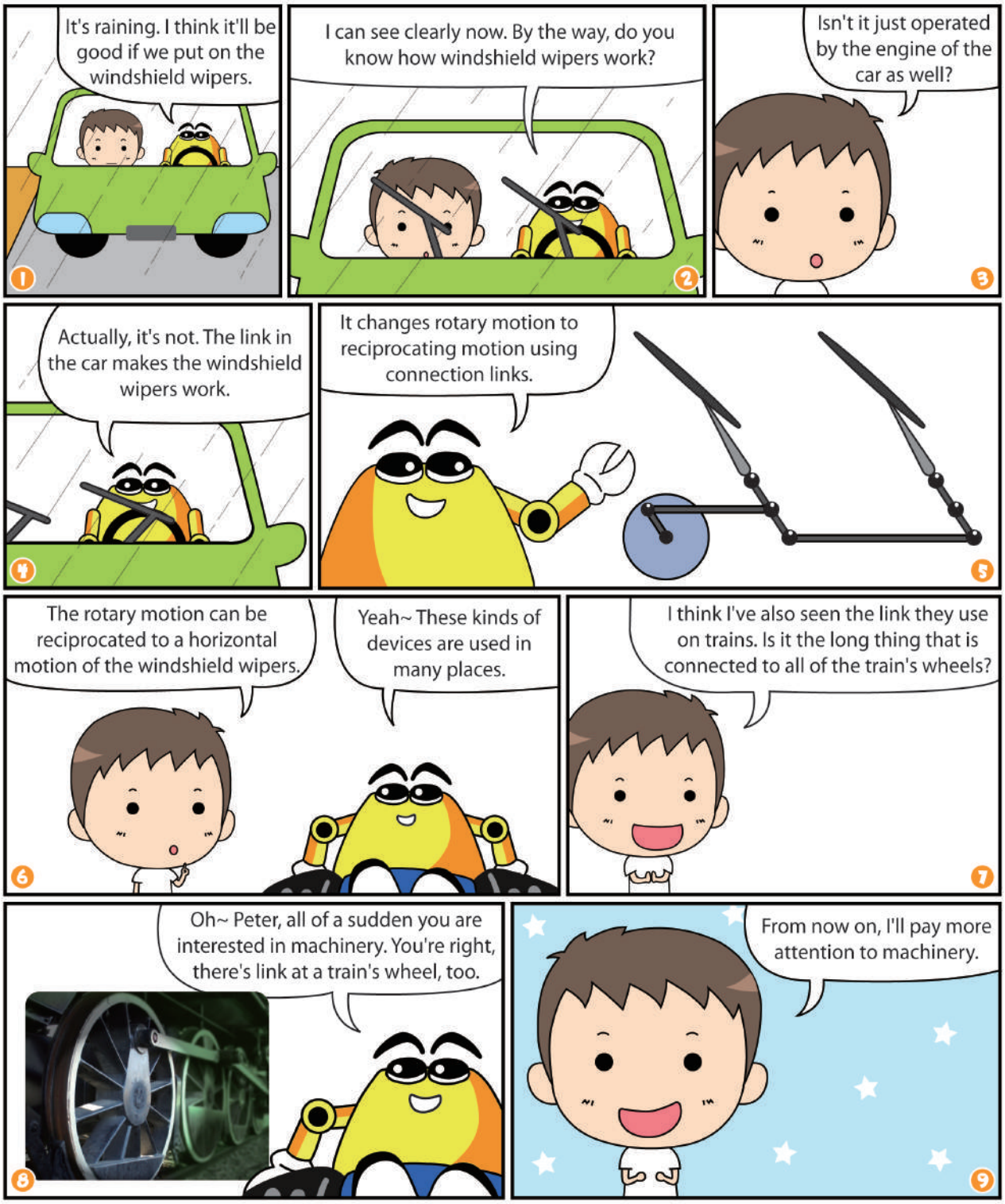
This is a small portable wireless telephone that is used in local area. Walkie-talkie uses VHF(Very High Frequency) and UHF(Ultrahigh Frequency) radio waves. It is mainly used for interviews and recreation.
It also called "Handie-Talkie".Because it derives from talking on the phone while walking.

★ **Plastic solar cell**

This is a battery that can change light into electricity by using polymer.
Existing solar cells use silicon and compound minerals semiconductors. But bad point is that it is expensive to produce and the manufacturing process is complex.
Plastic solar sell applies the principles of plant's photosynthesis action. So it is cheap, light and simple to manufacture.

A 8. ENIAC

Robot story 1 How a long slender things can move a lot of things - Link



Q 9. What is accord called that makes sure that humans get long well with robots?

Let's Make it 2

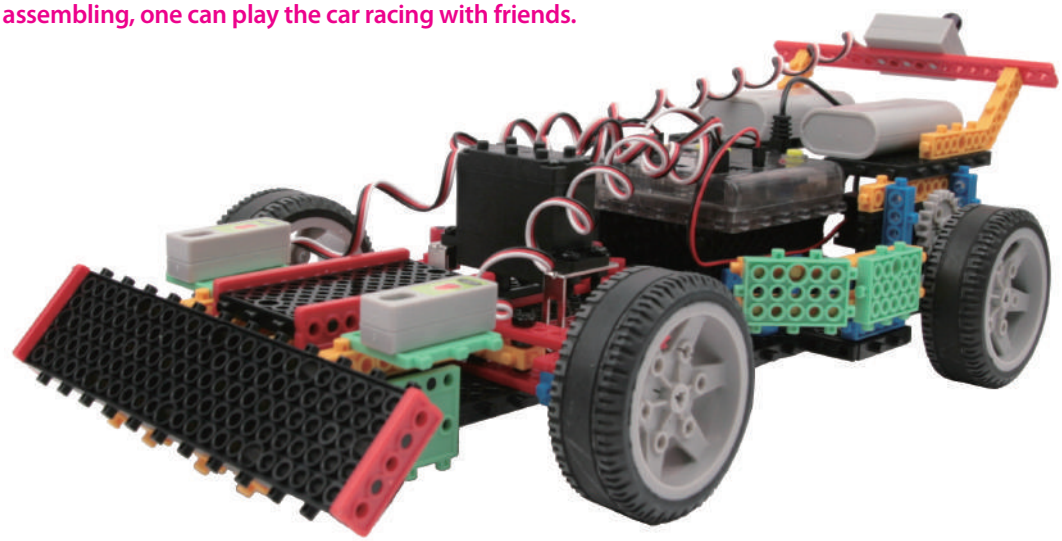
Making a formula 1 car using the principles of link structure



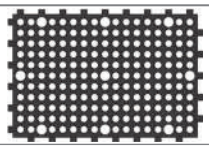
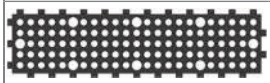
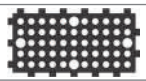
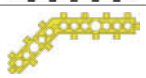
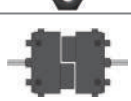
F1(FORMULA1)

F1 represent the highest stage in formula car racing.
It also represent the world leading car manufacturers and all of the new cutting edge technology .
Formula was coming to Korea in 2010 for the last time racing of Asia tour.

After assembling, one can play the car racing with friends.

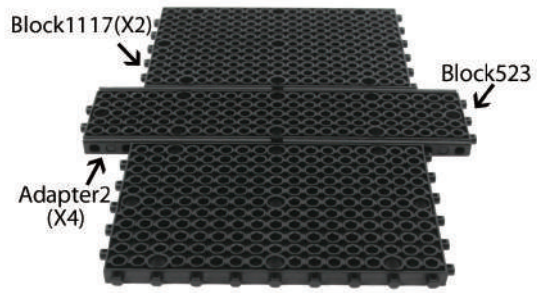


Prepare parts for assembly

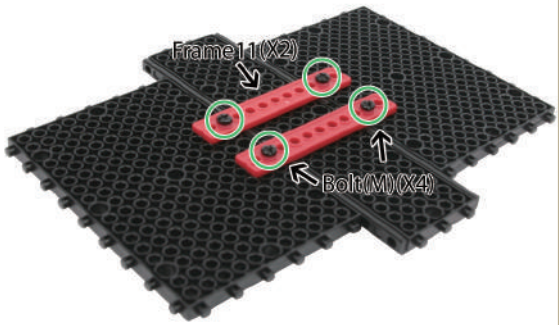
	Block1117	×3		Frame21	×5	 Mainboard ×1
				Frame11	×10	
				Frame5	×2	
				Adapter2	×7	
	Block523	×2		L Adapter	×10	
				Connection Shaft	×3	
	Block511	×8		Shaft(M)	×4	 RC Receiver ×1
				Half Bush	×6	
	Block135	×10		Bush	×8	
				Red Bush	×7	 LED board ×2
	Block111	×3		Gear(M)	×4	
	Block15	×10				 Remote Control ×1
	Block35	×4		Bolt(S)	×19	
	Motor Mount	×8		Bolt(M)	×6	
				Bolt(L)	×2	
	Wheel(L)	×4		Nut	×31	 Battery Case ×1
				DC Motor	×2	
	Servo Motor	×1				

A 6. The charter of robot ethics

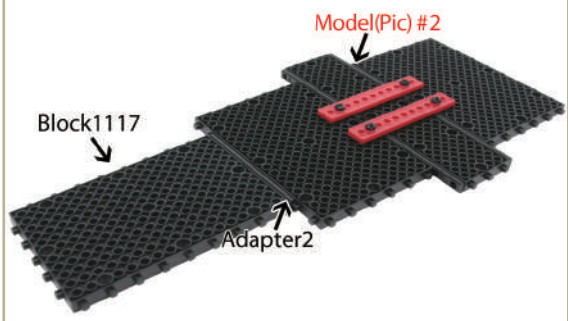
1



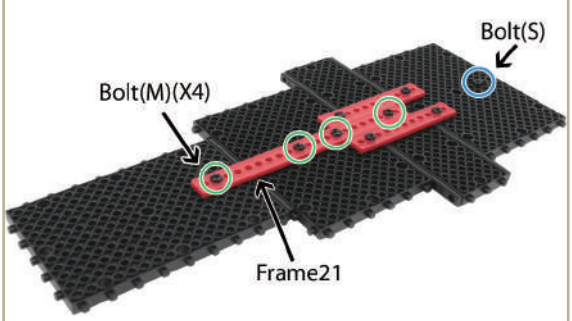
2



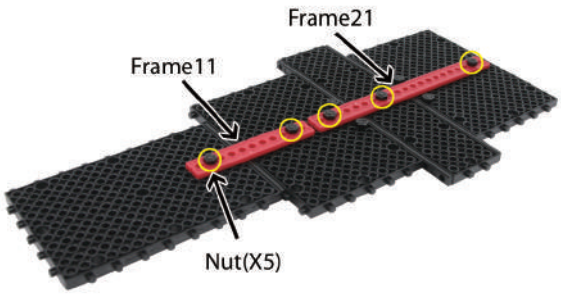
3



4

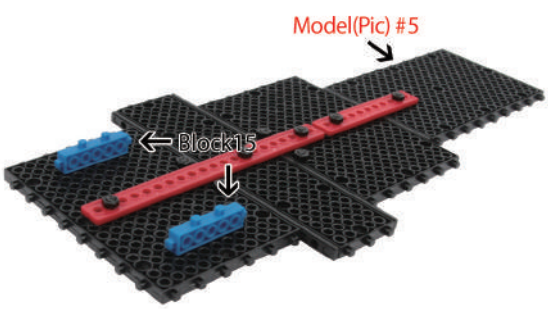


5 (*Opposite of model(pic)#4*)



Turn model(pic)#4 upside down, then attach a 「frame11」 and a 「frame21」 with nuts.

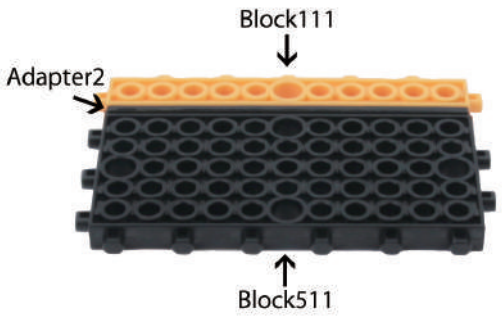
6



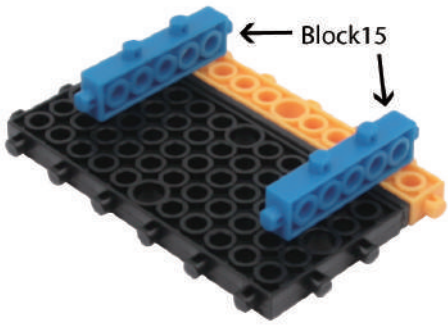
Turn model(pic)#5 to the right by 180 degrees, attach two 「block15」s to it.

1. What is the name of the computer system that has the same reasoning and learning capabilities as humans?

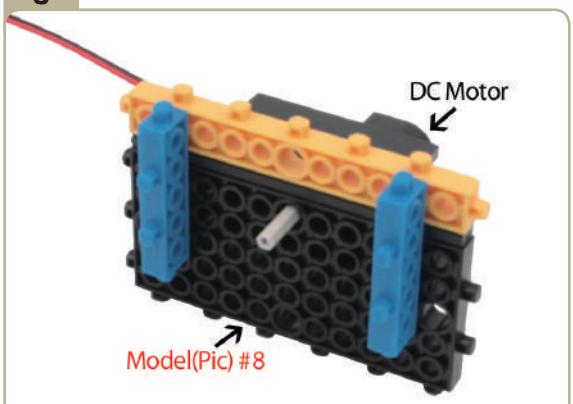
7



8



9



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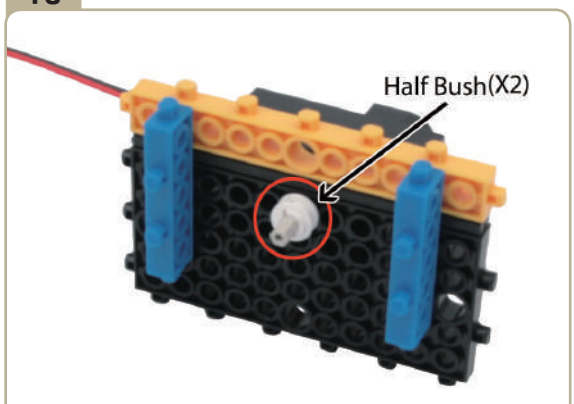
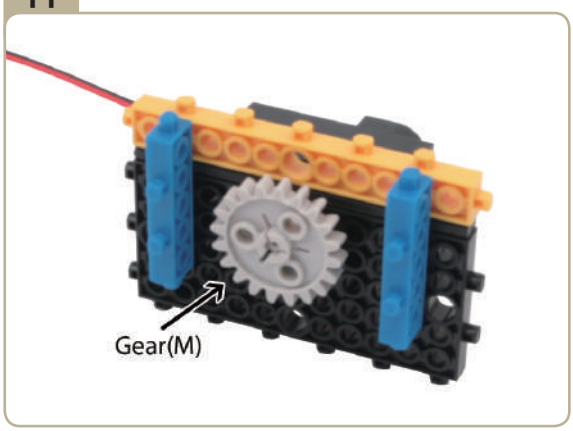
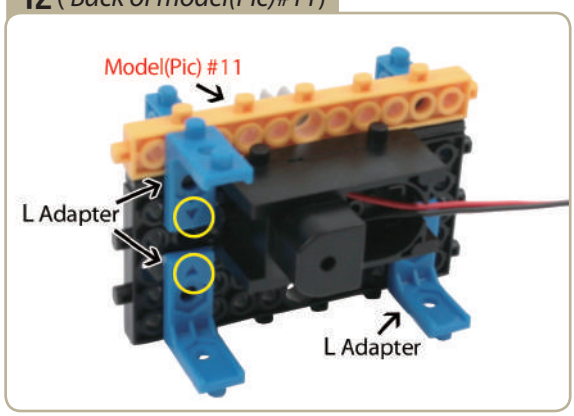


11

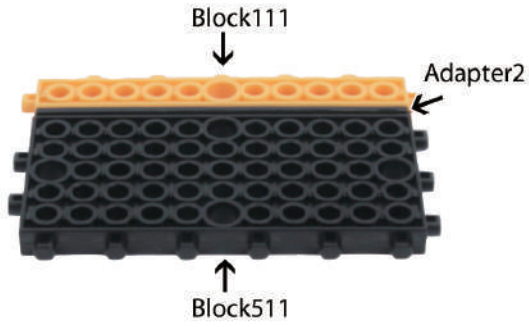


12 (*Back of model(Pic)#11*)



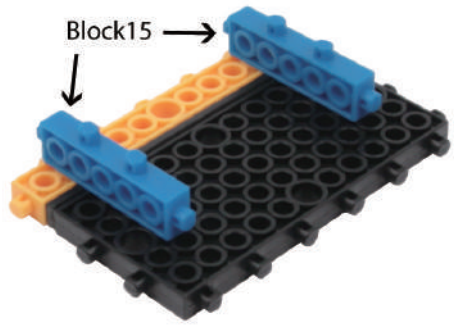
Attach three 'L' adapters to the back of model(pic)#11. Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

13



Assemble using the same method as model(pic)#7, but in reverse.

14



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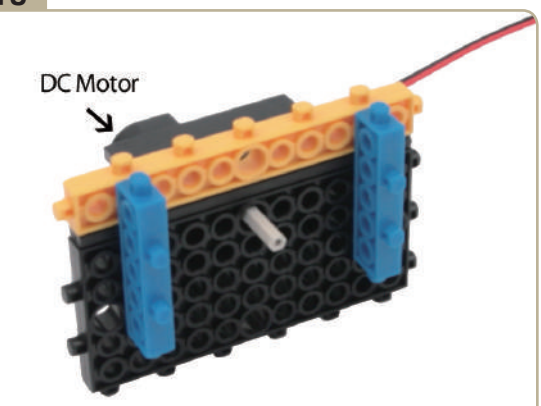

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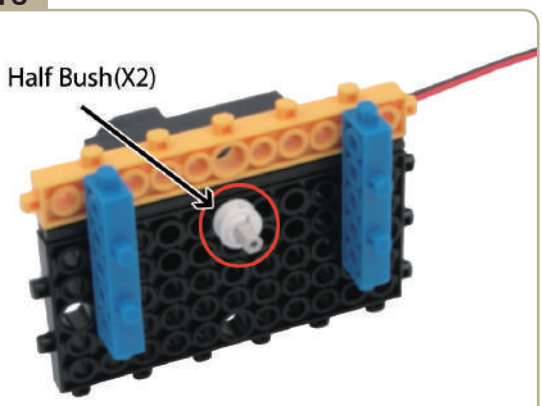
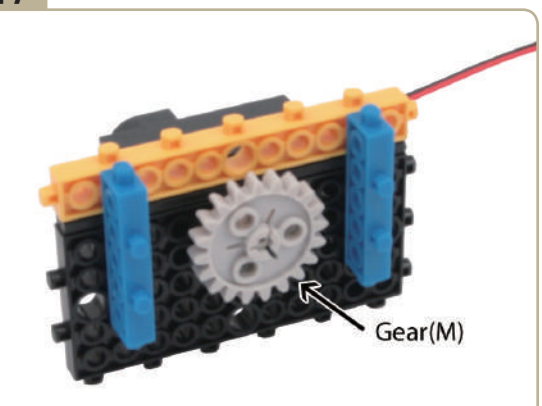
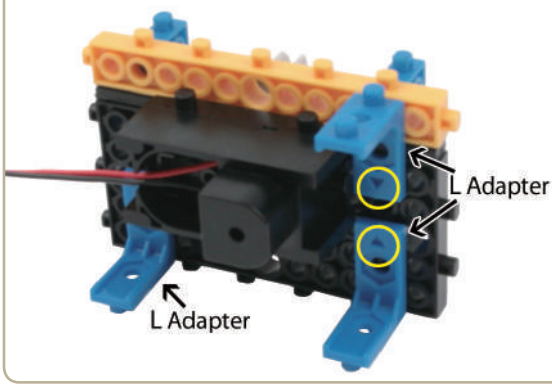


17



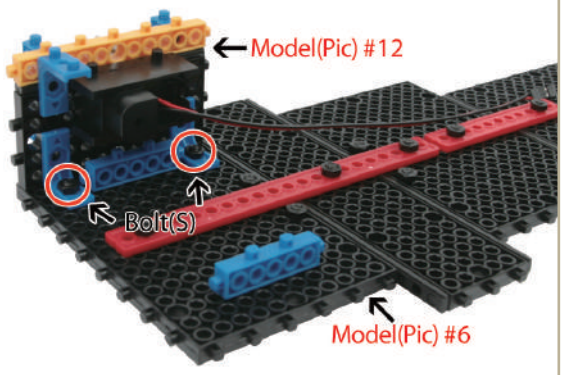
18 (*Back of model(Pic)#17)*



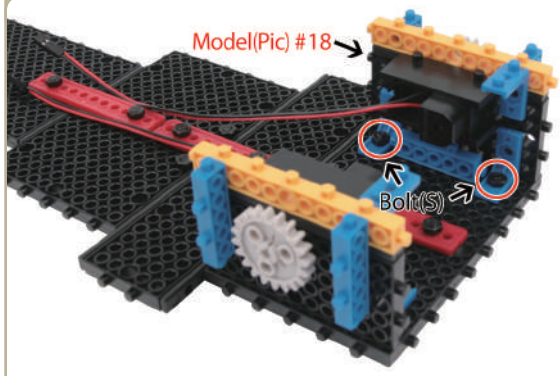
Attach three 'L' adapters to the back of model(pic)#17. Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

Q 2. What is the name of the device that controls equipment and machinery over long distances?

19



20

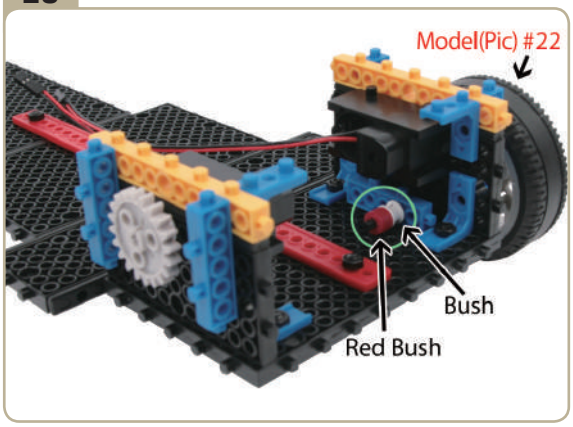


21

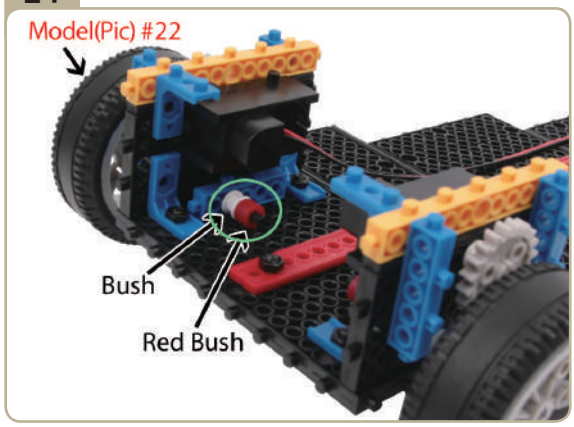
22

Assemble two identical models.

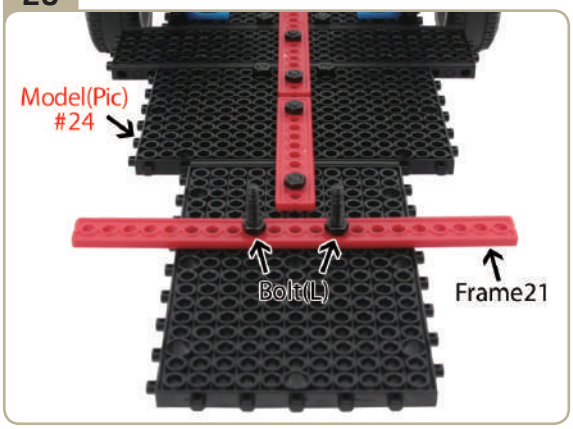
23



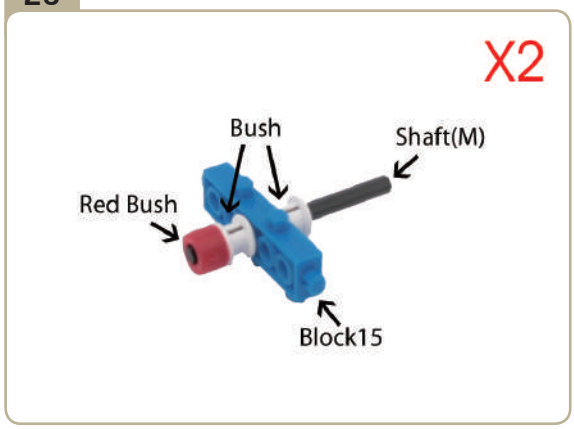
24



25

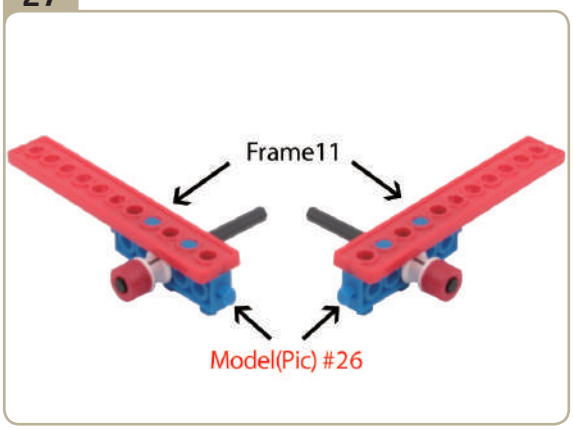


26



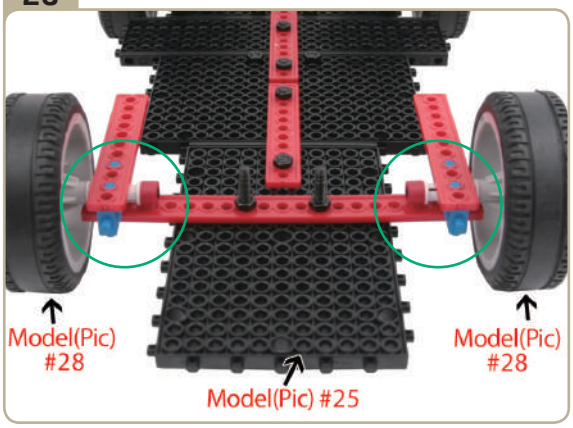
Assemble two identical models.

27

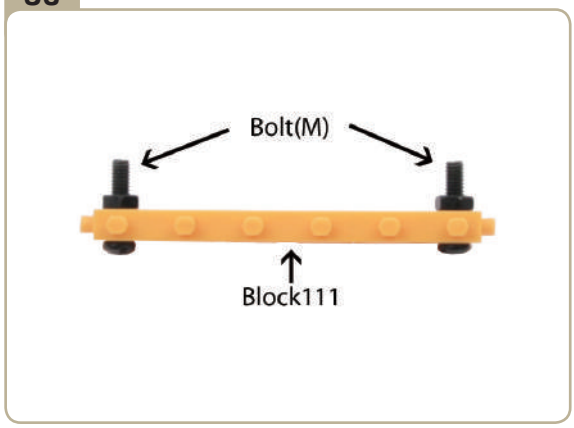


28

29

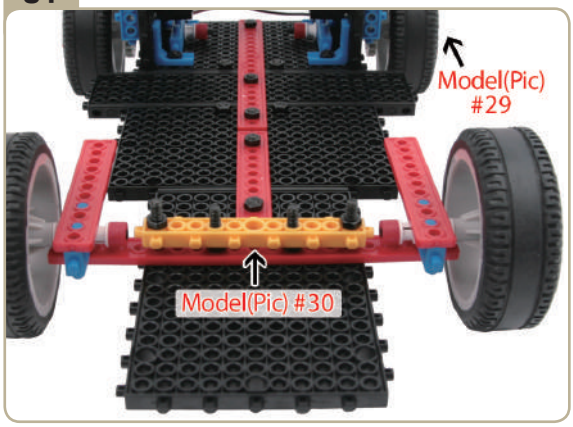


30



Q 3. What is the name of robot that looks like a human-being?

31



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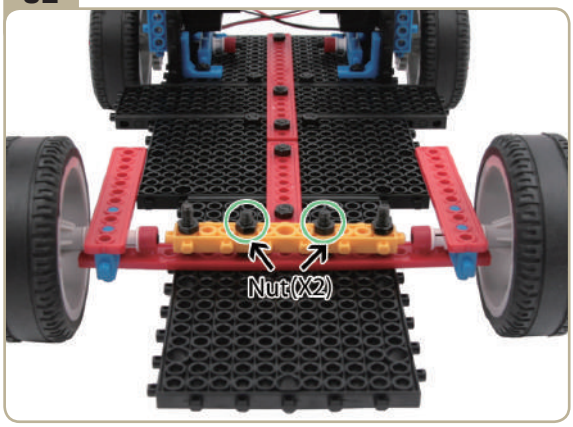
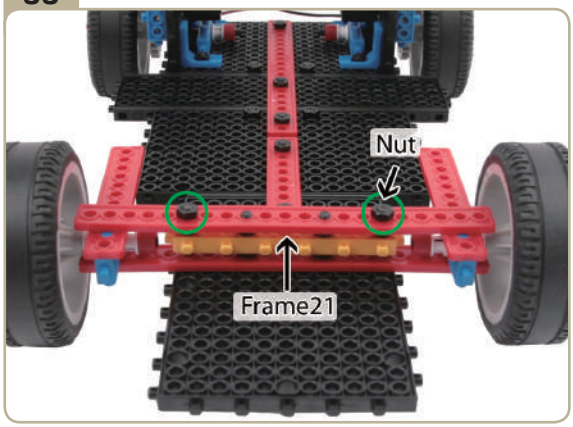


33



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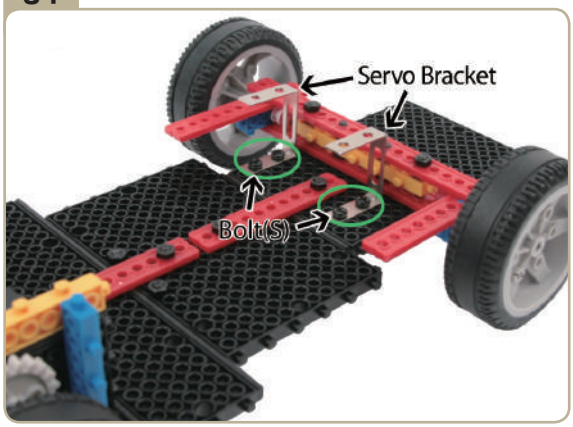

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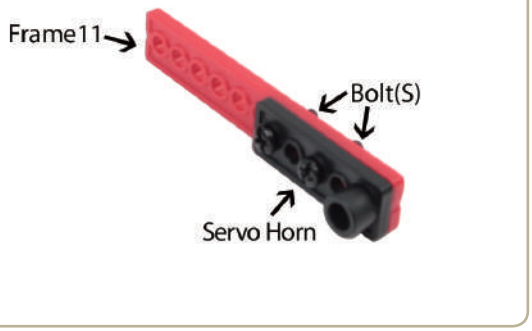

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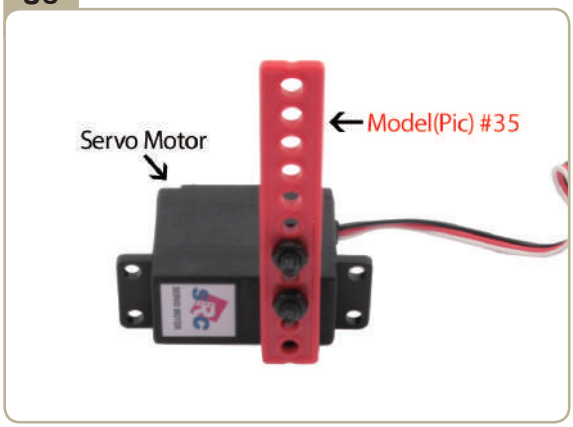
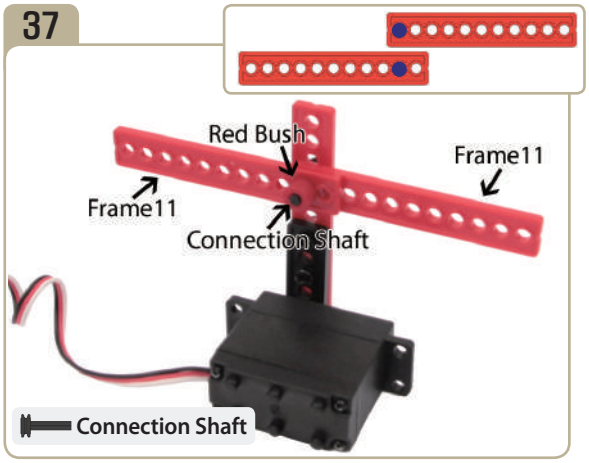


After adjusting zero point of servo motor, fix model(pic)#35 to servo motor with a small servo bolt.

37



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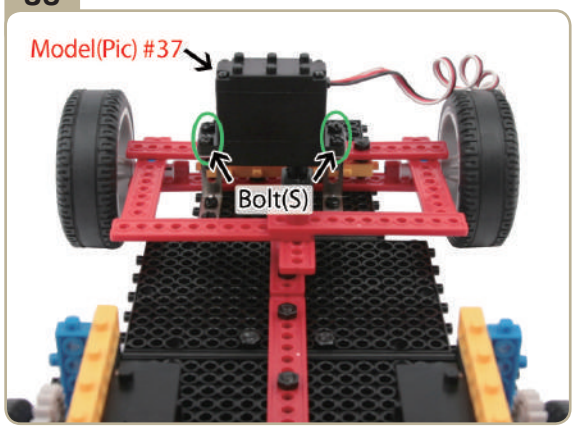

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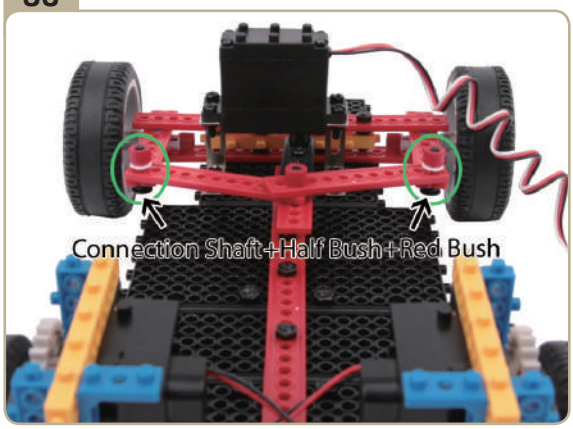
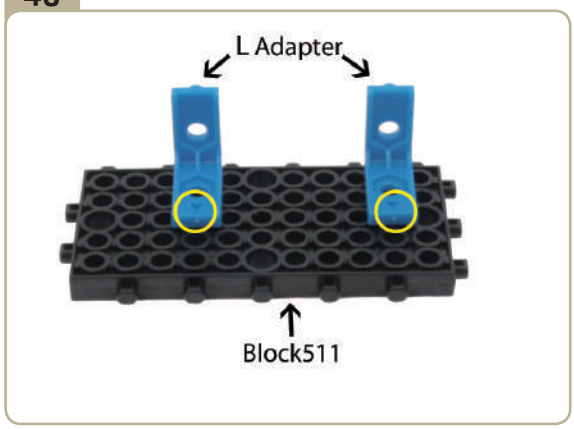


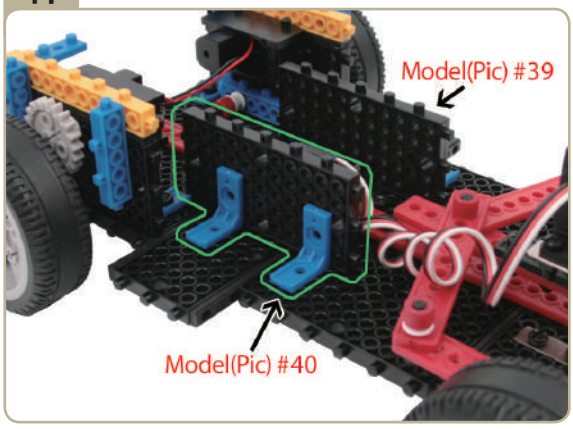
Connect the「frame11」that is connected to servo motor and the「frame11」that is connected to the wheels with, connection shafts and red bushes, bushes.

40



Attach 'L' adapters to「block511」.Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

41



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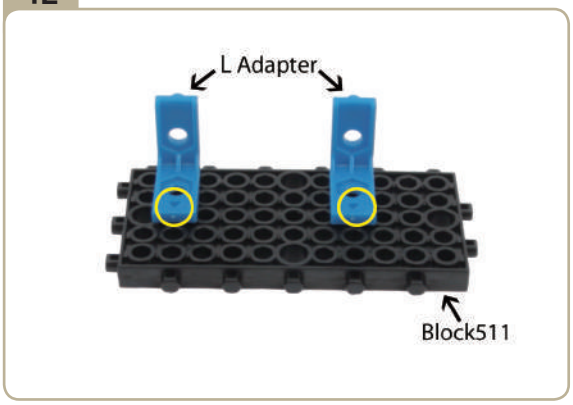
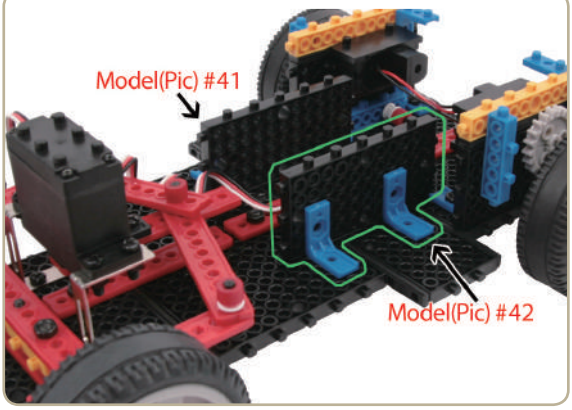


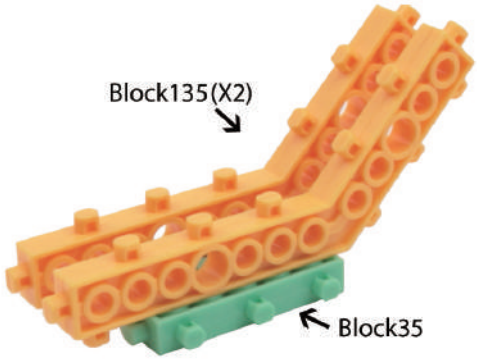
Attach 'L' adapters to「block511」.Pay close attention to the arrows(▲) that indicate how the adapters should be attached.

Q 4. What is the name of the first humanoid robot that was designed in Korea?

43 (*Opposite of model(pic)#41*)



44



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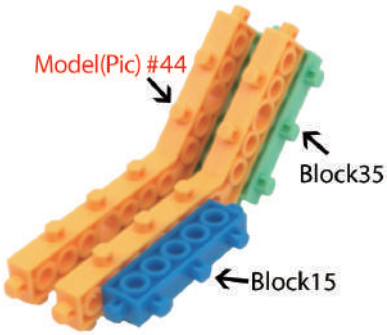

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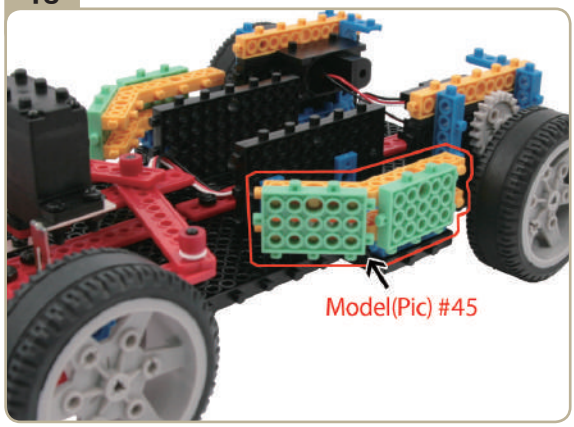

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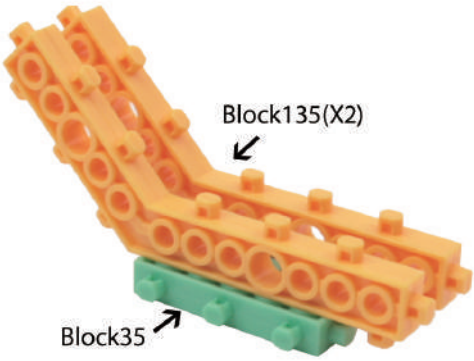
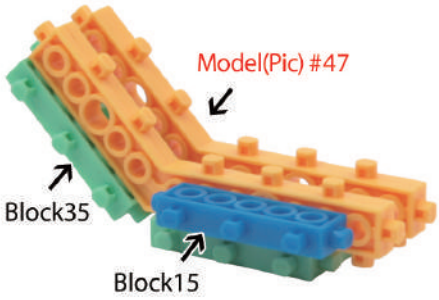
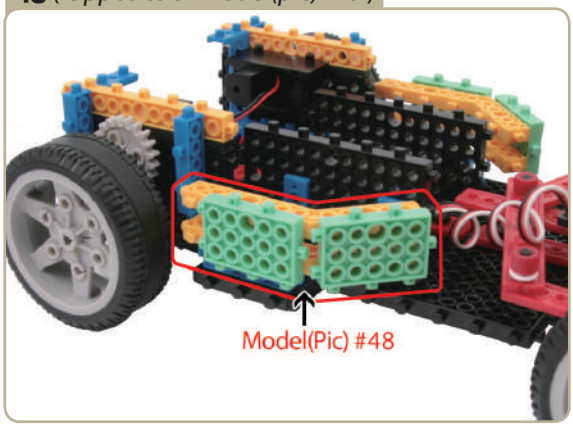


48



Assemble using the same method as model(pic)#44, but in reverse.

49 (*Opposite of model(pic)#46*)



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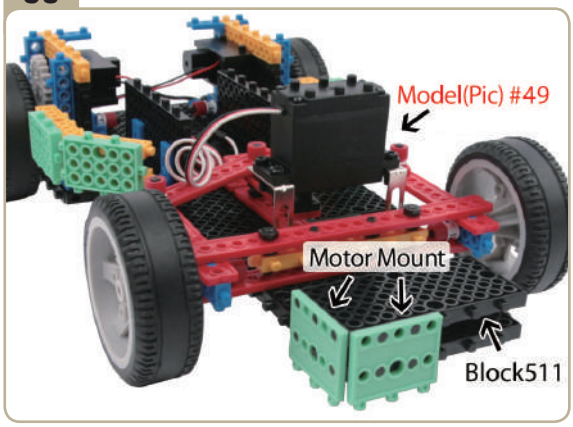

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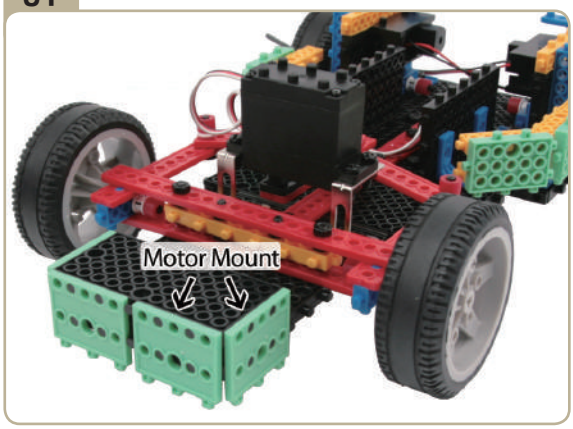

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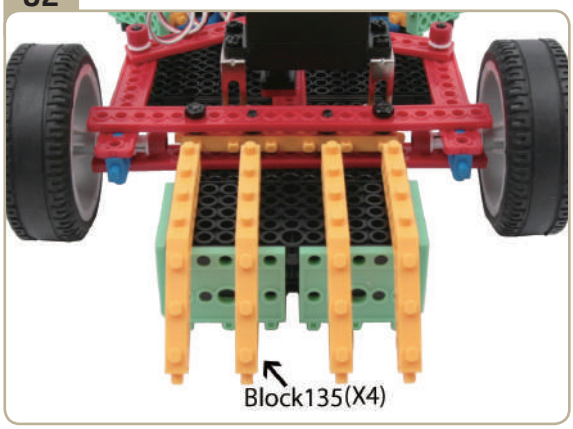

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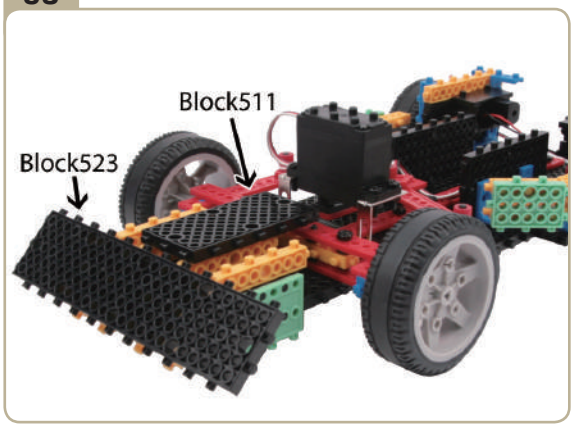

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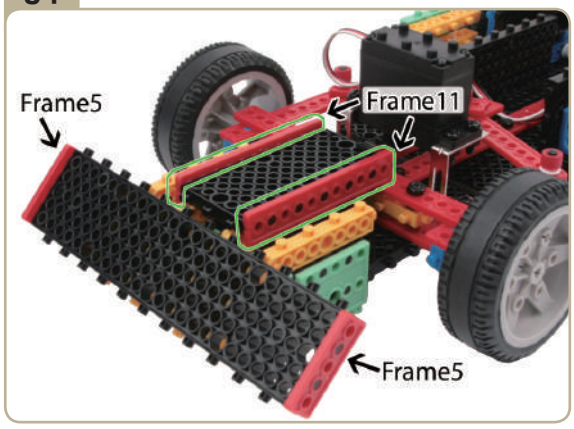
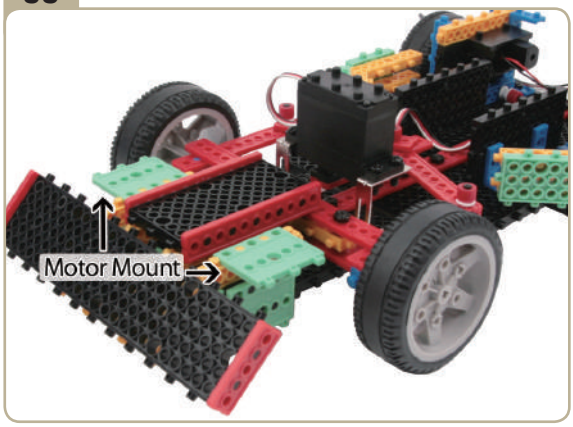


Q *5*. **What is the name of high speed auto-calculator that uses a electronic circuit?**

55



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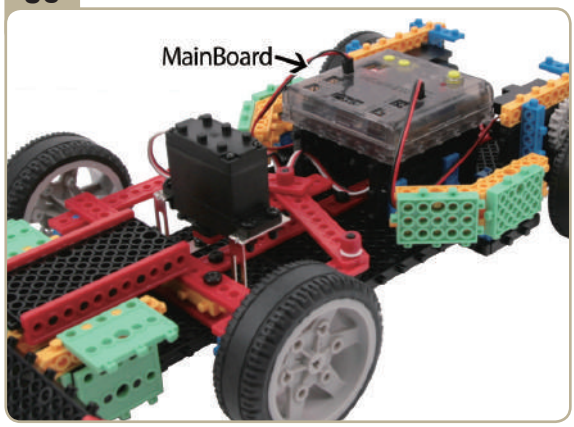
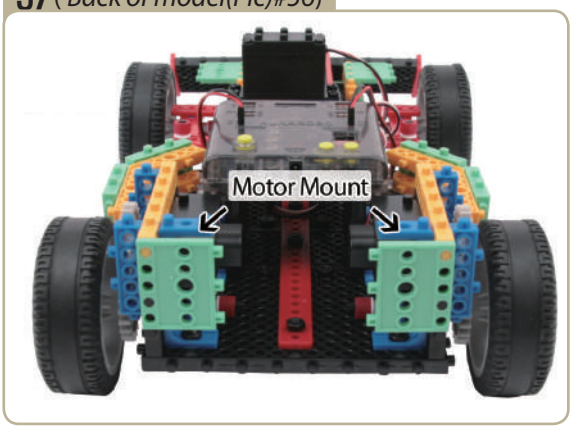


57 (*Back of model(Pic)#56*)



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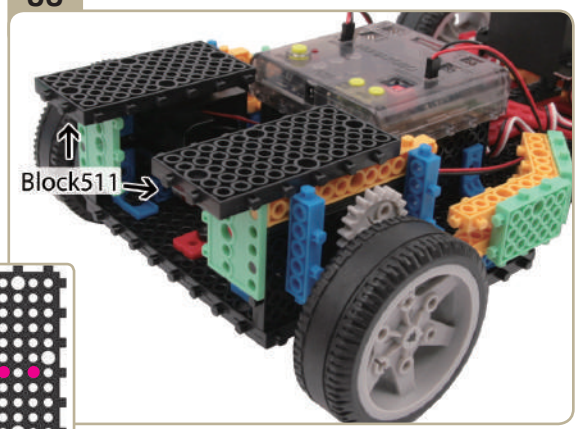

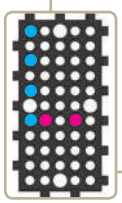

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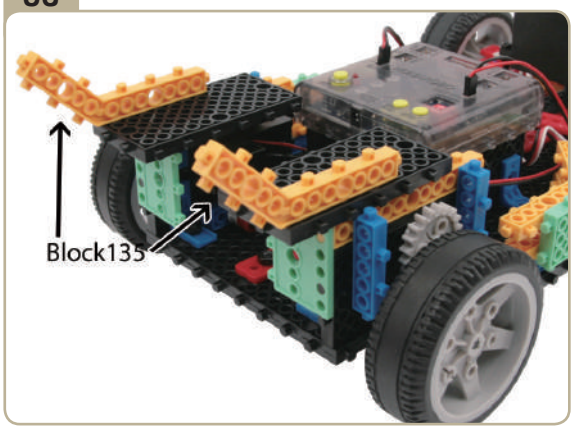

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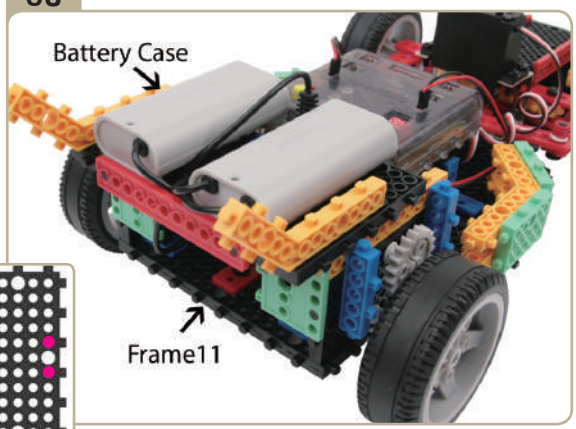

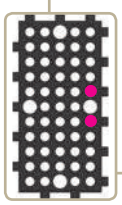

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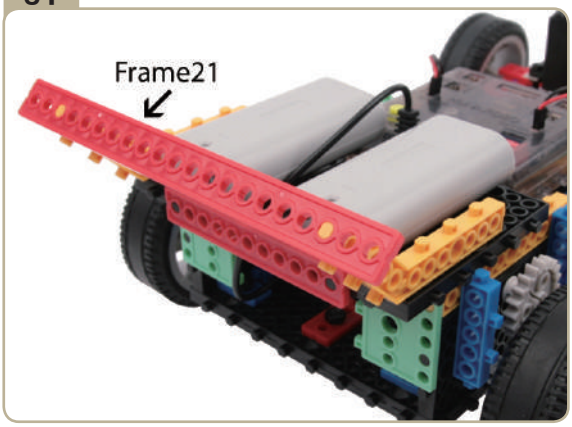

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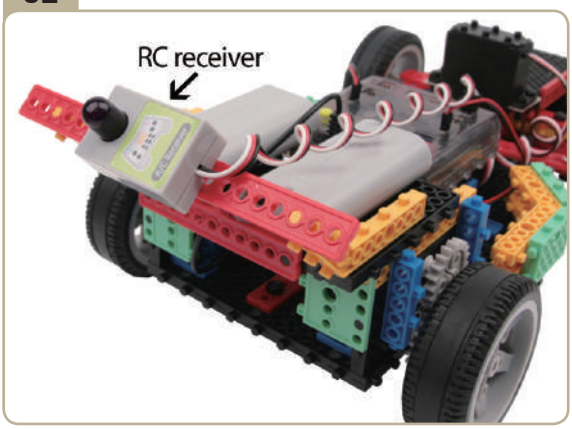

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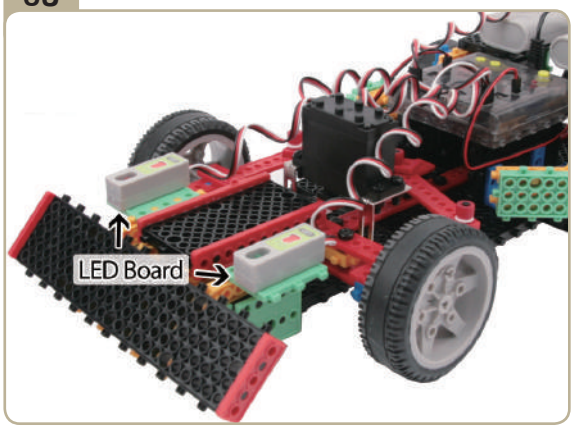
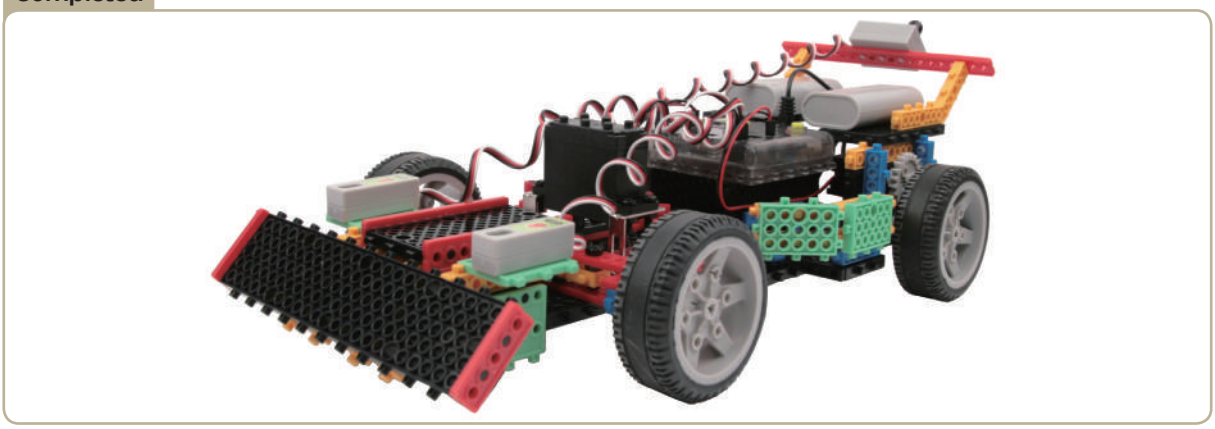


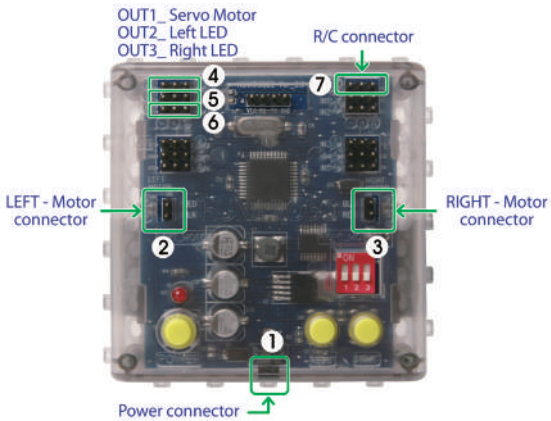
Completed



Q 6. What is the equipment called that we use make quick and accurate calculations with?

How to prepare the FORMULA CAR(F1)

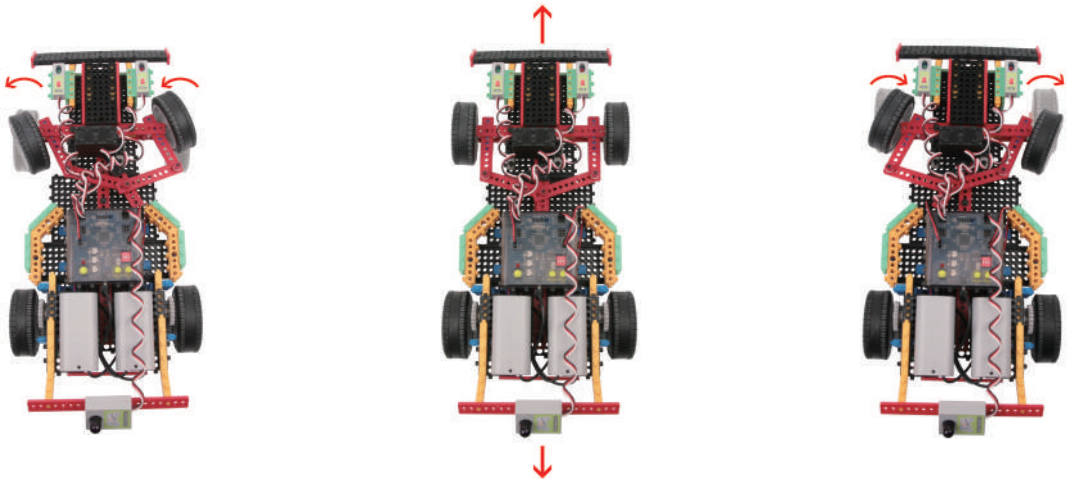
Connecting the mainboard



Connect in this order.

1. Connect Battery case to POWER connector.
2. Connect Left DC motor to LEFT-Motor connector.
3. Connect Right DC motor to RIGHT-Motor connector.
4. Connect Servo motor to OUT1 of OUTPUT connector.
5. Connect Left IR sensor to OUT2 of OUTPUT connector.
6. Connect Right IR sensor to OUT3 of OUTPUT connector.
7. Connect RC receiver to Remote Control connector.

Motion Pattern



Hint 1. Forward/Backward : Both DC motors activate forward and backward motion.
Hint 2. Left/Right turn : Servo motor + (angle) / - (angle))

- Using the motion patterns as reference, let's create the program.

**** For more program examples, visit our reference room. (HunaRobo on our web site, www.hunarobo.com)***

Program Download

1. Create the program.
2. Make sure Power / DC Motor connector and sensor's connector are well connected.
3. Check the power OFF state, then insert the download cable.
4. 'SAVE' and click the 'DOWNLOAD' button on the program window.
5. Turn on the power when 'DOWNLOAD' window opens. (Power ON)
6. Once the download is completed, remove the download cable and then turn the power off and on.
   (Power OFF → Power ON)

*** Refer to 「HunaRobo Compiler Manual」 on how to create more detailed programs and how to download them.**

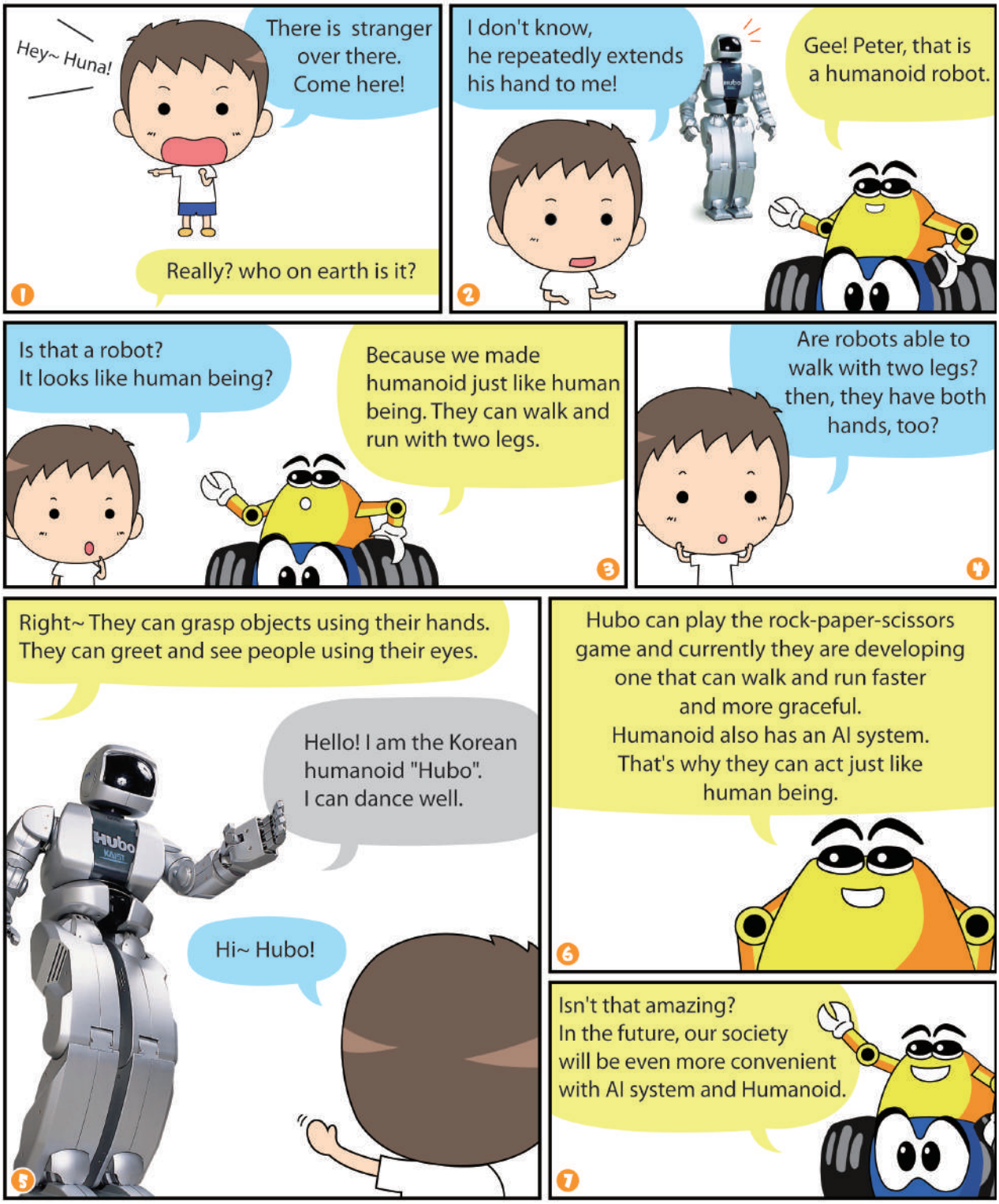
Program Example

Action	No
Program Start	0
Remocon : [Up] {	1
Servo : [OUT1]=[0]	2
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	3
END }	4
Remocon : [Down] {	5
Servo : [OUT1]=[0]	6
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	7
END }	8
Remocon : [Left] {	9
Servo : [OUT1]=[30]	10
LED : [OUT2]=[ON]	11
END }	12
Remocon : [Right] {	13
Servo : [OUT1]=[-30]	14
LED : [OUT3]=[ON]	15
END }	16
Remocon : [Up + Right] {	17
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	18
Servo : [OUT1]=[-30]	19
LED : [OUT3]=[ON]	20
END }	21
Remocon : [Up + Left] {	22
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	23
Servo : [OUT1]=[30]	24
LED : [OUT2]=[ON]	25
END }	26
Remocon : [Down + Left] {	27
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	28
Servo : [OUT1]=[30]	29
LED : [OUT2]=[ON]	30
END }	31
Remocon : [Down + Right] {	32
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	33
Servo : [OUT1]=[-30]	34
LED : [OUT3]=[ON]	35
END }	36
Remocon : [F1] {	37
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=8]	38
Servo : [OUT1]=[15]	39
LED : [OUT2]=[ON]	40
END }	41
Remocon : [F2] {	42
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=8]	43
Servo : [OUT1]=[0]	44
LED : [OUT2]=[ON], [OUT3]=[ON]	45
END }	46
Remocon : [F3] {	47
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=8]	48
Servo : [OUT1]=[-15]	49
LED : [OUT3]=[ON]	50
END }	51
Remocon : [F4] {	52
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=8]	53
Servo : [OUT1]=[15]	54
LED : [OUT2]=[ON]	55
END }	56
Remocon : [F5] {	57
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=8]	58
Servo : [OUT1]=[0]	59
LED : [OUT2]=[ON], [OUT3]=[ON]	60
END }	61
Remocon : [F6] {	62
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=8]	63
Servo : [OUT1]=[-15]	64
LED : [OUT3]=[ON]	65
END }	66
Remocon : [KEY OFF] {	67
DC motor 1 : [Both MOTOR1]=[Stop]	68
Servo : [OUT1]=[0]	69
LED : [OUT2]=[OFF], [OUT3]=[OFF]	70
END }	71
Program End	72

7. What is the equipment called that makes use of a electronic circuit to calculate problems?

Robot story 1

Robot is in the similitude of the human - AI 2 (Artificial Intelligence) Humanoid



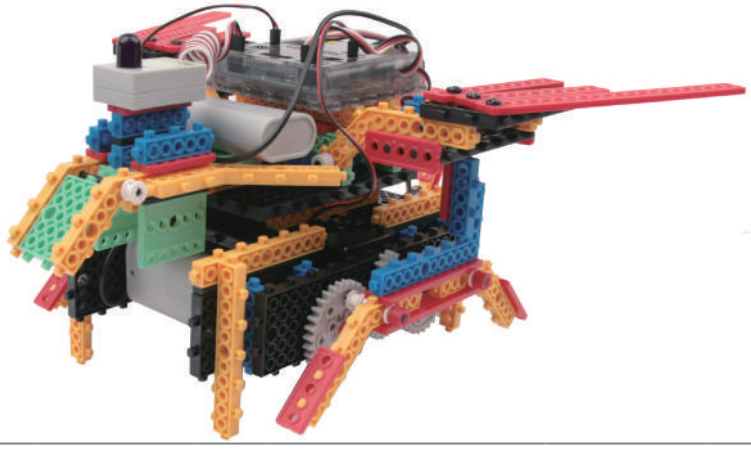
A 7. Computer or Electronic calculator

Let's Make it 3

Making a robot that can change its direction using two servo motors

PTEROSAURS

Pterosaurs is an extinct reptile of the Jurassic and Cretaceous period.
It has a bird-like beak and membranous wings that may have had a wingspan 6~8m on each side. It has long skull and big eyes, diamond-shaped long tail.
This pterosaurs was discovered in sedimentary layer in Europe and Eastern Africa.
Rhamphorhynchus is a representative of the Jurassic period and the Pteranodon is a representative of the Cretaceous period.

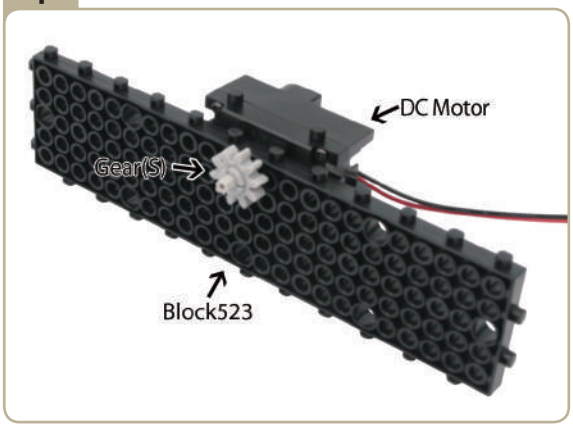


Prepare parts for assembly

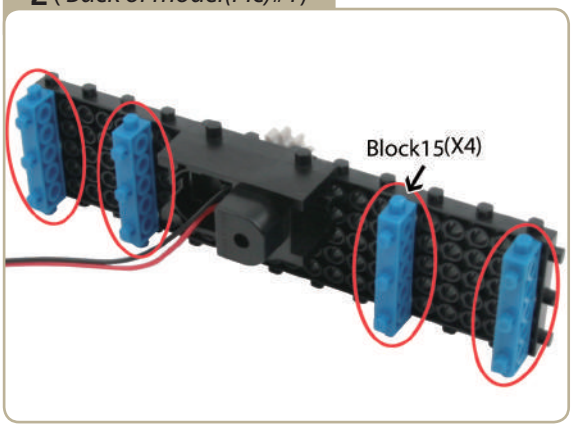
	Block1117	×1	Frame21	×6	Mainboard ×1
			Frame11	×8	
			Frame5	×15	
	Block523	×2	Adapter2	×4	
			Adapter1	×5	
	Block511	×12	L Adapter	×8	RC Receiver ×1
			Shaft(S)	×4	
	Block90	×2	Shaft(M)	×1	
			Shaft(L)	×8	Remote Control ×1
	Block135	×13	Half Bush	×4	
			Bush	×14	
	Block111	×15	Red Bush	×10	
	Block15	×17	Coupling	×3	Battery Case ×1
	Block35	×7	Gear(S)	×2	
	Motor Mount	×2	Gear(M)	×2	
	DC Motor	×2	Gear(L)	×4	
	Servo Motor	×2	Bolt(S) / Nut	×14	

Q 8. What is name of the world's electronic computer that was build in Pennsylvania University of USA in1946 ? A

1



2 (*Back of model(Pic)#1*)



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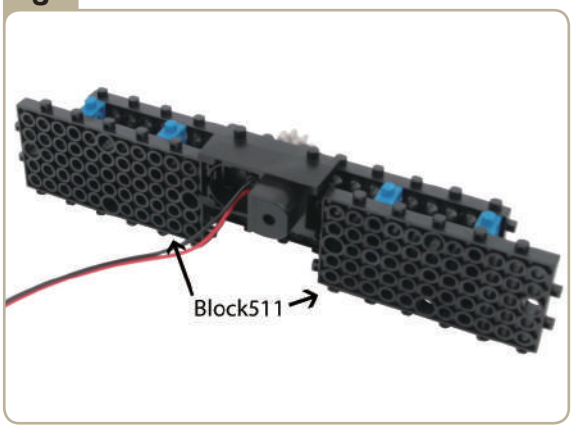

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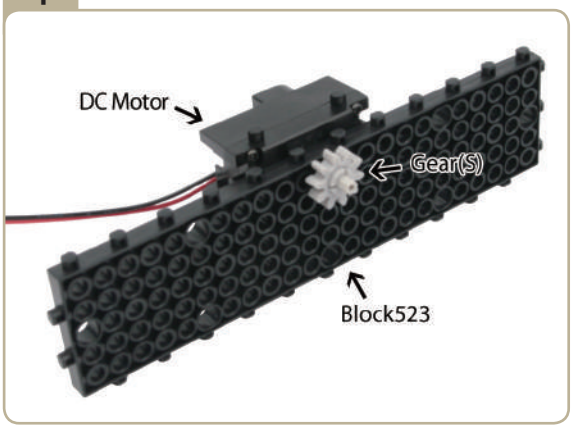
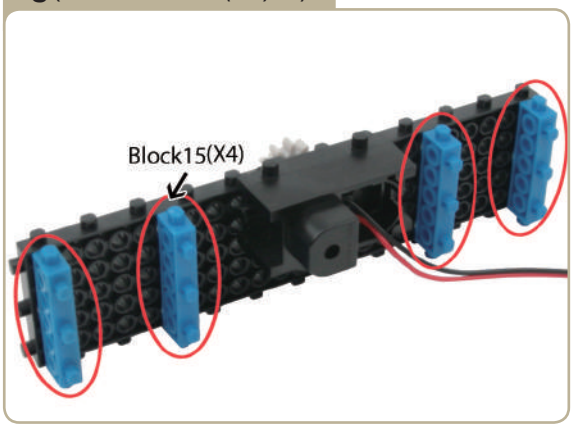
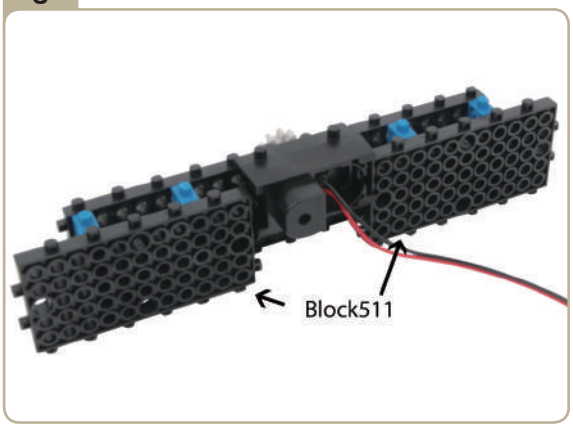


5 (*Back of model(Pic)#4*)



6



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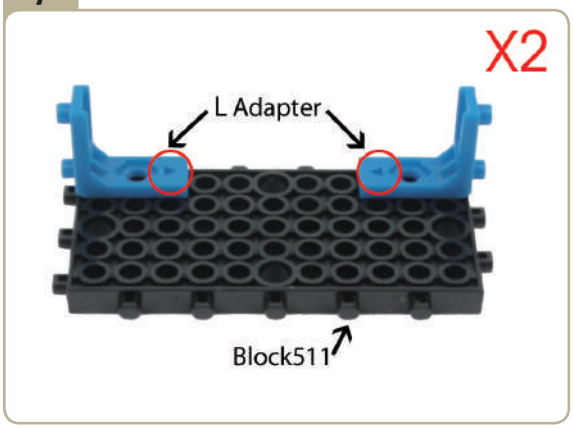
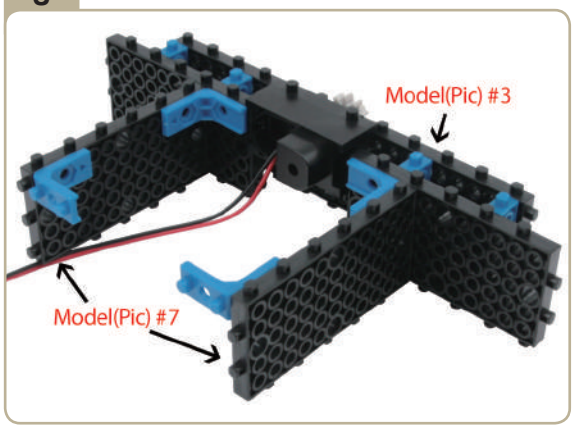
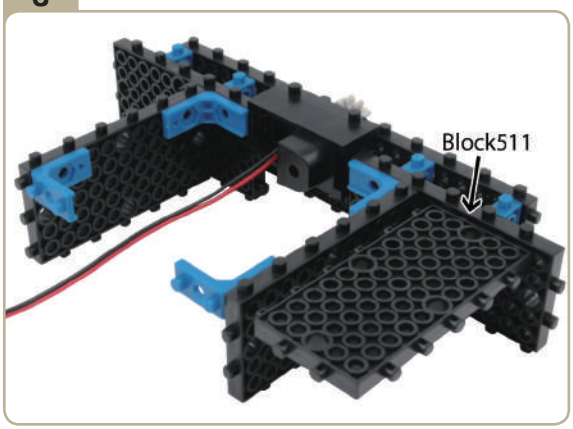


Attach 'L' adapters to 「block511」. Pay close attention to the arrows(▲) that indicate how the adapters should be attached. (Assemble two identical models.)

8



9



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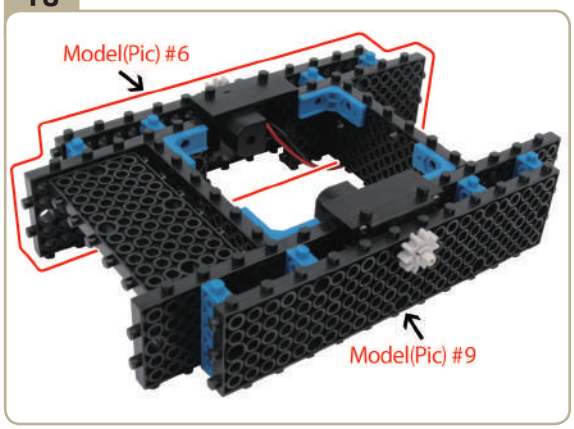
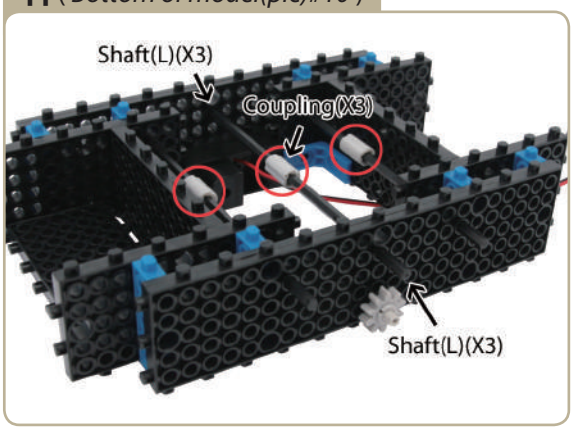
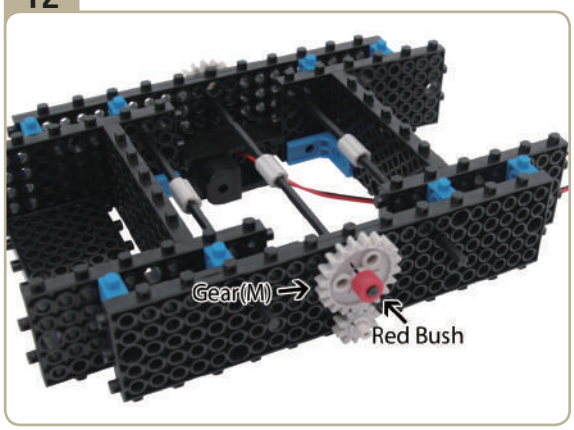


11 (*Bottom of model(pic)#10*)



Turn model(pic)#10 upside down, then connect three medium shafts and three long shafts with couplings.

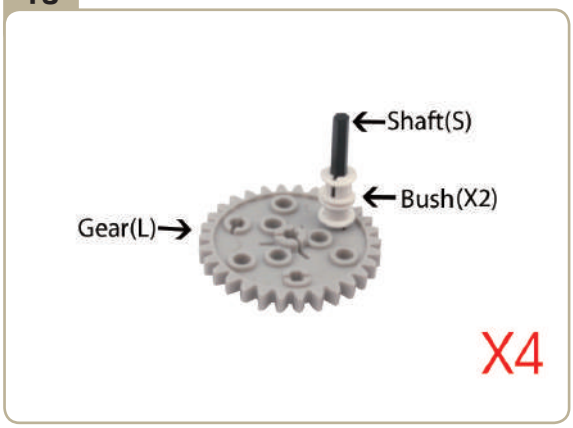
12



Connect a medium gear and a red bush.
(Assemble opposite side in same manner.)

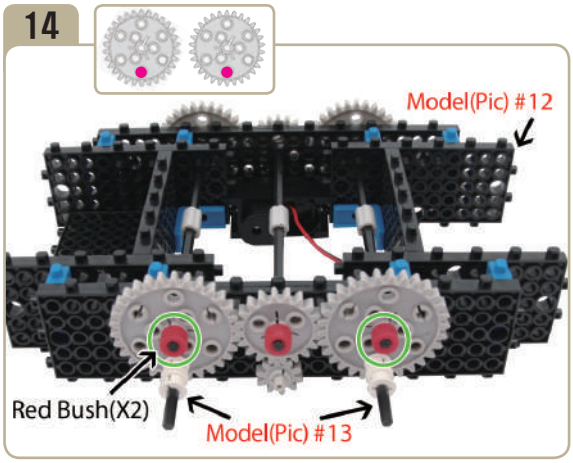
Q 9. What is accord called that makes sure that humans get long well with robots?

13

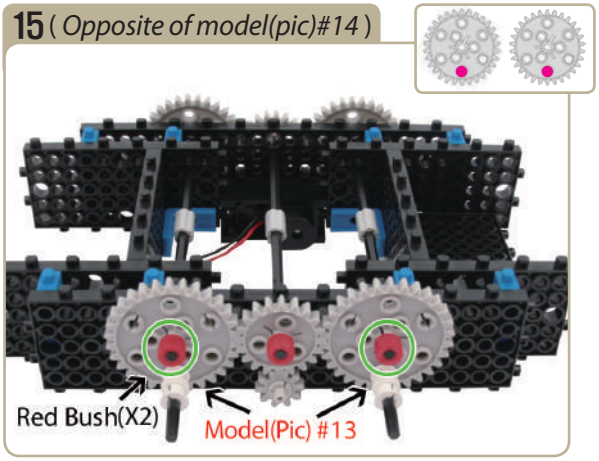


Assemble four identical models.

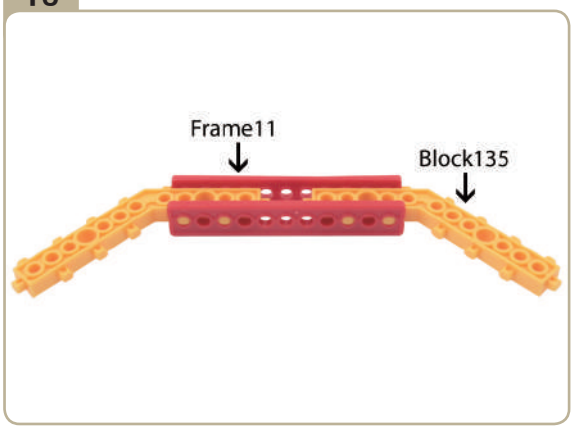
14



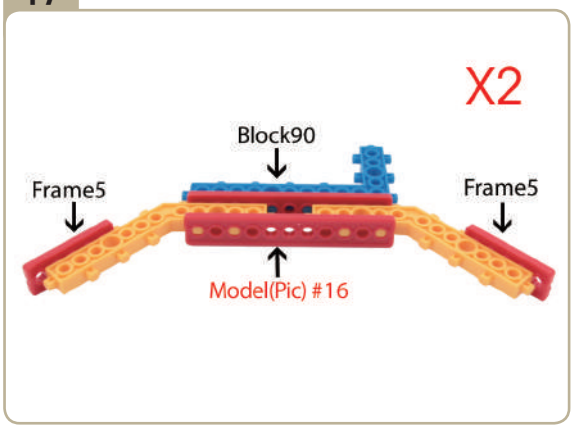
15 (*Opposite of model(pic)#14*)



16

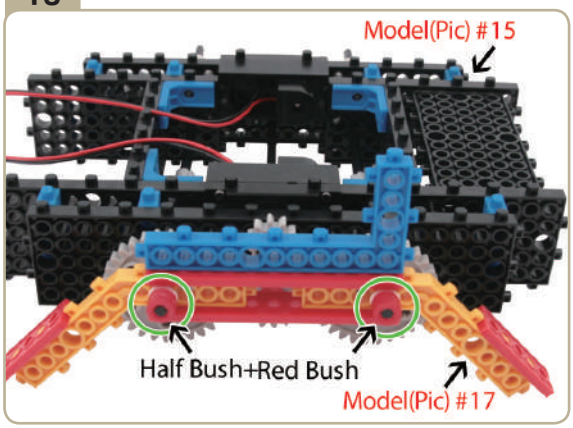


17



Assemble two identical models.

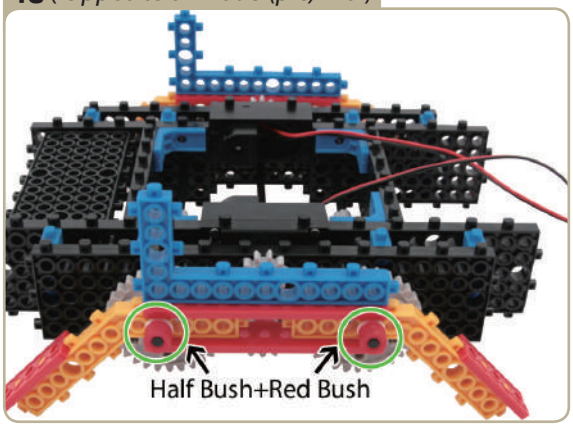
18



Turn model(pic)#15 upside down, then connect half bushes and red bushes.

A 9. The charter of robot ethics

19 (*Opposite of model(pic)#18*)



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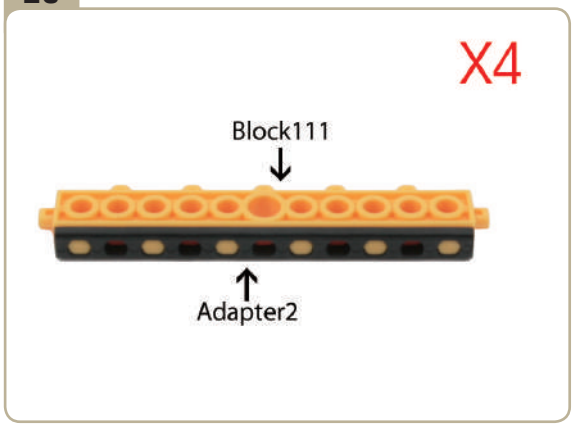

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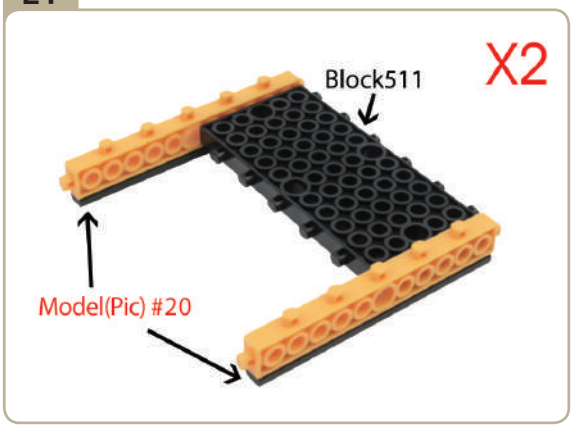

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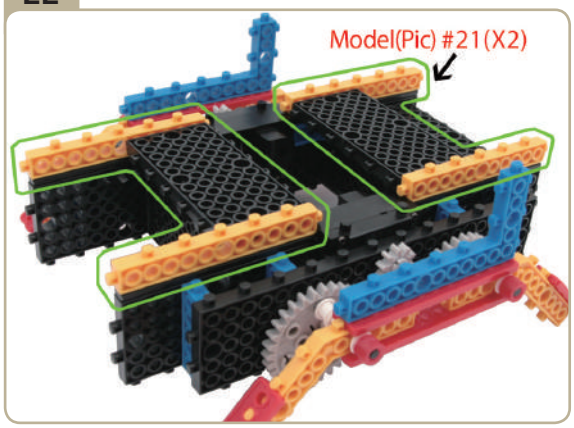
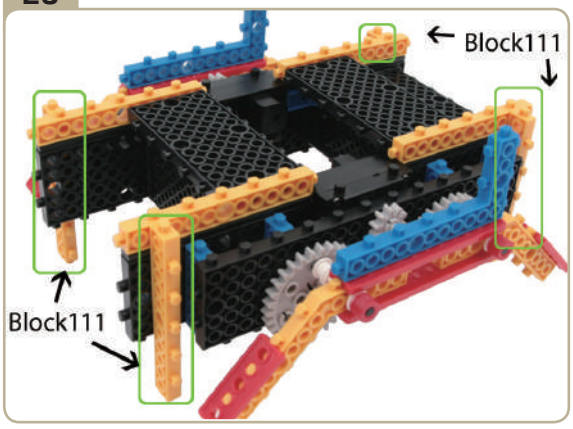


Assemble two identical models.

23



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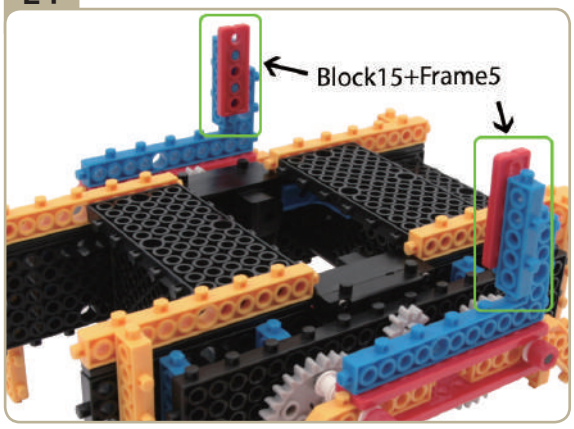
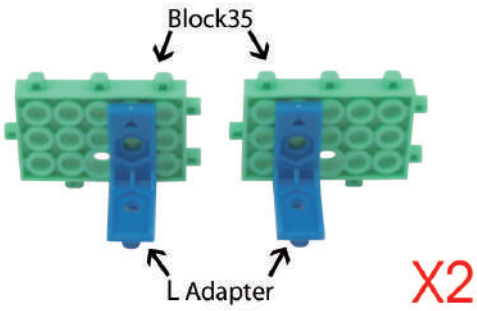


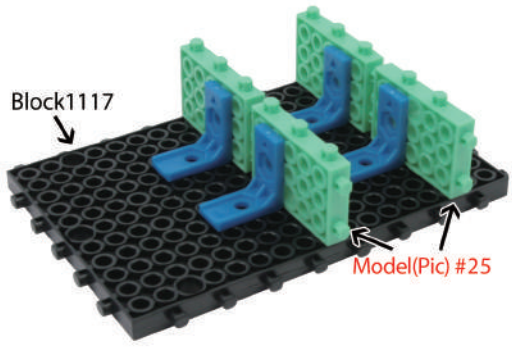
Q **1. What is the name of the computer system that has the same reasoning and learning capabilities as humans?**

25



Attach 'L' adapters to 「block35」. Pay close attention to the arrows(▲) that indicate how the adapters should be attached. (Assemble two identical models.)

26



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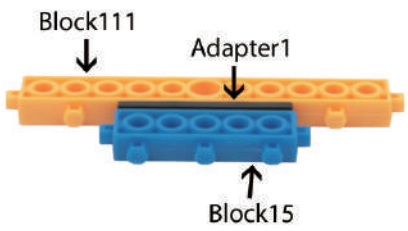

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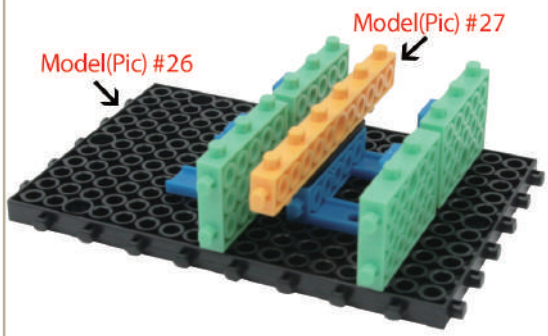

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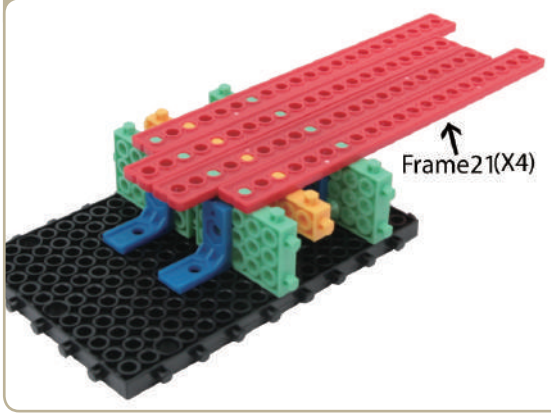

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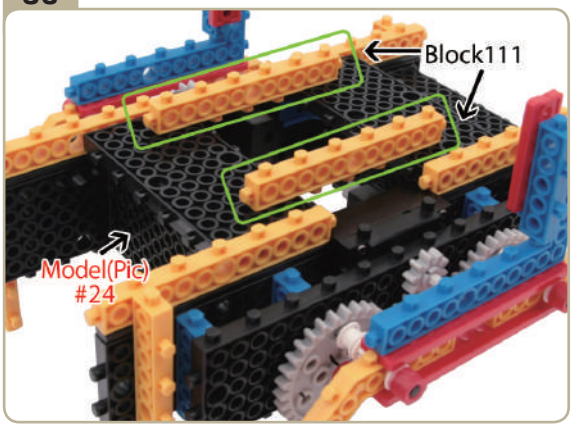

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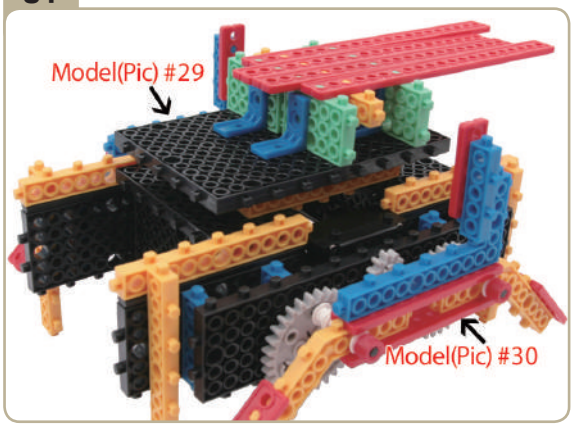

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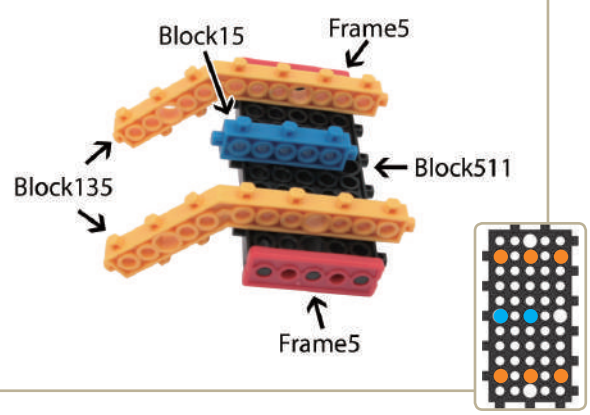

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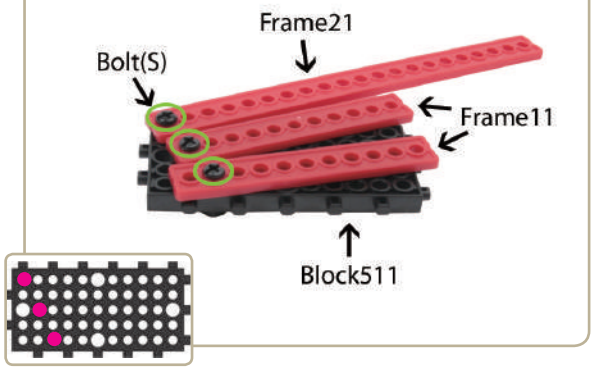

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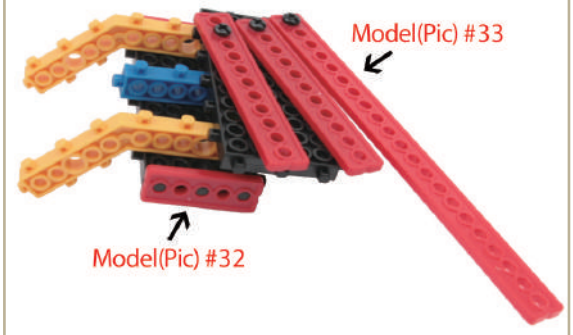

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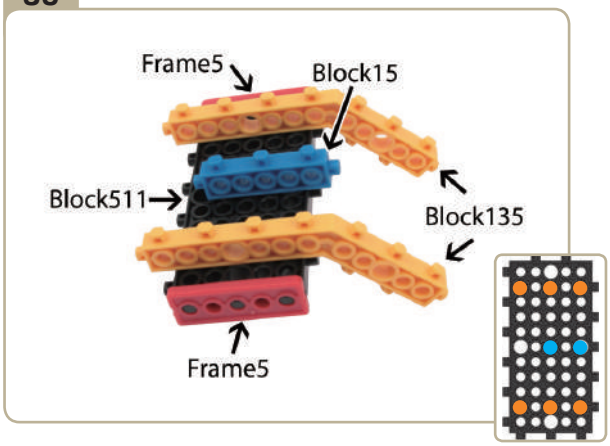

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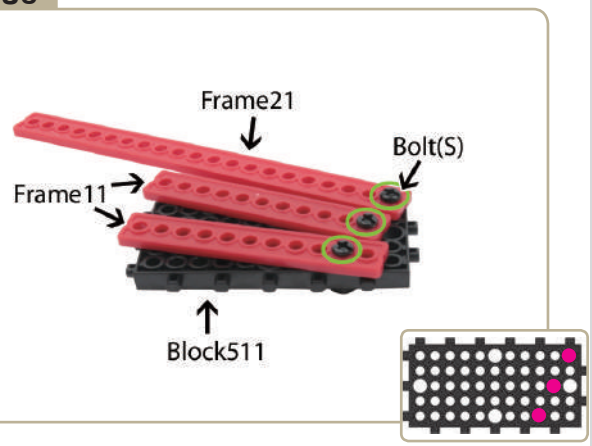
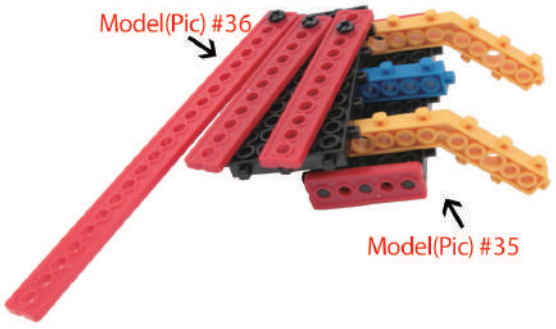


Q 2. What is the name of the device that controls equipment and machinery over long distances?

37



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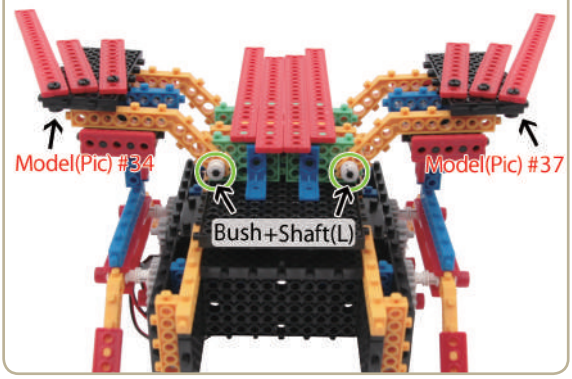

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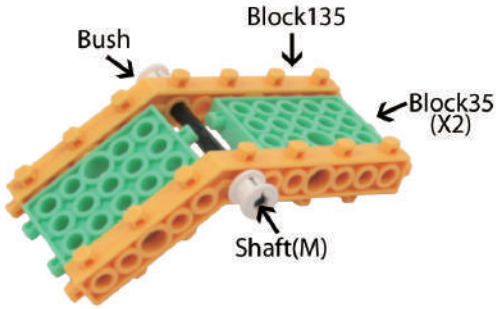

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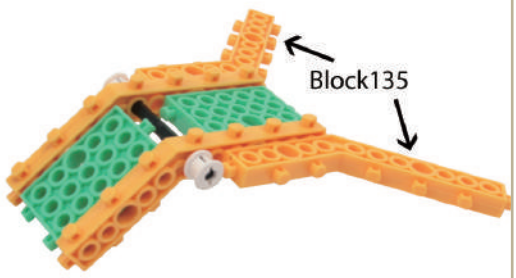
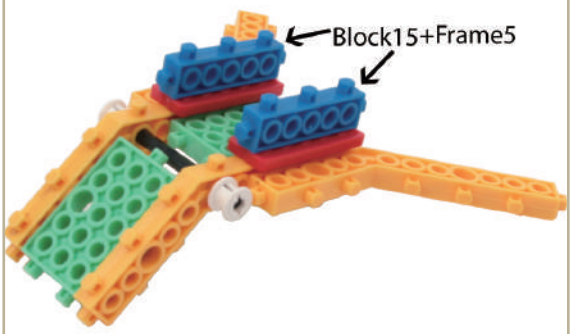
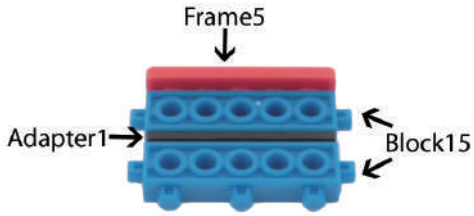


41



42



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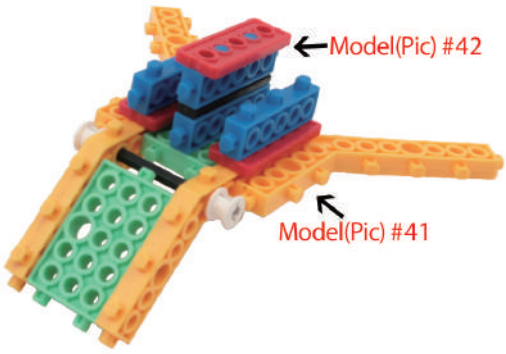
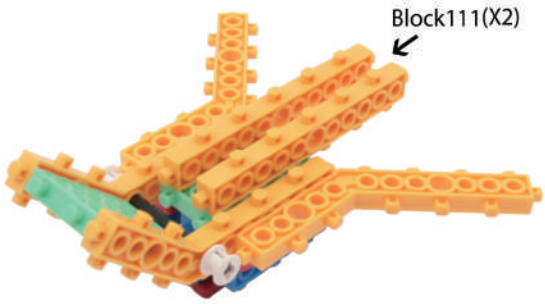
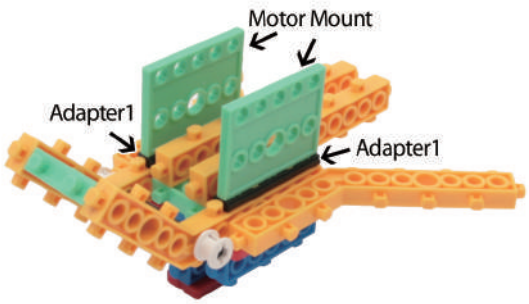


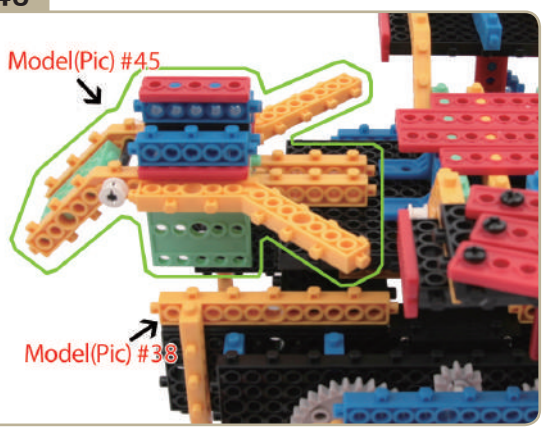
44 (Botttom of model(pic)#43)



45



46



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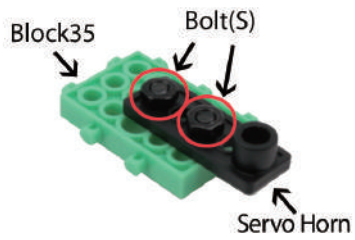

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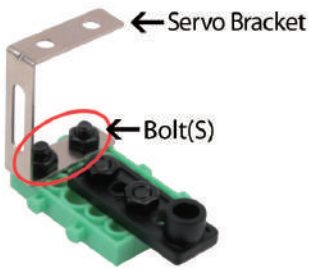
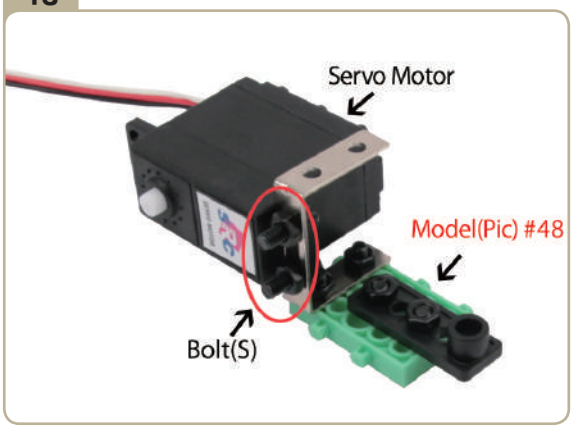


Q 3. What is the name of robot that looks like a human-being?

49



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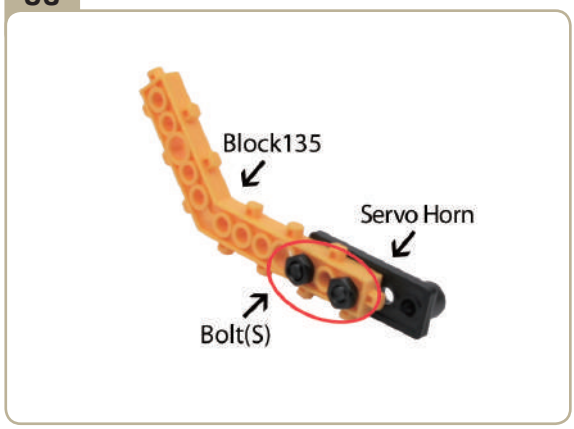
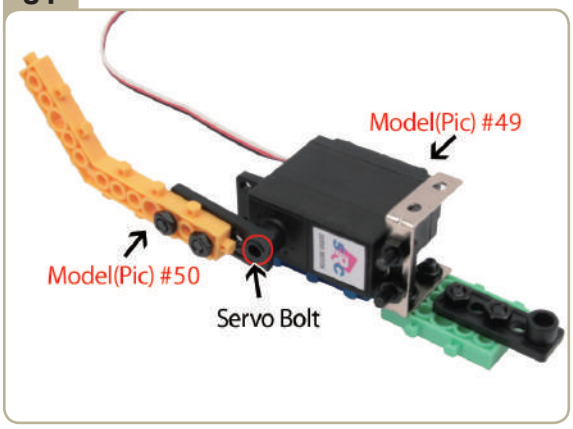
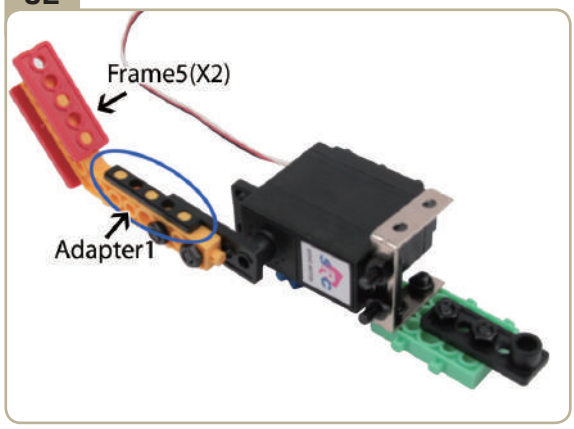


51

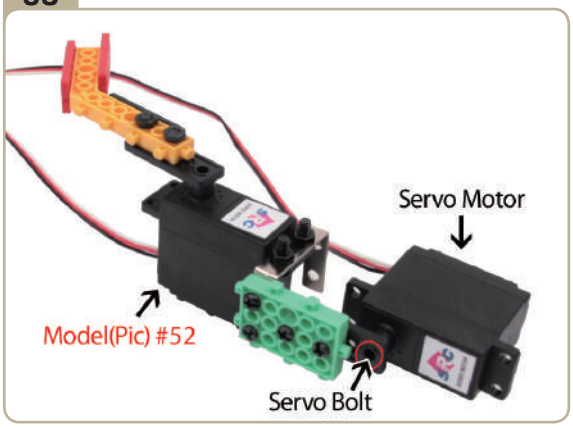


52



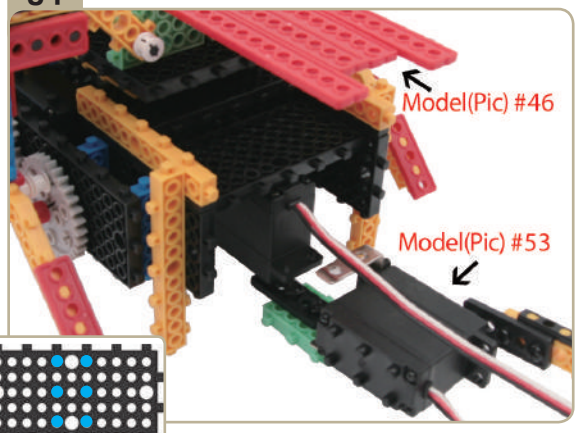
After adjusting zero point of servo motor, fix model(pic)#50 to model(pic)#49 with a small servo bolt.

53

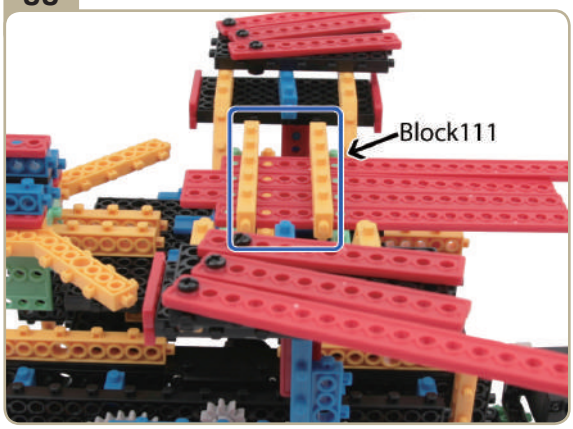


After adjusting zero point of servo motor, fix servo motor to model(pic)#52 with a small servo bolt.

54



55



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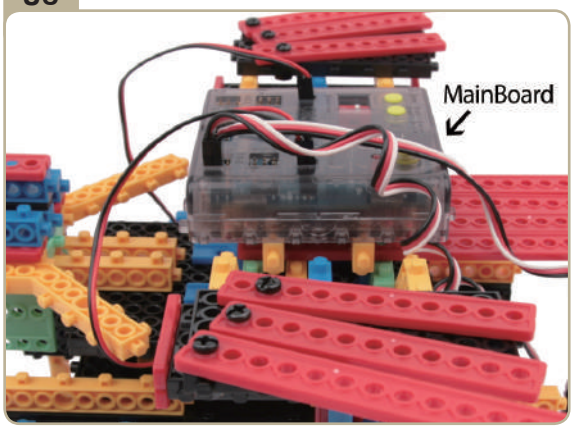

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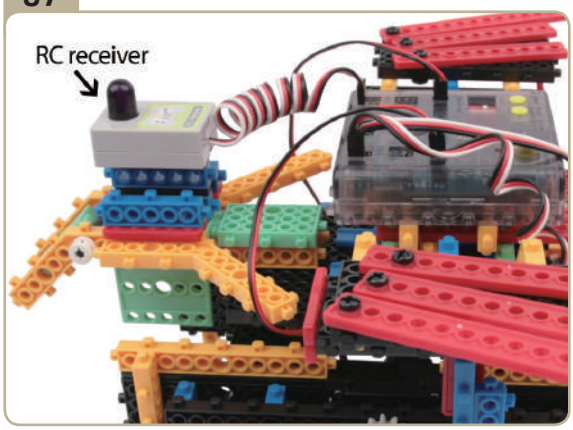
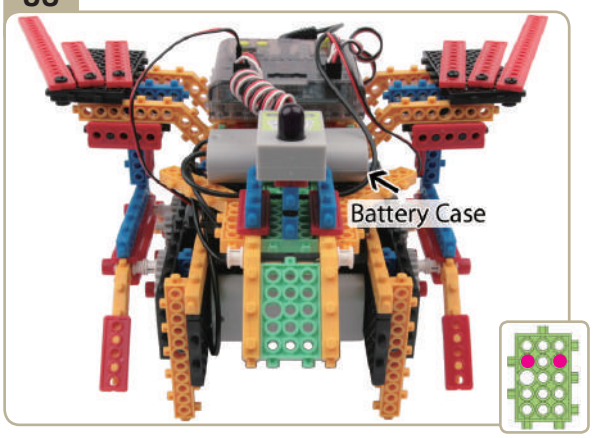
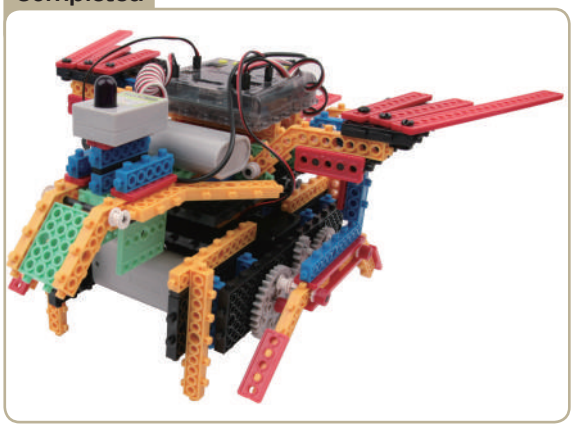


58



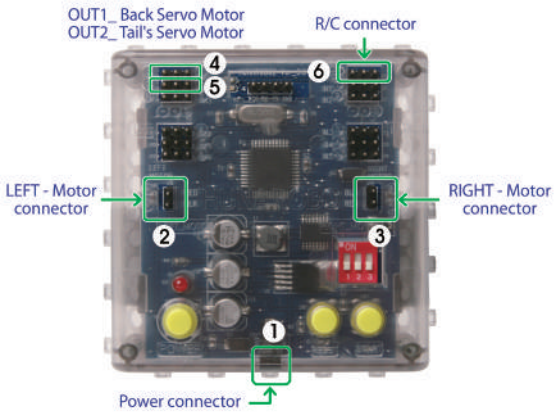
Completed



Q 4. What is the name of the first humanoid robot that was designed in Korea?

How to operate the PTEROSAURS

Connecting the mainboard



Connect in this order.

1. Connect Battery case to POWER connector.
2. Connect Left DC motor to LEFT-Motor connector.
3. Connect Right DC motor to RIGHT-Motor connector.
4. Connect Back Servo motor to OUT1 of OUTPUT connector.
5. Connect Tail's Servo motor to OUT2 of OUTPUT connector.
6. Connect RC receiver to Remote Control connector.

Motion Pattern

- Using the motion patterns as reference, let's create the program.

**** For more program examples, visit our reference room. (HunaRobo on our web site, www.hunarobo.com)***

Program Download

1. Create the program.
2. Make sure Power / DC Motor connector and sensor's connector are well connected.
3. Check the power OFF state, then insert the download cable.
4. 'SAVE' and click the 'DOWNLOAD' button on the program window.
5. Turn on the power when 'DOWNLOAD' window opens. (Power ON)
6. Once the download is completed, remove the download cable and then turn the power off and on.
   (Power OFF → Power ON)

*** Refer to 「HunaRobo Compiler Manual」 on how to create more detailed programs and how to download them.**

Program Example

Action	No
Program Start	0
Remocon : [Up] {	1
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	2
Servo : [OUT1]=[0], [OUT2]=[0]	3
END }	4
Remocon : [Down] {	5
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	6
Servo : [OUT1]=[0], [OUT2]=[0]	7
END }	8
Remocon : [Left] {	9
Servo : [OUT2]=[-60]	10
Delay : [0.5 sec]	11
Servo : [OUT1]=[-45]	12
Delay : [0.5 sec]	13
Servo : [OUT2]=[0]	14
Delay : [0.5 sec]	15
END }	16
Remocon : [Right] {	17
Servo : [OUT2]=[-60]	18
Delay : [0.5 sec]	19
Servo : [OUT1]=[45]	20
Delay : [0.5 sec]	21
Servo : [OUT2]=[0]	22
Delay : [0.5 sec]	23
END }	24
Remocon : [KEY OFF] {	25
DC motor 1 : [Both MOTOR1]=[Stop]	26
Servo : [OUT1]=[0], [OUT2]=[0]	27
END }	28
Program End	29

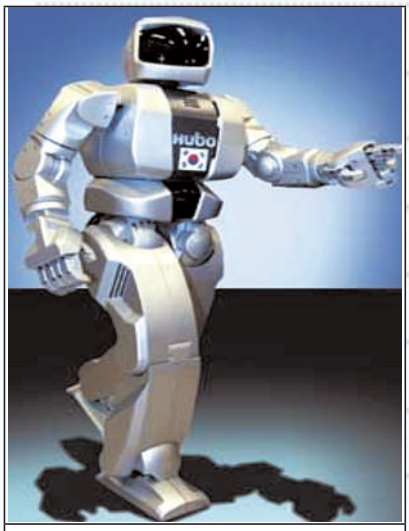
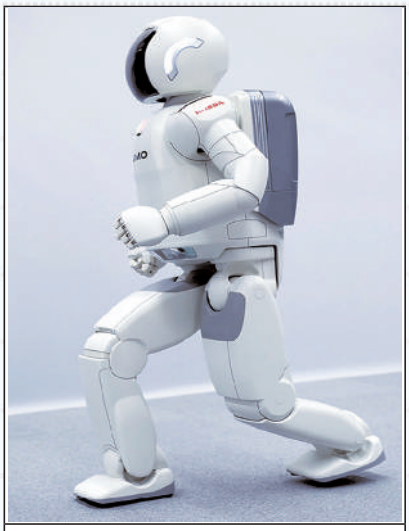
Q *5*. **What is the name of high speed auto-calculator that uses a electronic circuit?**

Robot story 2

Other Humanoids!

Let's compare Hubo with Asimo after reading a news item about humanoid!

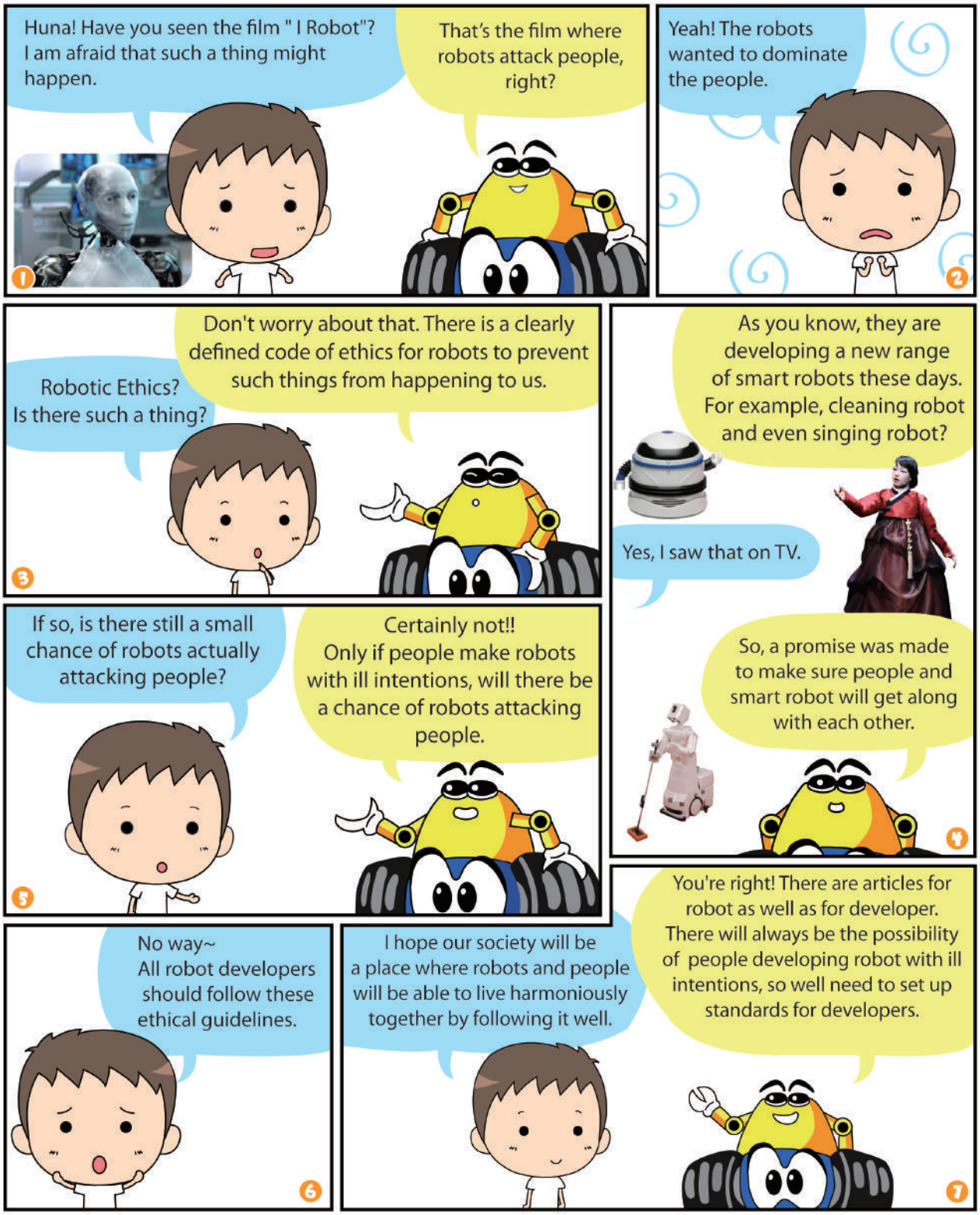
▣ Hubo and Asimo

		
Hubo	Name	Asimo
December, 2004	Birth Date	November, 2000
KAIST	Developer	HONDA, Japan
3 years	Period of development	15 years
About one billion won	Cost of development	About 3 hundred billion Won
120cm	Height	120cm
55kg	weight	43kg
41	Number of motorised Joints	26
Able to move 5 motors respectively	Motion of fingers	Able to move 5 motors at a time
Built -in battery in chest	Battery	Knapsack exterior battery
Speed of 1.2kph	Walking Speed	Speed of 1.6kph
Impossible	Driving Speed	3km for new-model

Q 6. What is the equipment called that we use make quick and accurate calculations with?

Robot story 1

Rules to follow-Robotic Ethics



A 6. Calculator

Let's Make it 4

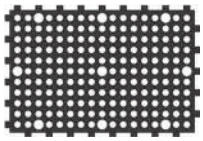
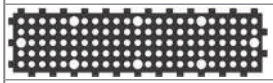
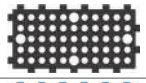
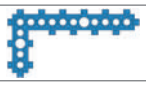
Making a robot that uses two DC motors and two servo motors



DUKE TANK

DUKE TANK was made to resemble the tank from the popular fortress game.
This model can turn left and right and it's cannon can move up and down with servo motor.

Prepare parts for assembly

	Block1117	×2		Frame21	×4
				Frame11	×4
				Frame5	×10
	Block523	×2		Adapter2	×6
				Adapter1	×6
	Block511	×5		L Adapter	×8
				Connection Shaft	×2
	Block90	×5		Shaft(S)	×11
				Shaft(M)	×4
	Block135	×6		Shaft(L)	×1
				Half Bush	×7
	Block111	×7		Bush	×34
	Block15	×22		Gear(S)	×4
	Block35	×18		Gear(M)	×2
	Motor Mount	×6		Gear(L)	×2
	Guide Wheel	×8		Sprocket	×4
	DC Motor	×2		Caterpillar Track	×78
	Servo Motor	×2		Bolt(S) / Nut	×2


Mainboard ×1


RC Receiver ×1

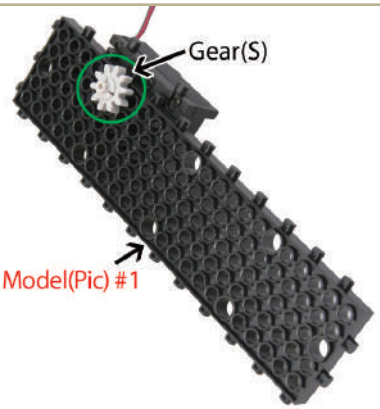

Remote Control ×1


Battery Case ×1

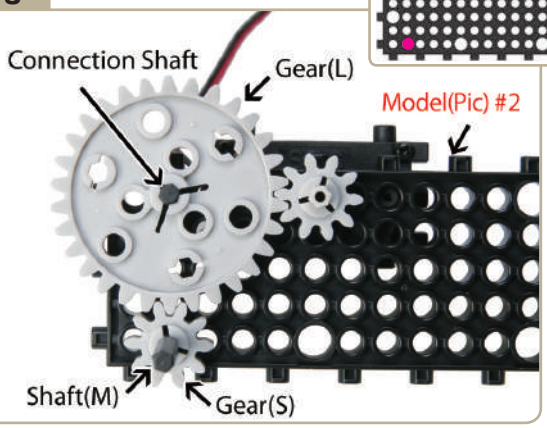
Q 7. What is the equipment called that makes use of a electronic circuit to calculate problems?

1

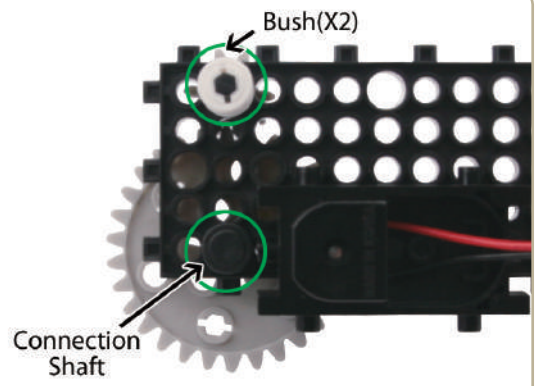
2



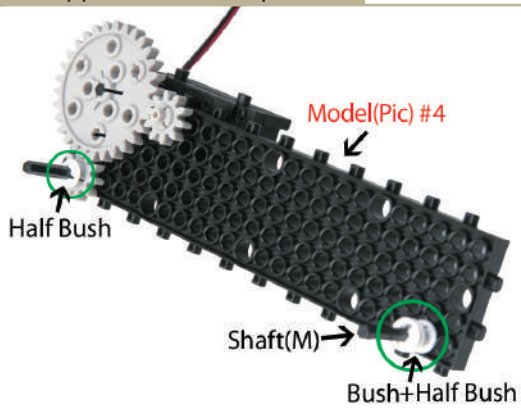
3



4 (*Opposite of model(pic)#3*)



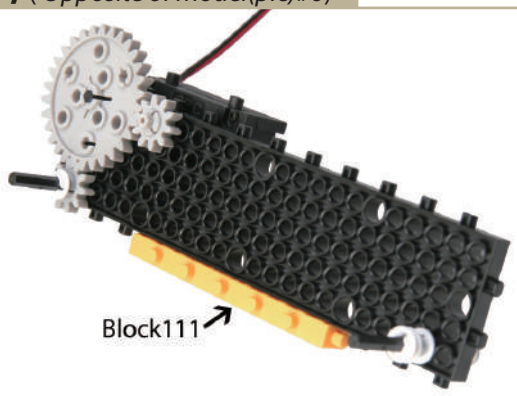
5 (*Opposite of model(pic)#4*)



6 (*Opposite of model(pic)#5*)

A 7. Computer or Electronic calculator

7 (*Opposite of model(pic)#6*)



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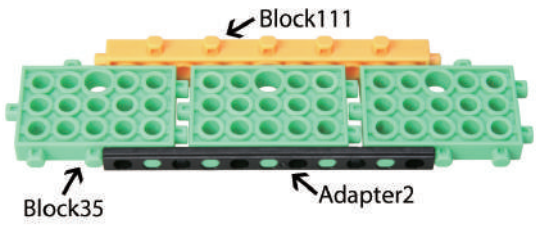

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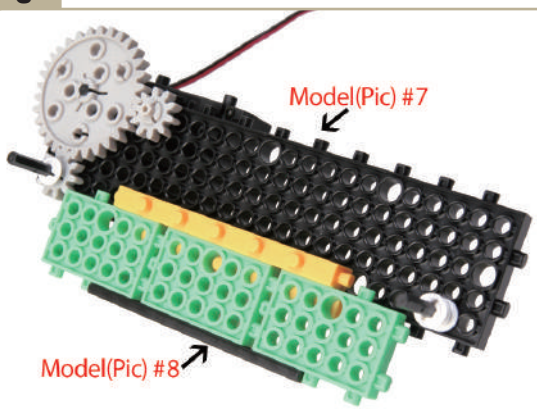

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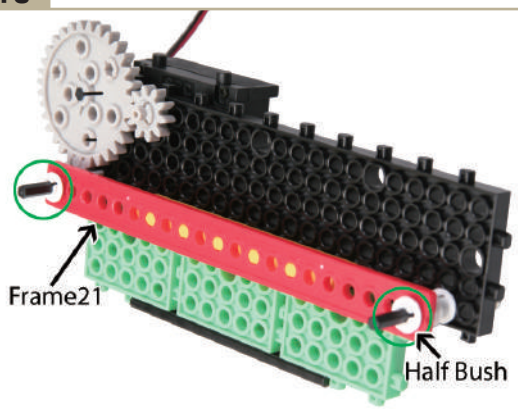

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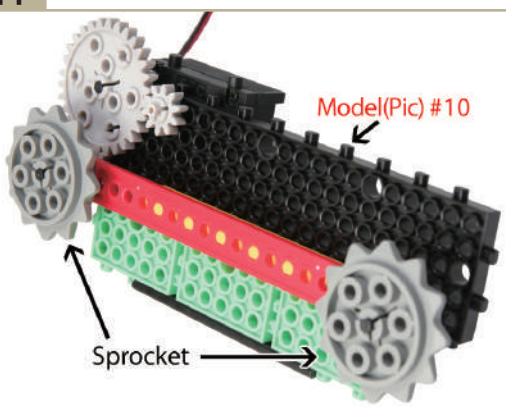

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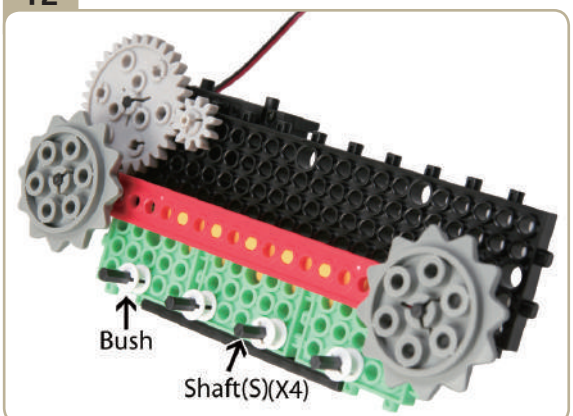
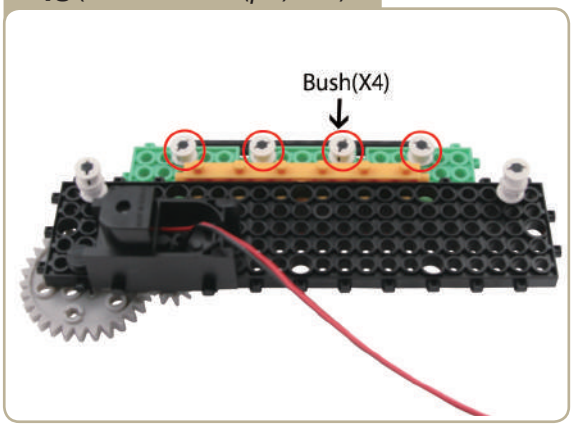


8. What is name of the world's first electronic computer that was build in Pennsylvania University of USA in1946 ?

13 (Back *of model(pic)#12*)



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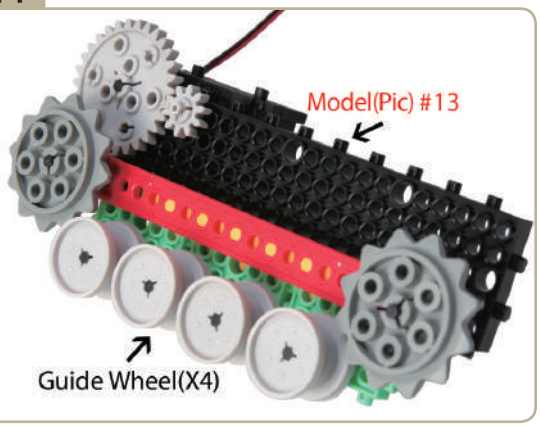

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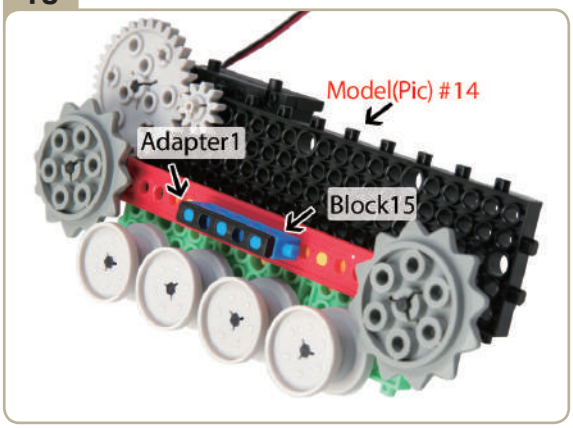

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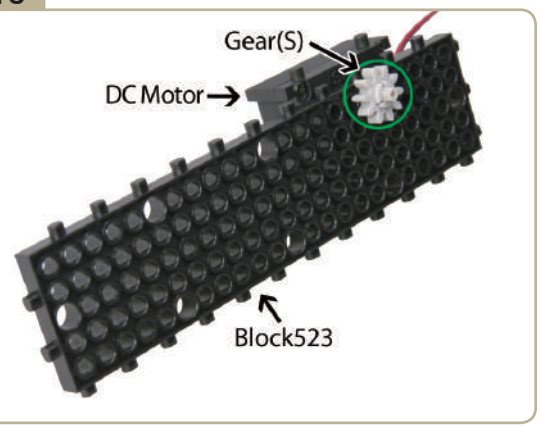

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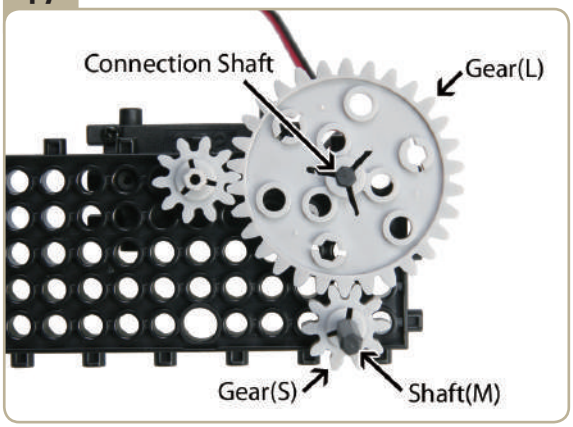

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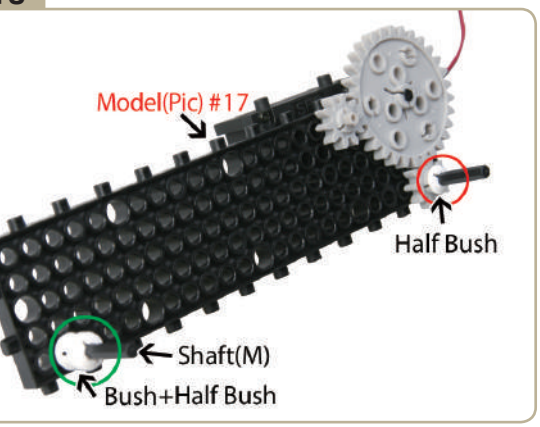

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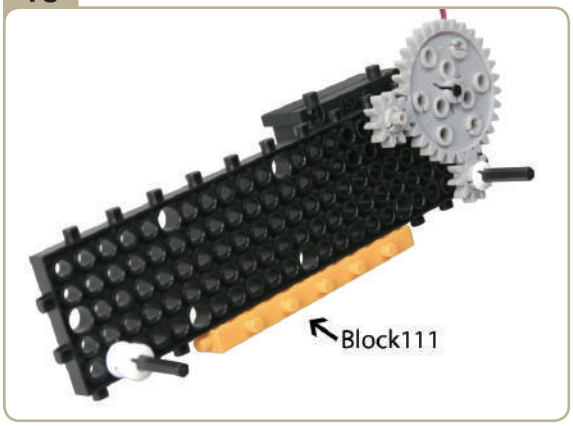

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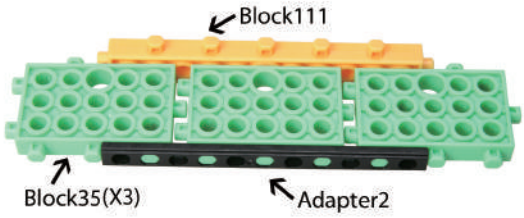

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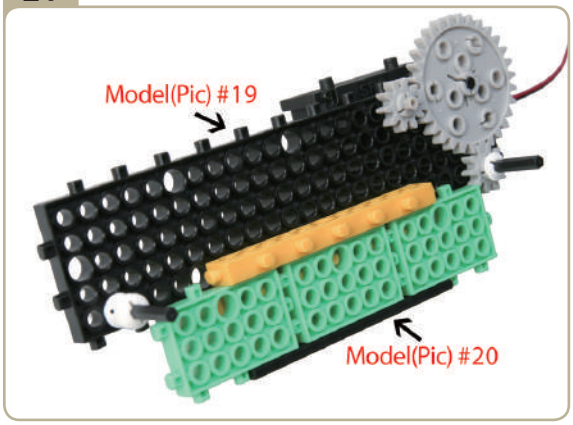

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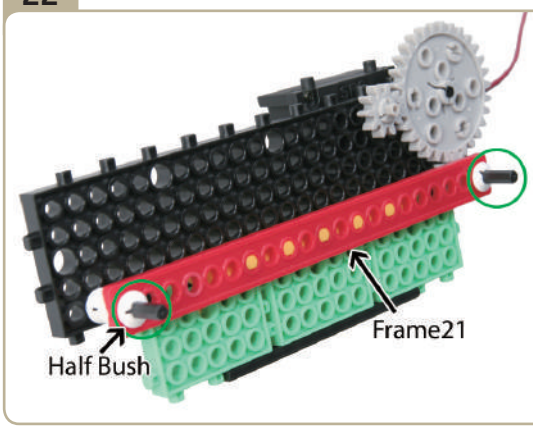

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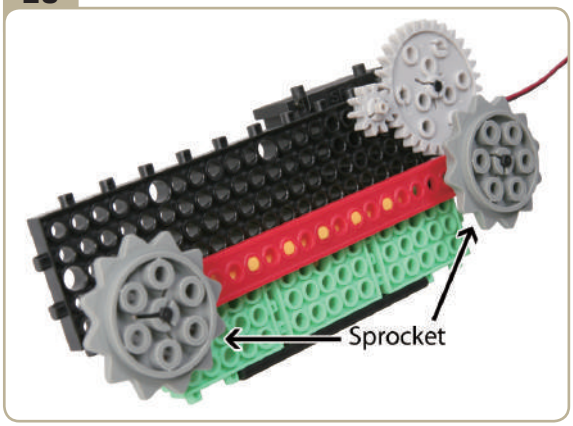

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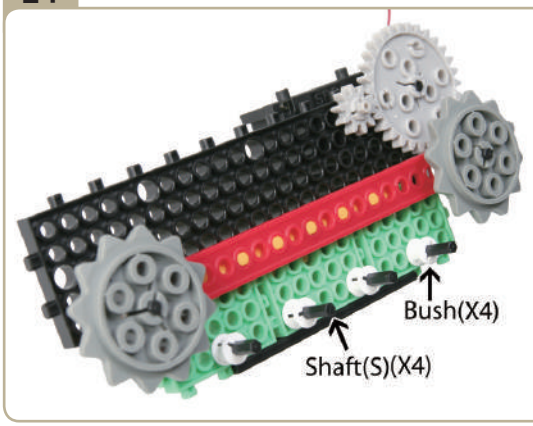
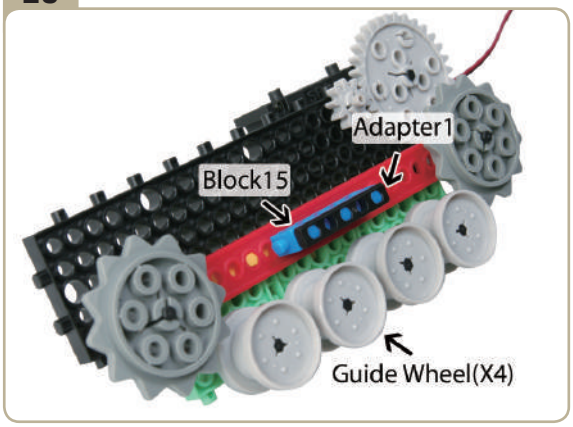


The back side fastens with four bushes.

Q 9. What is accord called that makes sure that humans get long well with robots?

25



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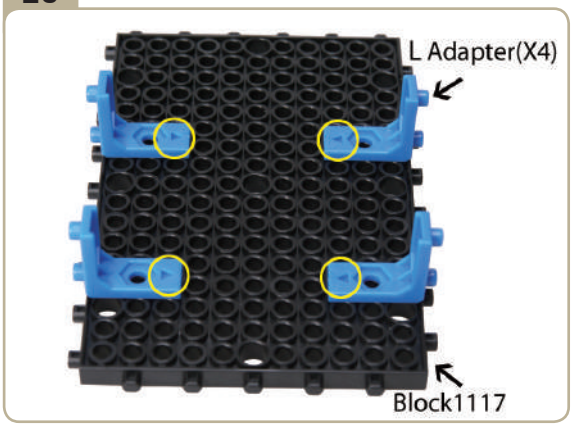
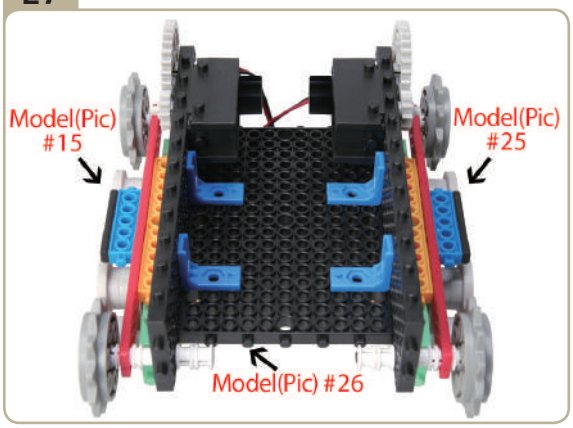


Attach four 'L' adapters to 「block1117」.
(Pay close attention to the arrows(▲) that indicate how the adapters should be attached.)

27



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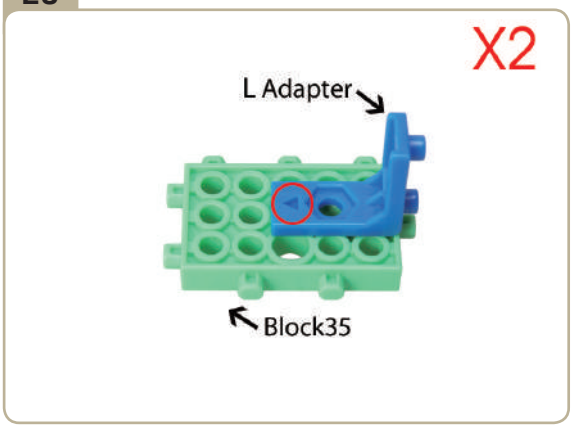
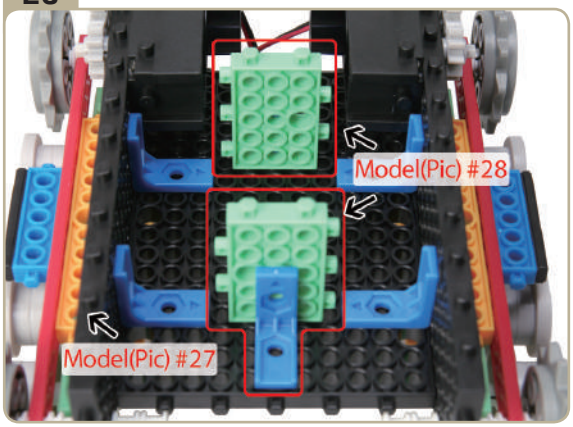


Attach a 'L' adapter to 「block35」. Pay close attention to the arrows(▲) that indicate how the adapters should be attached. (Assemble two identical models.)

29



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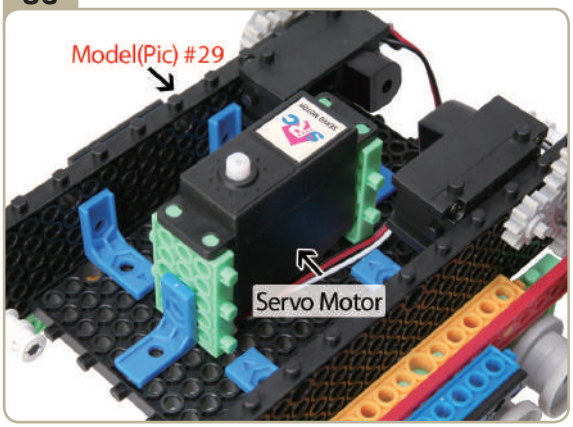

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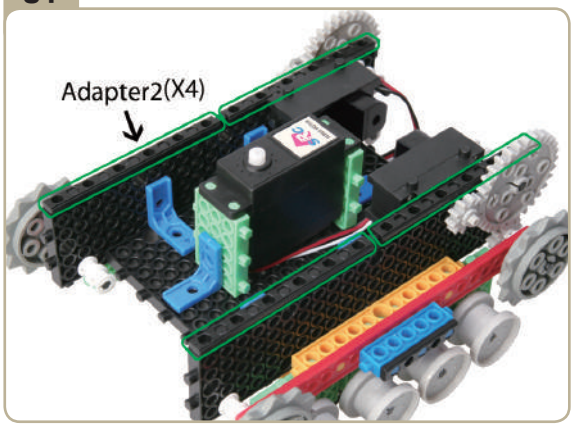

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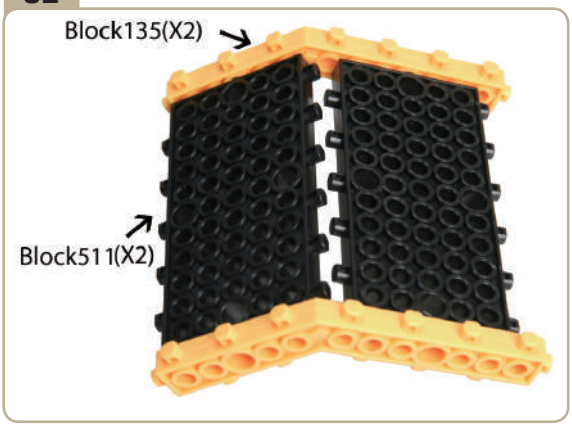

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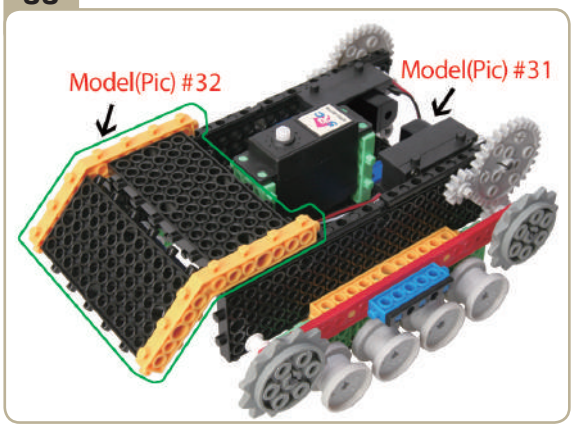

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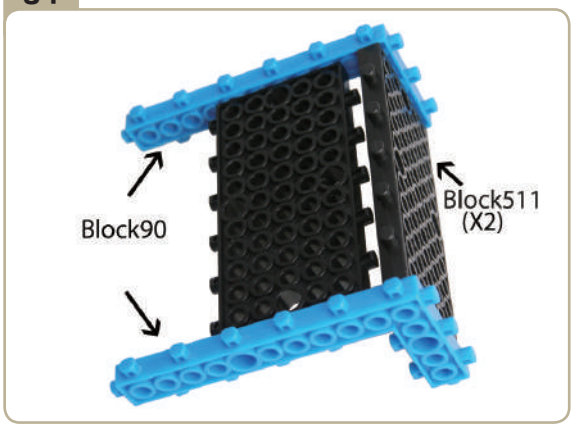

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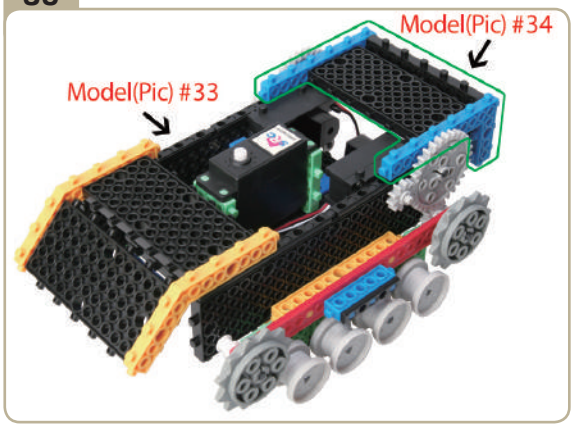

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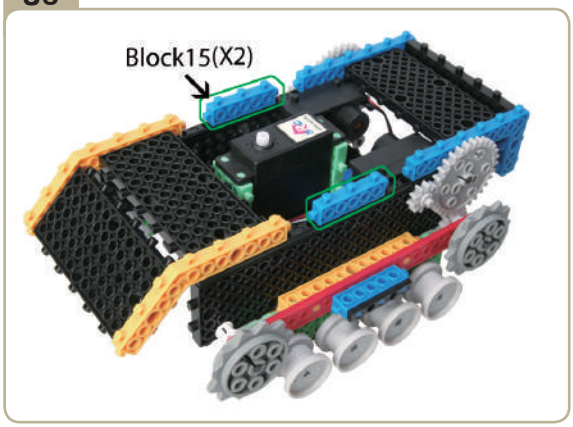
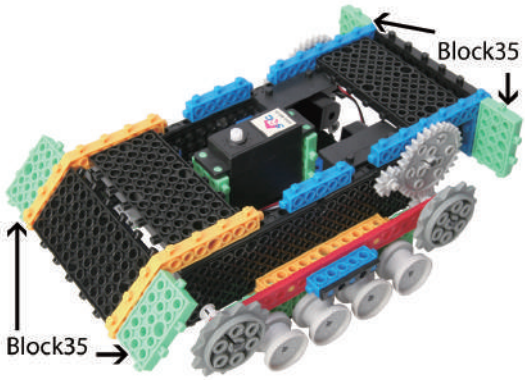


1. What is the name of the computer system that has the same reasoning and learning capabilities as humans?

37



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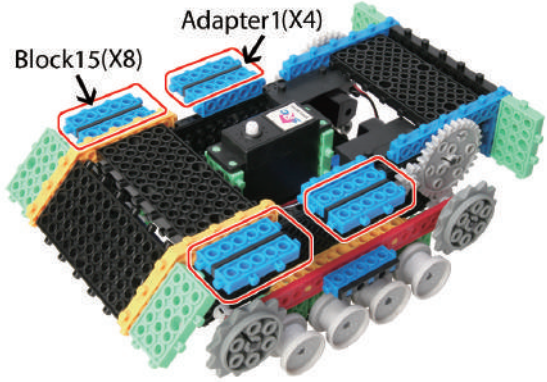

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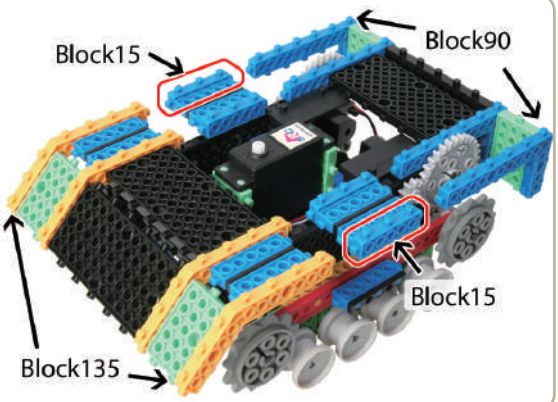

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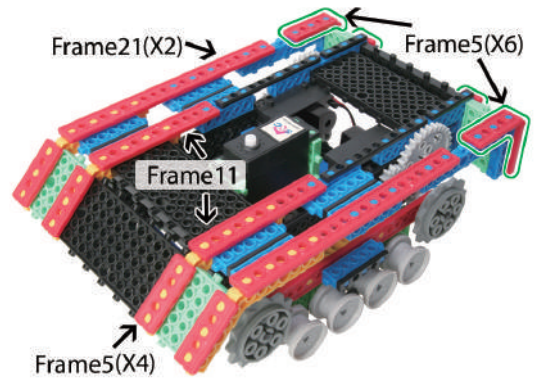
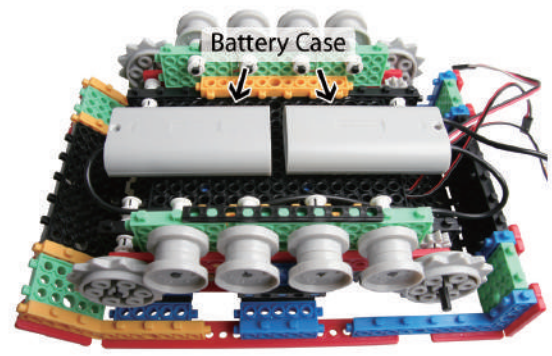


41 (*Bottom of model(Pic)#40*)



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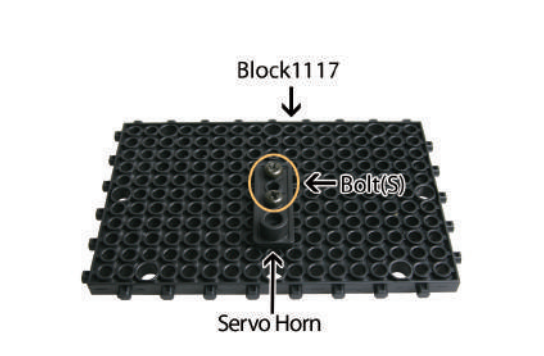

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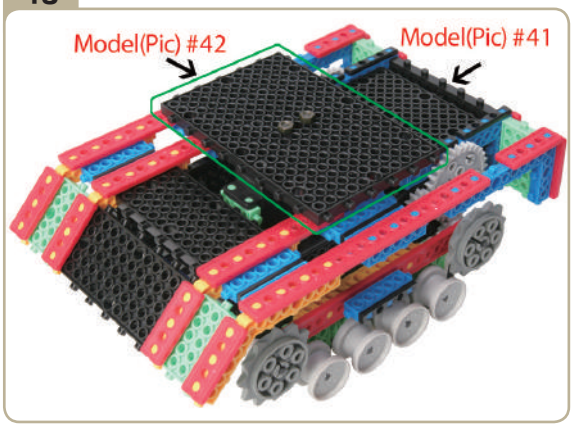
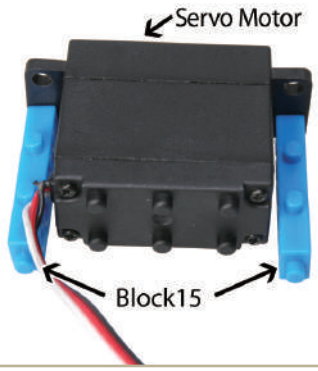
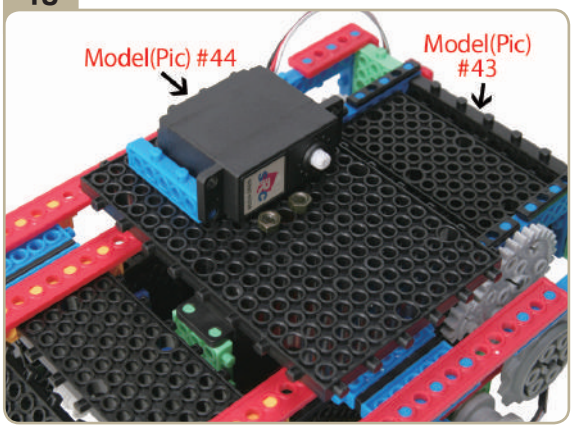


On model(pic)#41,after adjusting zero point of servo motor, connect model(pic)#42 to it.

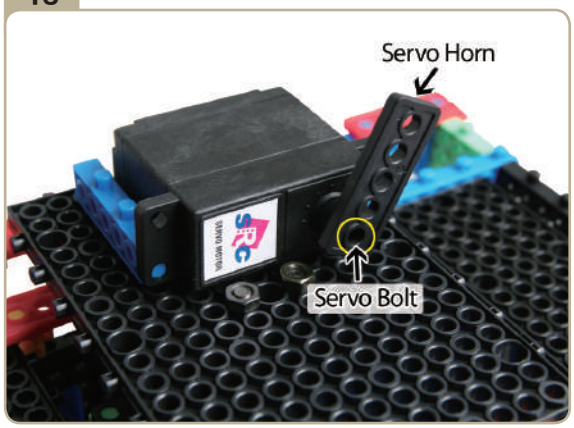
44



45

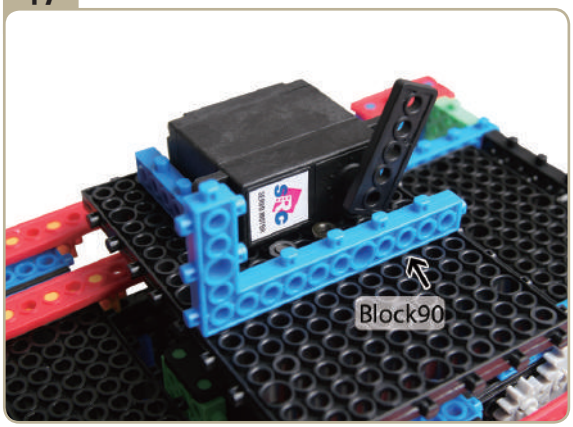


46



After adjusting zero point of servo motor, fix servo horn to model(pic)#45 with a small servo bolt.

47



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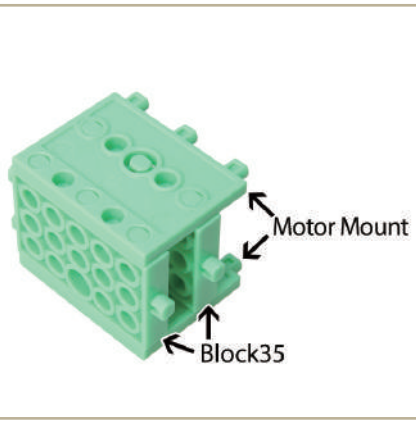

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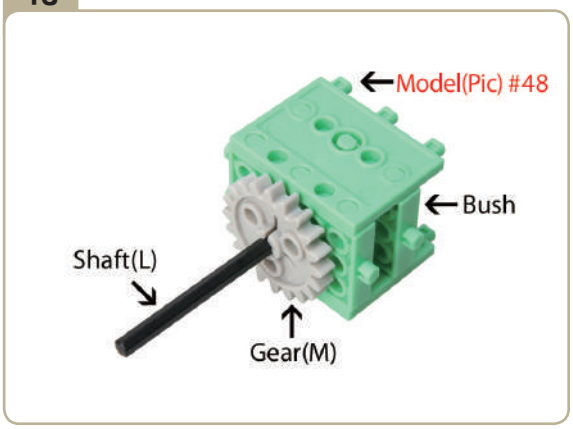
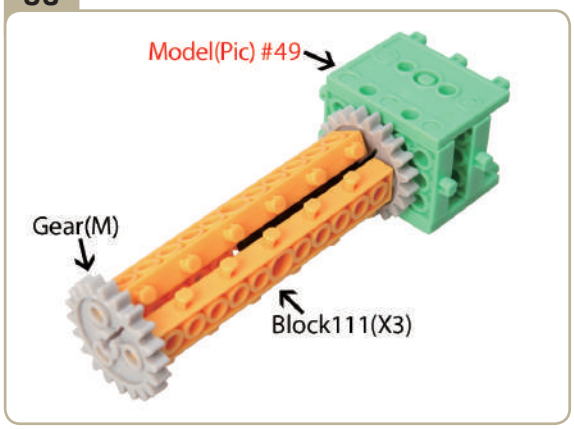
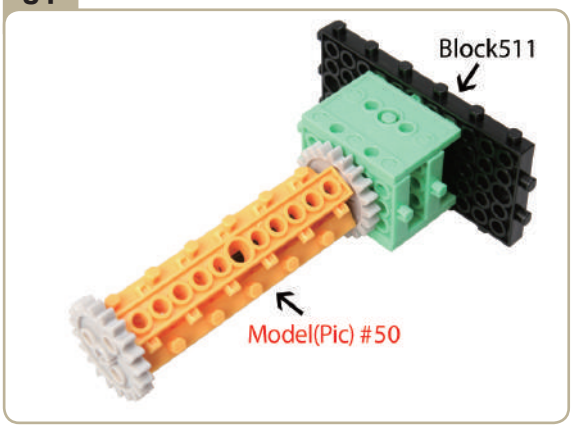


The back side fastens with a bush.

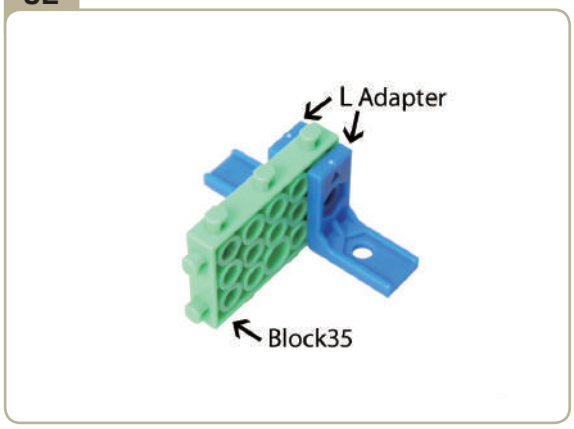
50



51

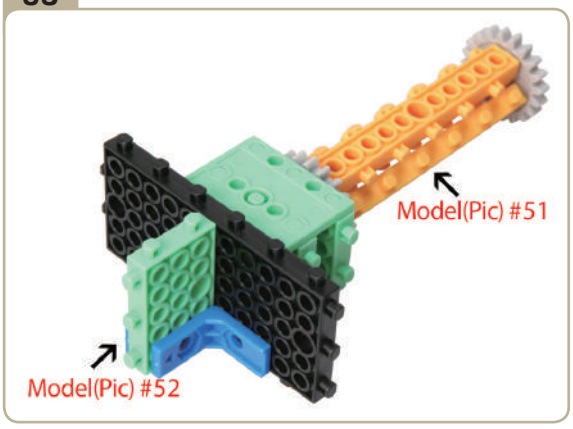


52



Attach two 'L' adapters to 「block35」.
(Pay close attention to the arrows (▲)that indicate how the adapters should be attached.)

53



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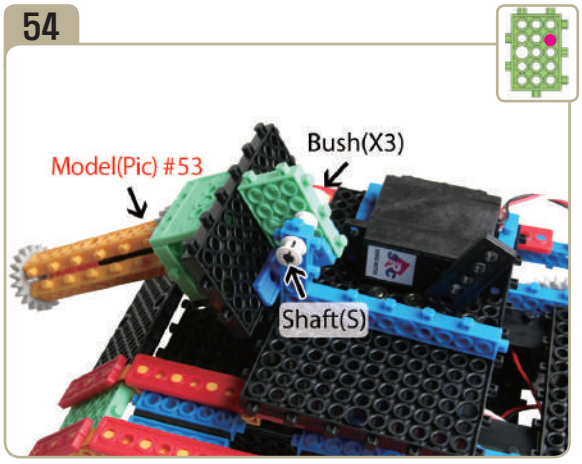

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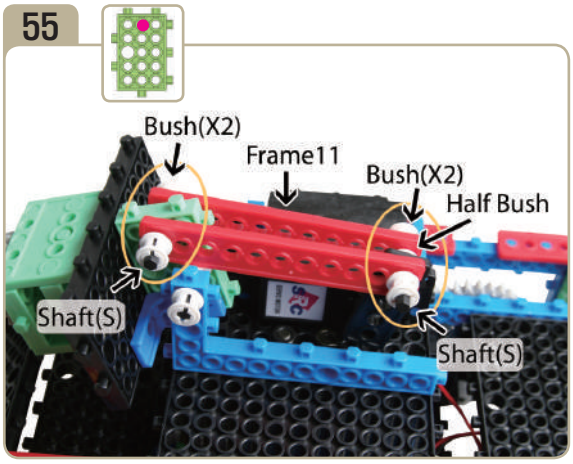

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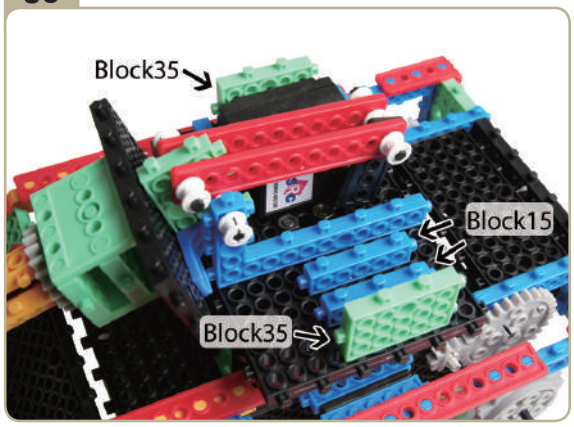

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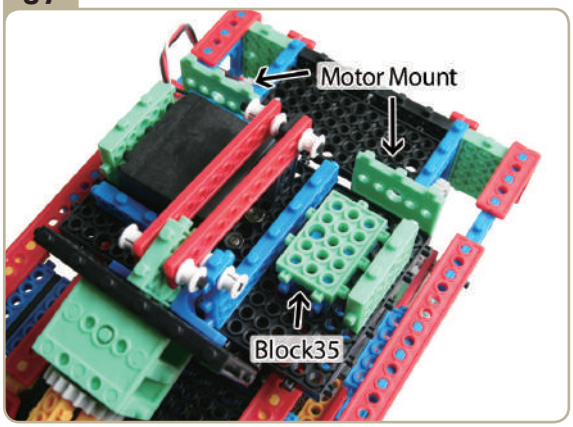
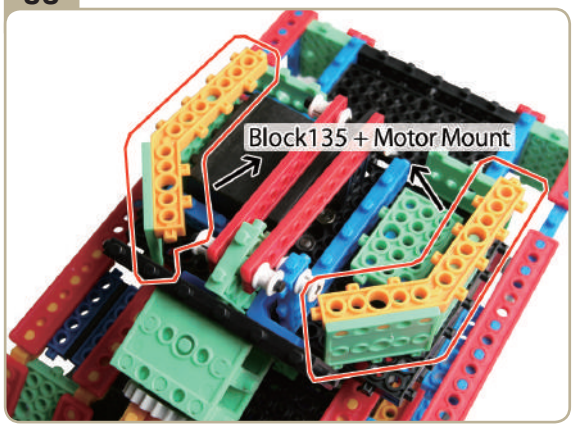
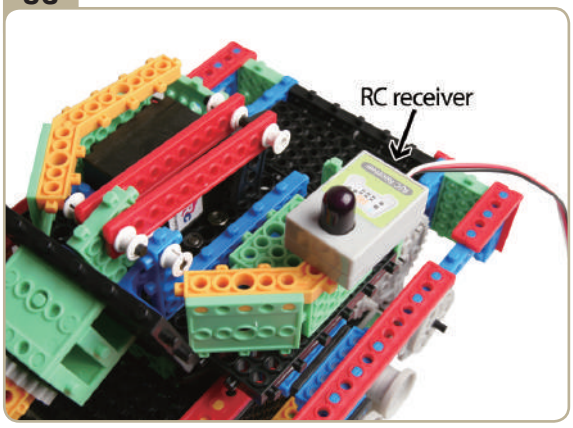


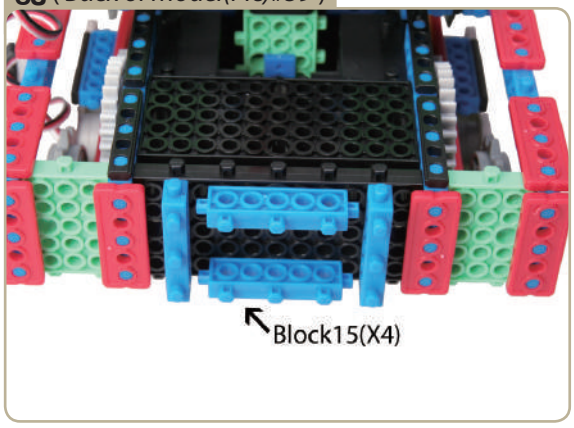
58



59

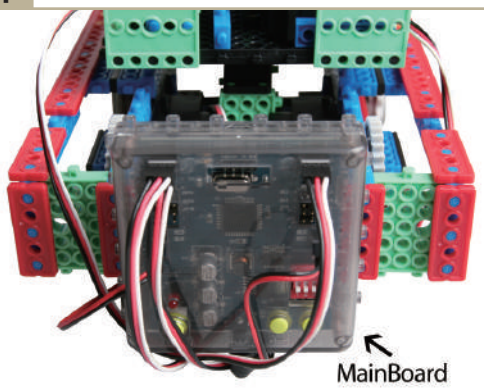


60 (*Back of model(Pic)#59*)

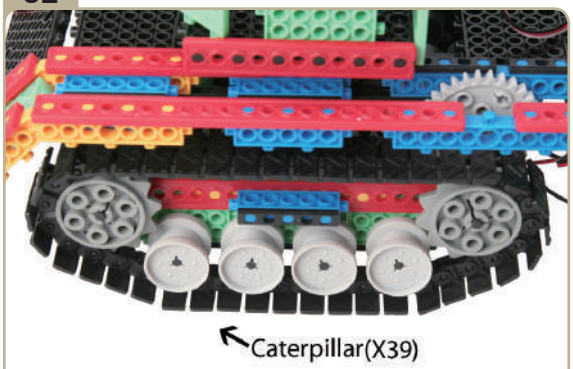


Q **3. What is the name of robot that looks like a human-being?**

61

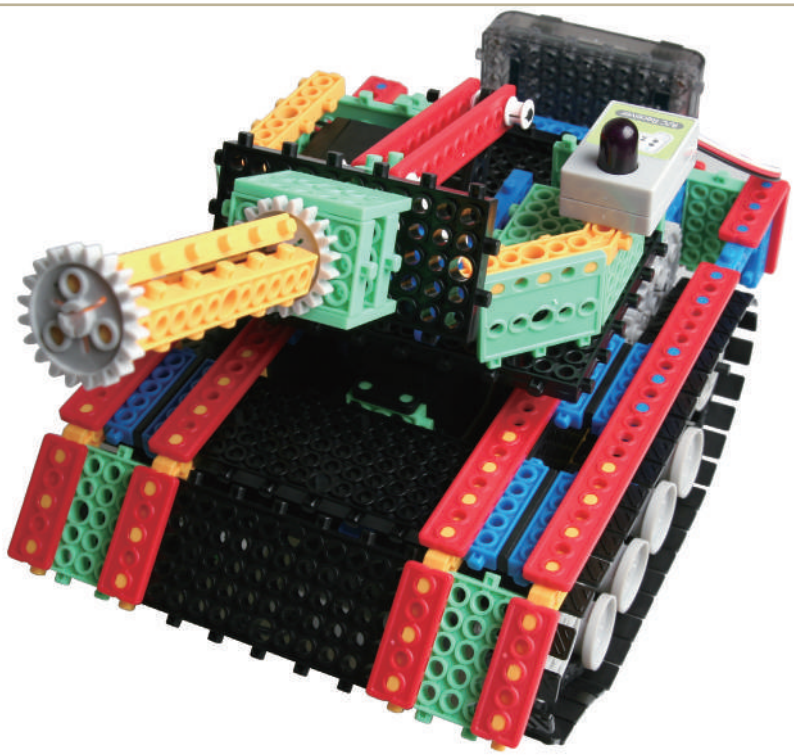


62



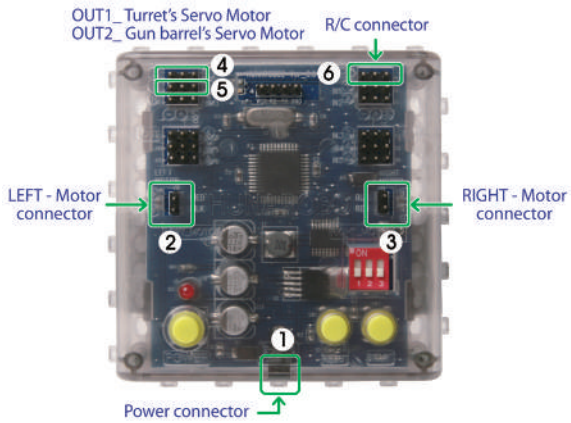
Connect 39 caterpillar tracks, and then combine it with model(pic)#61. (Assemble opposite side in same manner.)

Completed



How to operate the DUKE TANK

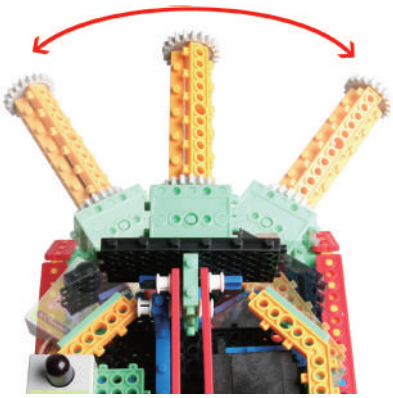
Connecting the mainboard



Connect in this order.

1. Connect Battery case to POWER connector.
2. Connect Left DC motor to LEFT-Motor connector.
3. Connect Right DC motor to RIGHT-Motor connector.
4. Connect Turret's Servo motor to OUT1 of OUTPUT connector.
5. Connect Gun barrel's Servo motor to OUT2 of OUTPUT connector.
6. Connect RC receiver to remote control connector.

Motion Pattern



HINT 1. Forward/Backward: Both DC Motors operate same direction.
HINT 2. Left/Right turn":Both DC Motors operate different direction.
HINT 3. Left/Right turn of turret(gun) : Adjustment +,- angle of OUT1 servo motor.
Adjustment UP/DOWN of gun barrel: Adjustment +,- angle of OUT2 servo motor.

- Using the motion patterns as reference, let's create the program.

**** For more program examples, visit our reference room. (HunaRobo on our web site, www.hunarobo.com)***

Program Download

1. Create the program.
2. Make sure Power / DC Motor connector and sensor's connector are well connected.
3. Check the power OFF state, then insert the download cable.
4. 'SAVE' and click the 'DOWNLOAD' button on the program window.
5. Turn on the power when 'DOWNLOAD' window opens. (Power ON)
6. Once the download is completed, remove the download cable and then turn the power off and on.
(Power OFF → Power ON)

*** Refer to 「HunaRobo Compiler Manual」 on how to create more detailed programs and how to download them.**

Q 4. What is the name of the first humanoid robot that was designed in Korea?

Program Example

	No
Program Start	0
Remocon : [Up] {	1
DC motor 1 : [Both MOTOR1]=[Forward],[Speed=10]	2
END }	3
Remocon : [Down] {	4
DC motor 1 : [Both MOTOR1]=[Backward],[Speed=10]	5
END }	6
Remocon : [Right] {	7
DC motor 1 : [L-MOTOR1]=[Forward],[Speed=10]	8
DC motor 1 : [R-MOTOR1]=[Backward],[Speed=10]	9
END }	10
Remocon : [Left] {	11
DC motor 1 : [R-MOTOR1]=[Forward],[Speed=10]	12
DC motor 1 : [L-MOTOR1]=[Backward],[Speed=10]	13
END }	14
Remocon : [Up + Right] {	15
DC motor 1 : [L-MOTOR1]=[Forward],[Speed=10]	16
DC motor 1 : [R-MOTOR1]=[Stop]	17
END }	18
Remocon : [Up + Left] {	19
DC motor 1 : [R-MOTOR1]=[Forward],[Speed=10]	20
DC motor 1 : [L-MOTOR1]=[Stop]	21
END }	22
Remocon : [KEY OFF] {	23
DC motor 1 : [Both MOTOR1]=[Stop]	24
END }	25
Remocon : [F1] {	26
Servo : [OUT1]=[-40]	27
END }	28
Remocon : [F2] {	29
Servo : [OUT1]=[0]	30
END }	31
Remocon : [F3] {	32
Servo : [OUT1]=[40]	33
END }	34
Remocon : [F4] {	35
Servo : [OUT2]=[10]	36
END }	37
Remocon : [F5] {	38
Servo : [OUT2]=[20]	39
END }	40
Remocon : [F6] {	41
Servo : [OUT1]=[0], [OUT2]=[0]	42
END }	43
Program End	44

Robot story 2

What does robotic ethics imply?

This chapter was made to promote a society that gets along well with robots and complies to standards of a people-orientated philosophy.

The second chapter contains the common principle of robots and people. Robots and people should comply with the ethics of information and engineering while cherishing the life of robots and people respectively.

The third chapter contains the ethics that should be kept by people . When you make robots, you should determine it with good intentions

The forth chapter contains the ethics that should be kept by robots. No robot will be allowed to commit a crime to people. And robots should befriend people and become mutual partners.

The fifth chapter contains the ethics that should be kept by developers . Developers should strive to protect information and the recycling of robots. The production of robots that shouldn't be produced will be sanctioned.

The sixth chapter contains the ethics that should be kept by consumer. Consumer tries not to remodel robots at will and not to use with bad intentions. Consumers should regard robots as their friends.

Let's create your own weapon to DUKE TANK!

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