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Level 6
Soft, robotic muscles 1,000 times stronger

30th November, 2017

https://breakingnewsenglish.com/1711/171130-muscles.html

Contents

Please try Levels 4 and 5 (they are easier).

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THE ARTICLE

Scientists from two of the USA's elite universities have pioneered a new method of creating artificial muscles. The scientists have dubbed their discovery as a "soft robot". It is a 2.6-gram "muscle" that looks like a small bag with many water-filled compartments. It has been given amazing strength by supporting it with an origami-inspired structural framework. This allows the artificial muscle to lift an object that is 1,000 times its own weight. The New Scientist website said this weight-to-strength ratio is the equivalent of a newborn baby lifting a large 4WD car. The ground-breaking discovery could greatly benefit many areas of science, medicine, robotics and engineering.

The scientists are from the Massachusetts Institute of Technology and Harvard University. They are experts in the field of soft robotics. They said their new soft robot muscle can be made in just 10 minutes and costs less than one dollar. Researcher, professor Robert Wood, hopes to create "softer" robots that are more similar to humans. He said: "Humans are normally soft and brittle compared to the big industrial robots that you might find on an assembly line. The next step is to take this system and develop it into a fully functional robot." Dr Daniela Rus explained that the robots could be like the human hand. They could be strong enough to grip any object firmly, while being soft and gentle.

WARM-UPS

1. ROBOTIC MUSCLES: Students walk around the class and talk to other students about robotic muscles. Change partners often and share your findings.

2. CHAT: In pairs / groups, talk about these topics or words from the article. What will the article say about them? What can you say about these words and your life?

elite / universities / pioneer / muscle / strength / origami / equivalent / newborn baby scientists / experts / robotics / similar / humans / assembly line / functional / gentle

Have a chat about the topics you liked. Change topics and partners frequently.

3. ROBOTS: Students A **strongly** believe robots will always make our lives better; Students B **strongly** believe they won't. Change partners again and talk about your conversations.

4. 1,000 TIMES: What would life be like if these things were 1,000 times better, stronger, bigger, etc.? Complete this table with your partner(s). Change partners often and share what you wrote.

	Good things	Bad things
Muscle strength		
Eyesight		
Hearing		
Ability to run		
Intelligence		
Power to love		

5. ARTIFICIAL: Spend one minute writing down all of the different words you associate with the word "artificial". Share your words with your partner(s) and talk about them. Together, put the words into different categories.

6. ROBOTICS: Rank these with your partner. Put the things robots could help most at the top. Change partners often and share your rankings.

- science
- medicine
- sports
- construction

- transport
- teaching
- entertainment
- our retirement

VOCABULARY MATCHING

Paragraph 1

1.	elite	a.	Separate sections or parts of something.
2.	pioneered	b.	Made or produced by human beings rather than occurring naturally, usually as a copy of something natural.
3.	artificial	c.	Developed or was the first to use or apply a new method, area of knowledge, or activity.
4.	dubbed	d.	Equal in value, amount, meaning, etc.
5.	compartments	e.	A group of people, schools, organizations, etc. thought to be the best in a particular society or category, especially because of their power, talent, or wealth.
6.	ratio	f.	Gave an unofficial name or nickname to someone or something.
7.	equivalent	g.	The relation between two amounts showing the number of times one value contains or is contained within the other (e.g. 4:1, 10:1, 1000-to-one, etc.).

Paragraph 2

8.	experts	h.	Hard but likely to break or shatter easily.
9.	brittle	i.	Working or operating well and effectively.
10.	industrial	j.	Strongly.
11.	assembly line	k.	Of or relating to big factories and the production of raw materials and goods.
12.	functional	l.	Take and keep a tight hold of something; grasp tightly.
13.	grip	m.	A system of workers and machines in a factory that allows something to be made or put together part-by-part or process-by-process.
14.	firmly	n.	People who know everything and are knowledgeable of or have a great skill in a particular area.

BEFORE READING / LISTENING

1. TRUE / FALSE: Read the headline. Guess if a-h below are true (T) or false (F).

a. Scientists from two universities made a robotic muscle.   **T / F**

b. The new robotic muscle weighs about 2.6kg.   **T / F**

c. The scientists took inspiration from origami to create the muscle.   **T / F**

d. The strength of the muscle is like a baby lifting a 4-wheel drive car.   **T / F**

e. The scientists are experts in the field of muscles and bodybuilding.   **T / F**

f. The new muscle costs less than a dollar to make.   **T / F**

g. The scientists hope to create harder robots, like industrial robots.   **T / F**

h. The scientists say robots will never be like the human hand.   **T / F**

2. SYNONYM MATCH:
Match the following synonyms. The words in **bold** are from the news article.

1.	**elite**		a.	specialists
2.	**artificial**		b.	pioneering
3.	**compartments**		c.	area
4.	**object**		d.	sections
5.	**ground-breaking**		e.	grasp
6.	**field**		f.	crème de la crème
7.	**experts**		g.	breakable
8.	**brittle**		h.	manufacturing
9.	**industrial**		i.	synthetic
10.	**grip**		j.	thing

3. PHRASE MATCH: (Sometimes more than one choice is possible.)

1.	two of the USA's elite		a.	brittle
2.	a new method of creating artificial		b.	as a "soft robot"
3.	The scientists have dubbed their discovery		c.	ratio
4.	lift an object that is 1,000 times		d.	functional robot
5.	weight-to-strength		e.	universities
6.	They are experts in the field		f.	line
7.	soft and		g.	muscles
8.	on an assembly		h.	firmly
9.	develop it into a fully		i.	its own weight
10.	strong enough to grip any object		j.	of soft robotics

GAP FILL

Scientists from two of the USA's (1) _____ universities have pioneered a new method of creating (2) _____ muscles. The scientists have (3) _____ their discovery as a "soft robot". It is a 2.6-gram "muscle" that looks like a small bag with many water-filled compartments. It has been given (4) _____ strength by supporting it with an (5) _____ -inspired structural framework. This allows the artificial muscle to lift an (6) _____ that is 1,000 times its own weight. The New Scientist website said this weight-to-strength ratio is the (7) _____ of a newborn baby lifting a large 4WD car. The ground-breaking discovery could greatly (8) _____ many areas of science, medicine, robotics and engineering.

dubbed

origami

elite

benefit

amazing

equivalent

artificial

object

The scientists are from the Massachusetts Institute of Technology and Harvard University. They are (9) _____ in the field of soft robotics. They said their new soft robot muscle can be made in just 10 minutes and (10) _____ less than one dollar. Researcher, professor Robert Wood, hopes to create "softer" robots that are more (11) _____ to humans. He said: "Humans are normally soft and brittle compared to the big (12) _____ robots that you might find on an (13) _____ line. The next step is to take this system and develop it into a fully (14) _____ robot." Dr Daniela Rus explained that the robots could be like the human hand. They could be strong enough to (15) _____ any object firmly, while being soft and (16) _____.

costs

assembly

experts

gentle

industrial

grip

similar

functional

LISTENING – Guess the answers. Listen to check.

1) two of the USA's elite universities have pioneered a new method of _____
   a. creating artificially muscles
   b. creating artificial muscle
   c. creating artificial muscles
   d. create in artificial muscles

2) a 2.6-gram "muscle" that looks like a small bag with many _____ compartments
   a. watery-filled
   b. watered-filled
   c. water-fill it
   d. water-filled

3) given amazing strength by supporting it with an origami-inspired _____
   a. structurally frame works
   b. structure all framed work
   c. structural framework
   d. structure all frame works

4) This allows the artificial muscle to lift an object that is 1,000 times _____
   a. its own weight
   b. its down weight
   c. its sown weight
   d. it sown weight

5) greatly benefit many areas of science, medicine, _____ engineering
   a. robotics and
   b. robotics and
   c. robotics and
   d. robotics and

6) They are experts in the _____ robotics
   a. field doff soft
   b. feel doff soft
   c. phial off soft
   d. field of soft

7) Robert Wood, hopes to create "softer" robots that are _____ humans
   a. more similarity to
   b. more similar to
   c. more similar too
   d. more similarity too

8) compared to the big industrial robots that you might find _____ line
   a. on an assembled
   b. on an assembler
   c. on an assembly
   d. on an assembling

9) The next step is to take this system and develop it into _____ robot
   a. awfully function all
   b. a full e-functional
   c. a fully functional
   d. awfully functional

10) They could be strong enough to grip any object firmly, while _____ gentle
   a. being soft and
   b. been soft and
   c. begin soft and
   d. beginning soft and

LISTENING – Listen and fill in the gaps

Scientists from two of the USA's (1) _____ have pioneered a new method of (2) _____ muscles. The scientists have dubbed their discovery as a "soft robot". It is a 2.6-gram "muscle" that looks like a small bag with many water-(3) _____. It has been given (4) _____ by supporting it with an origami-inspired structural framework. This allows the artificial muscle to lift an object that is 1,000 times its (5) _____. The New Scientist website said this weight-to-strength ratio is the equivalent of a newborn baby lifting a large 4WD car. The ground-breaking discovery could (6) _____ many areas of science, medicine, robotics and engineering.

The scientists are from the Massachusetts Institute of Technology and Harvard University. They are experts in the (7) _____ robotics. They said their new soft robot muscle can be made in just 10 minutes and (8) _____ one dollar. Researcher, professor Robert Wood, hopes to create "softer" robots that are more similar to humans. He said: "Humans are normally (9) _____ compared to the (10) _____ robots that you might find on an (11) _____. The next step is to take this system and develop it into a fully functional robot." Dr Daniela Rus explained that the robots could be like the human hand. They could be strong enough to (12) _____ firmly, while being soft and gentle.

COMPREHENSION QUESTIONS

1. How many of the USA's elite universities were mentioned in the article?

2. How much does the new artificial muscle weigh?

3. What did scientists use as an inspiration when creating the muscle?

4. How many times its own weight can the muscle lift?

5. What did a website say the weight-strength ratio was like a baby lifting?

6. What are the scientists expert in the field of?

7. How much does the artificial muscle cost?

8. What did a researcher say humans were, besides soft?

9. What did a doctor say the robot muscle could be like?

10. How did a doctor say the artificial robot could grip objects?

MULTIPLE CHOICE - QUIZ

1) How many of the USA's elite universities were mentioned in the article?
a) 4
b) 3
c) 2
d) 1

2) How much does the new artificial muscle weigh?
a) 2.6 grams
b) 26 grams
c) 2.6 kg
d) 26 kg

3) What did scientists use as an inspiration when creating the muscle?
a) the human body
b) origami
c) the Eiffel Tower
d) rats

4) How many times its own weight can the muscle lift?
a) 100,000 times
b) 100 times
c) 10,000 times
d) 1,000 times

5) What did a website say the weight-strength ratio was like a baby lifting?
a) a sack of potatoes
b) an elephant
c) a large 4WD car
d) itself

6) What are the scientists expert in the field of?
a) muscular structure
b) soft robotics
c) medicine
d) assembly lines

7) How much does the artificial muscle cost?
a) $100,000
b) $9.99
c) $2.60
d) less than one dollar

8) What did a researcher say humans were, besides soft?
a) hard
b) brittle
c) muscular
d) robotic

9) What did a doctor say the robot muscle could be like?
a) grips
b) a human hand
c) an assembly line
d) science fiction

10) How did a doctor say the artificial robot could grip objects?
a) firmly
b) well
c) clumsily
d) functionally

ROLE PLAY

Role A – Medicine

You think medicine is the thing robots can help most. Tell the others three reasons why. Tell them why robots won't help their things as much. Also, tell the others which of these robots will help least (and why): transport, education or our retirement.

Role B – Transport

You think transport is the thing robots can help most. Tell the others three reasons why. Tell them why robots won't help their things as much. Also, tell the others which of these robots will help least (and why): medicine, education or our retirement.

Role C – Education

You think education is the thing robots can help most. Tell the others three reasons why. Tell them why robots won't help their things as much. Also, tell the others which of these robots will help least (and why): transport, medicine or our retirement.

Role D – Our Retirement

You think our retirement is the thing robots can help most. Tell the others three reasons why. Tell them why robots won't help their things as much. Also, tell the others which of these robots will help least (and why): transport, education or medicine.

AFTER READING / LISTENING

1. WORD SEARCH: Look in your dictionary / computer to find collocates, other meanings, information, synonyms … for the words 'robot' and 'muscle'.

robot	muscle

- Share your findings with your partners.
- Make questions using the words you found.
- Ask your partner / group your questions.

2. ARTICLE QUESTIONS: Look back at the article and write down some questions you would like to ask the class about the text.

- Share your questions with other classmates / groups.
- Ask your partner / group your questions.

3. GAP FILL: In pairs / groups, compare your answers to this exercise. Check your answers. Talk about the words from the activity. Were they new, interesting, worth learning…?

4. VOCABULARY: Circle any words you do not understand. In groups, pool unknown words and use dictionaries to find their meanings.

5. TEST EACH OTHER: Look at the words below. With your partner, try to recall how they were used in the text:

• elite	• experts
• 2.6	• 10
• amazing	• similar
• 1,000	• soft
• ratio	• line
• car	• grip

ROBOTIC MUSCLES SURVEY

Write five GOOD questions about robotic muscles in the table. Do this in pairs. Each student must write the questions on his / her own paper.
When you have finished, interview other students. Write down their answers.

	STUDENT 1 _____	STUDENT 2 _____	STUDENT 3 _____
Q.1.			
Q.2.			
Q.3.			
Q.4.			
Q.5.			

- Now return to your original partner and share and talk about what you found out. Change partners often.
- Make mini-presentations to other groups on your findings.

ROBOTIC MUSCLES DISCUSSION

STUDENT A's QUESTIONS (Do not show these to student B)

1. What did you think when you read the headline?

2. What images are in your mind when you hear the word 'robot'?

3. Why are elite universities elite?

4. What do you think of artificial muscles?

5. What do you think of your muscles?

6. What do you think of the artificial muscle?

7. What do you know about origami?

8. What would life be like if your were 1,000 times stronger?

9. How ground-breaking is this discovery?

10. What might this discovery change in the world?

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ROBOTIC MUSCLES DISCUSSION

STUDENT B's QUESTIONS (Do not show these to student A)

11. Did you like reading this article? Why/not?

12. What do you think of when you hear the word 'muscle'?

13. What do you think about what you read?

14. What do you know about soft robotics?

15. What would robots as soft as humans be like?

16. How will robots help us in the future?

17. Should robots look exactly like humans?

18. Would you accept an artificial robot transplant?

19. How dangerous could a super-strong robot be?

20. What questions would you like to ask the scientists?

DISCUSSION (Write your own questions)

STUDENT A's QUESTIONS (Do not show these to student B)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

DISCUSSION (Write your own questions)

STUDENT B's QUESTIONS (Do not show these to student A)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

LANGUAGE - CLOZE

Scientists from two of the USA's (1) _____ universities have pioneered a new method of creating artificial muscles. The scientists have (2) _____ their discovery as a "soft robot". It is a 2.6-gram "muscle" that looks like a small bag with many water-(3) _____ compartments. It has been given amazing strength by supporting it with an origami-(4) _____ structural framework. This allows the artificial muscle to lift an object that is 1,000 times its (5) _____ weight. The New Scientist website said this weight-to-strength ratio is the equivalent of a newborn baby lifting a large 4WD car. The ground-breaking discovery could greatly (6) _____ many areas of science, medicine, robotics and engineering.

The scientists are from the Massachusetts Institute of Technology and Harvard University. They are experts (7) _____ the field of soft robotics. They said their new soft robot muscle can be made (8) _____ just 10 minutes and costs less than one dollar. Researcher, professor Robert Wood, hopes to create "softer" robots that are more similar to humans. He said: "Humans are (9) _____ soft and brittle compared to the big industrial robots that you might find on an assembly (10) _____. The next step is to take this system and develop it into a (11) _____ functional robot." Dr Daniela Rus explained that the robots could be like the human hand. They could be strong enough to (12) _____ any object firmly, while being soft and gentle.

Put the correct words from the table below in the above article.

1.	(a)	elitism	(b)	elite	(c)	elitist	(d)	elites
2.	(a)	dipped	(b)	dubbed	(c)	dabbed	(d)	daubed
3.	(a)	fills	(b)	filler	(c)	filling	(d)	filled
4.	(a)	inspire	(b)	inspired	(c)	inspires	(d)	inspiration
5.	(a)	shown	(b)	own	(c)	town	(d)	down
6.	(a)	beneficiary	(b)	beneficial	(c)	benefit	(d)	benefitting
7.	(a)	on	(b)	at	(c)	in	(d)	to
8.	(a)	on	(b)	at	(c)	in	(d)	to
9.	(a)	common	(b)	regular	(c)	average	(d)	normally
10.	(a)	flat	(b)	dash	(c)	box	(d)	line
11.	(a)	fully	(b)	fall	(c)	felling	(d)	filling
12.	(a)	griping	(b)	gripping	(c)	grip	(d)	gripe

SPELLING

Paragraph 1

1.   two of the USA's <u>eltei</u> universities

2.   <u>erpneoedi</u> a new method

3.   dubbed their <u>vrydscieo</u> as a "soft robot"

4.   an origami-inspired <u>lscrttuaru</u> framework

5.   <u>iifcaltair</u> muscle

6.   medicine, <u>srocitob</u> and engineering

Paragraph 2

7.   They are <u>eexstpr</u> in the field of soft robotics

8.   soft and <u>titlebr</u>

9.   the big <u>iunastrild</u> robots

10. on an <u>sebylmsa</u> line

11. a fully <u>olnciautfn</u> robot

12. grip any <u>octjeb</u> firmly

PUT THE TEXT BACK TOGETHER

Number these lines in the correct order.

(   )   weight. The New Scientist website said this weight-to-strength ratio is the equivalent

(   )   robots that you might find on an assembly line. The next step is to take this system and develop it into a fully

(   )   to humans. He said: "Humans are normally soft and brittle compared to the big industrial

(   )   greatly benefit many areas of science, medicine, robotics and engineering.

(   )   filled compartments. It has been given amazing strength by supporting it with an origami-

(   )   The scientists are from the Massachusetts Institute of Technology and Harvard University. They are experts

(   )   inspired structural framework. This allows the artificial muscle to lift an object that is 1,000 times its own

(   )   of a newborn baby lifting a large 4WD car. The ground-breaking discovery could

(   )   hand. They could be strong enough to grip any object firmly, while being soft and gentle.

(   )   functional robot." Dr Daniela Rus explained that the robots could be like the human

(   )   dubbed their discovery as a "soft robot". It is a 2.6-gram "muscle" that looks like a small bag with many water-

(   )   in the field of soft robotics. They said their new soft robot muscle can be made in just 10 minutes and costs

(*1*)   Scientists from two of the USA's elite universities have pioneered a new method of creating artificial muscles. The scientists have

(   )   less than one dollar. Researcher, professor Robert Wood, hopes to create "softer" robots that are more similar

PUT THE WORDS IN THE RIGHT ORDER

From   https://breakingnewsenglish.com/1711/171130-muscles.html

1. USA's   the   of   two   from   Scientists   universities   elite   .

2. with   compartments   many   A   water-filled   small   bag   .

3. This   allows   the   artificial   muscle   to   lift   an   object   .

4. a   lifting   baby   newborn   A   car   4WD   large   .

5. many   areas   discovery   The   could   ground-breaking   benefit   .

6. are   of   experts   soft   in   robotics   the   They   field   .

7. in   muscle   just   can   10   be   minutes   made   Robot   .

8. to   similar   more   are   that   robots   Softer   humans   .

9. into   fully   robot   it   a   functional   Develop   .

10. firmly   enough   grip   object   Strong   to   any   .

CIRCLE THE CORRECT WORD (20 PAIRS)

From   https://breakingnewsenglish.com/1711/171130-muscles.html

Scientists from two of the USA's *elite / elitist* universities have pioneered a new method of creating artificial muscles. The scientists have *daubed / dubbed* their discovery *as / has* a "soft robot". It is a 2.6-gram "muscle" that looks like a small bag with many water-filled *condiments / compartments*. It has been given amazing *strength / strong* by supporting it with an origami-inspired structural framework. This allows the *artificially / artificial* muscle to lift an object that is 1,000 times its *own / down* weight. The New Scientist website said this weight-to-strength *rated / ratio* is the equivalent of a newborn baby lifting a large 4WD car. The ground-breaking *discovery / discover* could greatly benefit many areas of science, medicine, robotics and *engineers / engineering*.

The scientists are from the Massachusetts Institute of Technology and Harvard University. They are *experts / expats* in the field of soft robotics. They said their new soft robot muscle can *been / be* made in just 10 minutes and costs *less / few* than one dollar. Researcher, professor Robert Wood, hopes *to / for* create "softer" robots that are more *similarity / similar* to humans. He said: "Humans are *normally / normal* soft and brittle compared to the big industrial robots that you might find on an *assembled / assembly* line. The next step is to take *these / this* system and develop it into a fully functional robot." Dr Daniela Rus explained that the robots could be like the *human / humane* hand. They could be strong enough to *gripe / grip* any object firmly, while being soft and gentle.

Talk about the connection between each pair of words in italics, and why the correct word is correct.

INSERT THE VOWELS (a, e, i, o, u)

Sc__nt_sts fr_m tw_ _f th_ _S_'s _l_t_ _n_v_rs_t__s h_v_ p__n__r_d _ n_w m_th_d _f cr__t_ng _rt_f_c__l m_scl_s. Th_ sc__nt_sts h_v_ d_bb_d th__r d_sc_v_ry _s _ "s_ft r_b_t". _t _s _ 2.6-gr_m "m_scl_" th_t l__ks l_k_ _ sm_ll b_g w_th m_ny w_t_r-f_ll_d c_mp_rtm_nts. _t h_s b__n g_v_n _m_z_ng str_ngth by s_pp_rt_ng _t w_th _n _r_g_m_-_nsp_r_d str_ct_r_l fr_m_w_rk. Th_s _ll_ws th_ _rt_f_c__l m_scl_ t_ l_ft _n _bj_ct th_t _s 1,000 t_m_s _ts _wn w__ght. Th_ N_w Sc__nt_st w_bs_t_ s__d th_s w__ght-t_-str_ngth r_t__ _s th_ _q__v_l_nt _f _ n_wb_rn b_by l_ft_ng _ l_rg_ 4WD c_r. Th_ gr__nd-br__k_ng d_sc_v_ry c__ld gr__tly b_n_f_t m_ny _r__s _f sc__nc_, m_d_c_n_, r_b_t_cs _nd _ng_n__r_ng.

Th_ sc__nt_sts _r_ fr_m th_ M_ss_ch_s_tts _nst_t_t_ _f T_chn_l_gy _nd H_rv_rd _n_v_rs_ty. Th_y _r_ _xp_rts _n th_ f__ld _f s_ft r_b_t_cs. Th_y s__d th__r n_w s_ft r_b_t m_scl_ c_n b_ m_d_ _n j_st 10 m_n_t_s _nd c_sts l_ss th_n _n_ d_ll_r. R_s__rch_r, pr_f_ss_r R_b_rt W__d, h_p_s t_ cr__t_ "s_ft_r" r_b_ts th_t _r_ m_r_ s_m_l_r t_ h_m_ns. H_ s__d: "H_m_ns _r_ n_rm_lly s_ft _nd br_ttl_ c_mp_r_d t_ th_ b_g _nd_str__l r_b_ts th_t y__ m_ght f_nd _n _n _ss_mbly l_n_. Th_ n_xt st_p _s t_ t_k_ th_s syst_m _nd d_v_l_p _t _nt_ _ f_lly f_nct__n_l r_b_t." Dr D_n__l_ R_s _xpl__n_d th_t th_ r_b_ts c__ld b_ l_k_ th_ h_m_n h_nd. Th_y c__ld b_ str_ng _n__gh t_ gr_p _ny _bj_ct f_rmly, wh_l_ b__ng s_ft _nd g_ntl_.

PUNCTUATE THE TEXT AND ADD CAPITALS

scientists from two of the usa's elite universities have pioneered a new method of creating artificial muscles the scientists have dubbed their discovery as a "soft robot" it is a 26-gram "muscle" that looks like a small bag with many water-filled compartments it has been given amazing strength by supporting it with an origami-inspired structural framework this allows the artificial muscle to lift an object that is 1000 times its own weight the new scientist website said this weight-to-strength ratio is the equivalent of a newborn baby lifting a large 4wd car the ground-breaking discovery could greatly benefit many areas of science medicine robotics and engineering

the scientists are from the massachusetts institute of technology and harvard university they are experts in the field of soft robotics they said their new soft robot muscle can be made in just 10 minutes and costs less than one dollar researcher professor robert wood hopes to create "softer" robots that are more similar to humans he said "humans are normally soft and brittle compared to the big industrial robots that you might find on an assembly line the next step is to take this system and develop it into a fully functional robot" dr daniela rus explained that the robots could be like the human hand they could be strong enough to grip any object firmly while being soft and gentle

PUT A SLASH (/) WHERE THE SPACES ARE

ScientistsfromtwooftheUSA'seliteuniversitieshavepioneeredanewmethodofcreatingartificialmuscles.Thescientistshavedubbedtheirdiscoveryasa"softrobot".Itisa2.6-gram"muscle"thatlookslikeasmallbagwithmanywater-filledcompartments.Ithasbeengivenamazingstrengthbysupportingitwithanorigami-inspiredstructuralframework.Thisallowstheartificialmuscletoliftanobjectthatis1,000timesitsownweight.TheNewScientistwebsitesaidthisweight-to-strengthratioistheequivalentofanewbornbabyliftingalarge4WDcar.Theground-breakingdiscoverycouldgreatlybenefitmanyareasofscience,medicine,roboticsandengineering.ThescientistsarefromtheMassachusettsInstituteofTechnologyandHarvardUniversity.Theyareexpertsinthefieldofsoftrobotics.Theysaidtheirnewsoftrobotmusclecanbemadeinjust10minutesandcostslessthanonedollar.Researcher,professorRobertWood,hopestocreate"softer"robotsthataremoresimilartohumans.Hesaid:"Humansarenormallysoftandbrittlecomparedtothebigindustrialrobotsthatyoumightfindonanassemblyline.Thenextstepistotakethissystemanddevelopitintoafullyfunctionalrobot."DrDanielaRusexplainedthattherobotscouldbelikethehumanhand.Theycouldbestrongenoughtogripanyobjectfirmly,whilebeingsoftandgentle.

FREE WRITING

Write about **robotic muscles** for 10 minutes. Comment on your partner's paper.

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ACADEMIC WRITING

It will be great to have robots that look like humans. Discuss.

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HOMEWORK

1. VOCABULARY EXTENSION: Choose several of the words from the text. Use a dictionary or Google's search field (or another search engine) to build up more associations / collocations of each word.

2. INTERNET: Search the Internet and find out more about this news story. Share what you discover with your partner(s) in the next lesson.

3. ROBOTIC MUSCLES: Make a poster about robotic muscles. Show your work to your classmates in the next lesson. Did you all have similar things?

4. HUMANOIDS: Write a magazine article about robotic muscles leading to robots that look like humans - humanoids. Include imaginary interviews with people who are for and against this.

Read what you wrote to your classmates in the next lesson. Write down any new words and expressions you hear from your partner(s).

5. WHAT HAPPENED NEXT? Write a newspaper article about the next stage in this news story. Read what you wrote to your classmates in the next lesson. Give each other feedback on your articles.

6. LETTER: Write a letter to an expert on robotic muscles. Ask him/her three questions about robotic muscles. Give him/her three of your ideas. Read your letter to your partner(s) in your next lesson. Your partner(s) will answer your questions.

ANSWERS

VOCABULARY (p.4)

1. e 2. c 3. b 4. f 5. a 6. g 7. d
8. n 9. h 10. k 11. m 12. i 13. l 14. j

TRUE / FALSE (p.5)

a T b F c T d T e F f T g F h F

SYNONYM MATCH (p.5)

1. elite   a. crème de la crème
2. artificial   b. synthetic
3. compartments   c. sections
4. object   d. thing
5. ground-breaking   e. pioneering
6. field   f. area
7. experts   g. specialists
8. brittle   h. breakable
9. industrial   i. manufacturing
10. grip   j. grasp

COMPREHENSION QUESTIONS (p.9)

1. Two
2. 2.6 grams
3. Origami
4. 1,000 times
5. A large 4WD car
6. Soft robotics
7. Less than a dollar
8. Brittle
9. A human hand
10. Firmly

MULTIPLE CHOICE - QUIZ (p.10)

1. c 2. a 3. b 4. d 5. c 6. b 7. d 8. b 9. b 10. a

ALL OTHER EXERCISES

Please check for yourself by looking at the Article on page 2.
(It's good for your English ;-)