Unit 5.2: Why I make robots the size of a grain of rice

WATCH

E ▶ 1.20 **WATCH FOR MAIN IDEAS** Watch Bergbreiter's edited TED Talk. Check [✓] the two most important ideas that Bergbreiter wants her audience to understand.

1. ☐ The scale of robots is getting smaller every year.
2. ☐ Micro-robots have many possible applications.
3. ☐ Micro-robots of the future will be semi-intelligent.
4. ☐ Engineering mobility on a small scale is a big challenge.

F ▶ 1.21 **RECOGNIZE KEY TERMS** One of Bergbreiter's key terms is *mobility*. Watch and complete the excerpts below with different words and phrases that refer to this key term.

Segment 1

1. *"First of all, how do we get the capabilities of an ant in a robot at the same size scale? Well, first we need to figure out how to make them _____ when they're so small."*
2. *"I'll start with _____. Insects _____ around amazingly well. This video is from UC Berkeley. It shows a cockroach moving over incredibly rough terrain without tipping over."*
3. *"_____ is another really interesting way to _____ when you're very small."*

Segment 2

4. *"So, the next video is one of my favorites. So you have this 300-mg robot _____ about eight centimeters in the air."*
5. *"So, I think you can imagine all the cool things that we could do with robots that can _____ and _____ and _____ and _____ at this size scale."*

LIVEWORKSHEETS

G UNDERSTAND TRANSITIONS Read the excerpts from Bergbreiter's talk. Underline each signal word. Choose the reason she made each transition.

1. *"To make these things really functional, we want a lot of them working together in order to do bigger things. So, I'll start with mobility. Insects move around amazingly well."*
   - **a.** to introduce a new topic
   - **b.** to explain or expand current topic
   - **c.** to sum up
2. *"And the basic idea is that we're going to compress this, store energy in the springs, and then release it to jump. So, there's no motors on board this right now, no power."*
   - **a.** to introduce a new topic
   - **b.** to explain or expand current topic
   - **c.** to sum up
3. *"So, I think I've given you some of the possibilities of what we can do with these small robots."*
   - **a.** introduce a new topic
   - **b.** explain or expand current topic
   - **c.** sum up

H ▶ 1.22 WATCH FOR DETAILS Watch segments of the Talk and complete the notes with details.

Segment 3

Intro:

- Bergbreiter and students work on _____ (1) robots
- Think of robotic versions of _____ (2)
- Challenge = get capabilities of ant in robot same _____ (3) scale

Segment 4

Contributions from B's lab:

- Combine _____ (4) and _____ (5) materials in small mechanism
  - _____ (6) material = silicon
  - _____ (7) material = silicon rubber
- No _____ (8) on board, no power

LIVEWORKSHEETS

What we could do with micro-robots:

- After natural disastors, look for _____ (9)
- Inspect _____ (10) to make sure it's _____ (11)
- They could operate without having to _____ (12) you open

AFTER YOU WATCH

K THINK CRITICALLY Infer. Work with a partner. Read the excerpt from the TED Talk. Then discuss your answers to the questions.

> *"And we've made some advances so far, but there's still a long way to go, and hopefully some of you can contribute to that destination."*

1. What does Bergbreiter mean by "there's still a long way to go"?
2. What does she mean by "contribute"?

1 .....

2 .....

LIVEWORKSHEETS