

SQ4R strategy: "Robotic Flies"

SURVEY Skim for overview of content and purpose. Check meaning of key terms.

General idea: development of a robotic device that has the size and manoeuvrability of a fly, design challenges and potential use in small confined spaces inaccessible to or dangerous for humans.

What do I already know?

Robotics-potential functionalities/capabilities of robotic devices, common fly, their wing movements, insect behaviour-small, airborne

What do I predict I might learn?

Functionalities, problems, challenges, potential uses of the device

QUESTIONS Write questions: **What? When? Who? Why? How?**

What is the aim of the research? How successful is it? What are some problems? How significant is the research (potential uses)?

READ Answer questions raised, scan for specific information, make notes in the margins, underline key terms

Notes in the margin with distinctive topic headings.
Key vocabulary, facts, details (of measurements) highlighted.

RECITE Restate main idea(s) and key concepts in your own words (notes/diagram/mind-map).

Aim: develop a robot that is as small as a fly and can fly like one.

Prototype: wingspan 3cm, weighs 60 mg, reasonable upper thrust lift (using "laser micromachining and thin materials")

Problems: replicating wing movements – difficult because aerodynamics different from that of aircraft because of insect's size; has to be small, strong, light, cheap, easy to work with and have great manoeuvrability.

Key challenges: miniature sensors so robot can stabilise flight itself; control mechanisms to regulate flight, and a small on-board battery for flight time up to 10 minutes.

Potential uses: rescue and spy operations; used in small confined/dangerous places.

REVIEW Reread your notes. Review objectives for reading and questions posed earlier. Write a paragraph summary.

The article describes a research into the development of a small aerial robot that has the same wing and air-borne manoeuvrability of a fly. Designing is a challenge because an insect's aerodynamics is difficult because of its size. The robot also has to be light but with a lift force of at least twice its weight. To enable the robot to stabilise and regulate its flight, and to hover in particular, three miniature devices need to be installed: sensors, control mechanisms and an on board power source, which is likely to be a lithium battery to provide up to 10 minutes of flight. The device is potentially useful in rescue and spy operations in small confined spaces inaccessible to or dangerous for humans. Further research using the prototype created would enable the device to perform more complex tasks such as the ability to receive and transmit information.

RELATE/REFLECT Make connections with what you already know about the topic and how you will use this new information.

Could be useful for essay on robotics and the future and engineering design

Could be useful as a comparison to XXX's work on miniature or "micro-aerial" robots.

Check out interview with designers on the internet.