National Aeronautics and Space Administration

To space & back!

How we can all use NASA's tools

coronet book

Technology Transfer:

How we can all use the tools NASA creates for their space program

Did you ever think about all of the work NASA puts into creating the tools they use to study outer space? Every year, NASA scientists come up with new and better ways to explore and learn about our world and the universe. We call the new tools they create "technologies." Technologies help scientists, astronauts, and other people in the space program do their jobs better, safer, and easier.

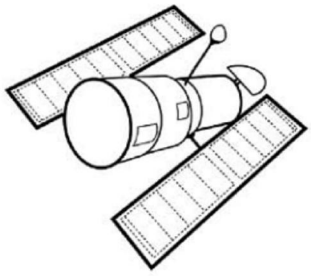
What is Technology Transfer?

Many times the tools NASA creates can also help us do things better here on Earth. When NASA sees a way to put a tool that they use in space to use for something in our world, they "transfer" that technology to a company that can use it. This is called "Technology Transfer."

Each of NASA's ten Field Centers has people whose job it is to find new uses for the tools their scientists have developed. This coloring book was put together by the people at the Technology Transfer Program office at NASA's Goddard Space Flight Center.

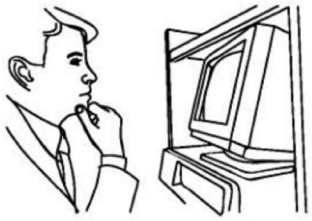
With the help of Space Pup, Goddard's technology transfer mascot, we'll show you how we use some of those space technologies here on Earth!

See how Technology Transfer happens:



NASA needs to find a new way to study space or solve a problem.

Their scientists study the problem and come up with a new technology that solves it.



People at NASA's Technology Transfer Program get a patent for the new technology and study it to find ways it could be used in everyday life.

Then they find companies or other organizations that are interested in licensing the technology.

Those companies use the new technology to make a new product or to make existing products better.

patent: A patent is an official document that describes an invention to protect it and keep others from making, using, or selling something just like it without the inventor's permission. (**Inventors** are people who use their imaginations to create something useful that is different from anything else.)

license: A license is an agreement between the inventor and another person that allows the other person to use the inventor's invention in their own work—usually for a fee.

Space words jumble:

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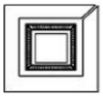
scinortelec  — _ l _ c _ r _ _ _ _ _

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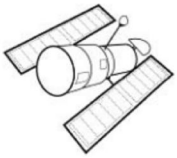

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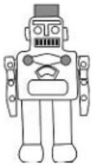
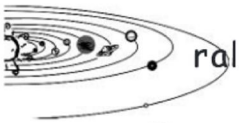
toobr  — _ o _ _ _



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Now arrange the circled letters to form the name of Goddard's technology transfer mascot:

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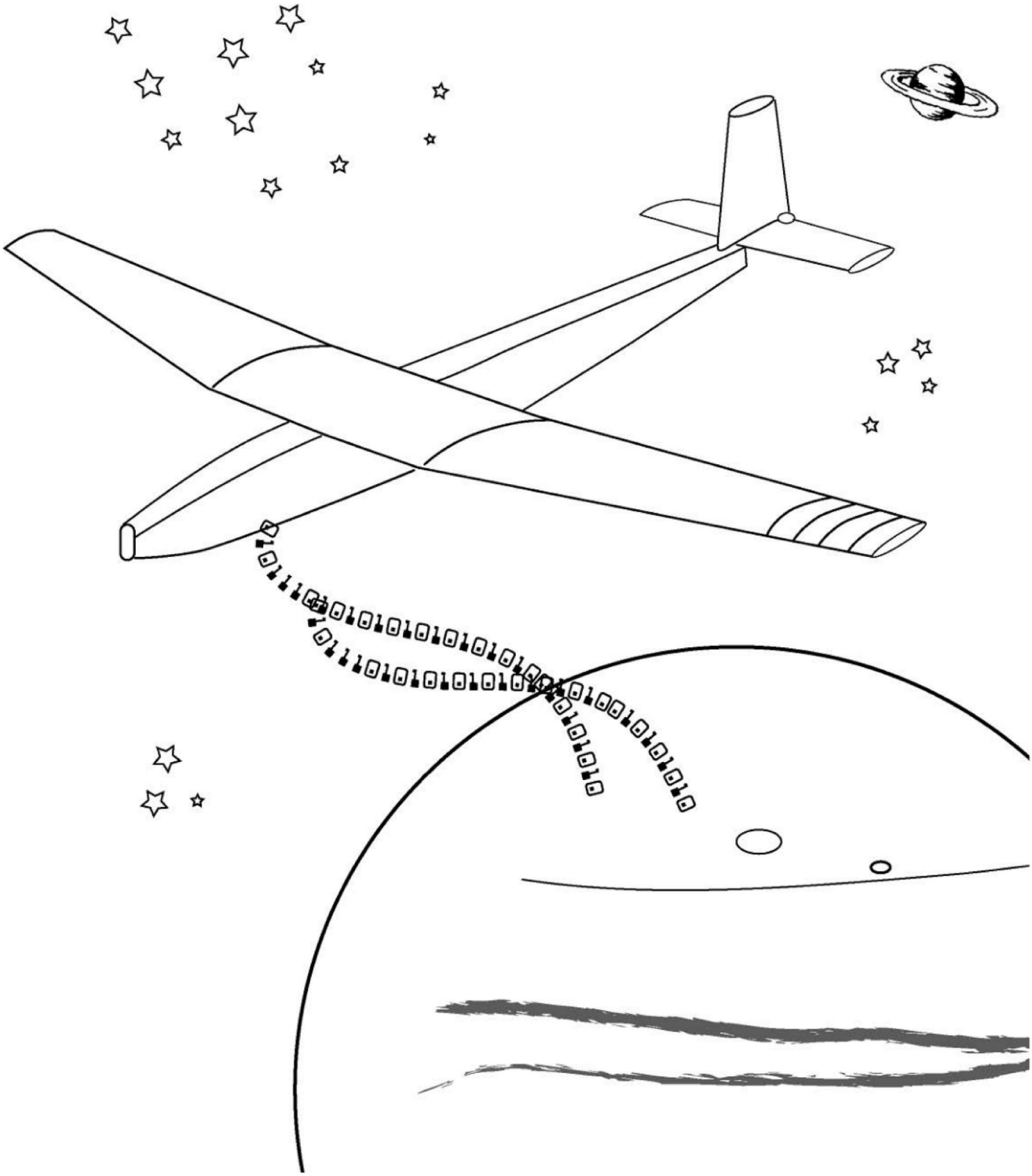
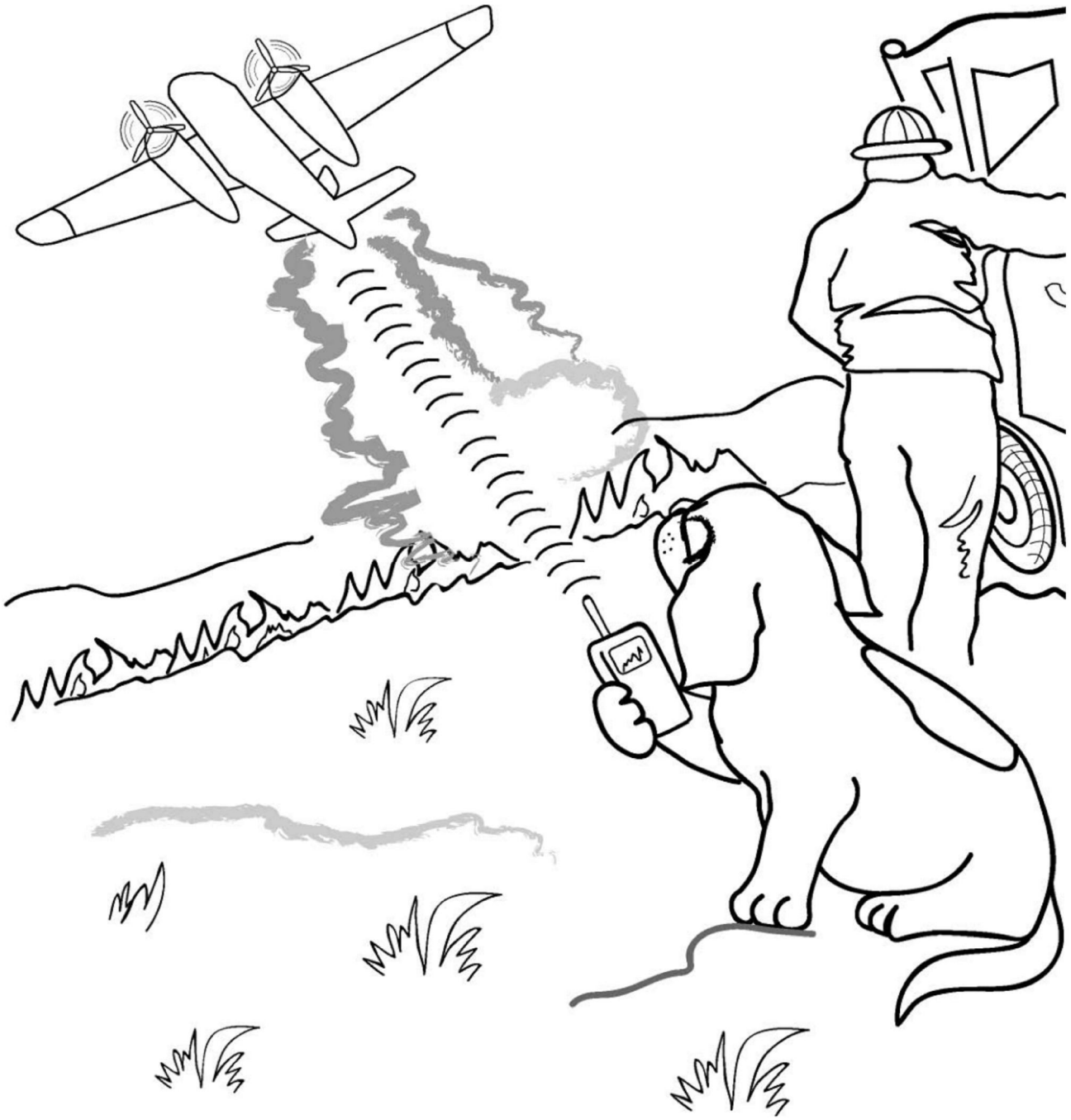
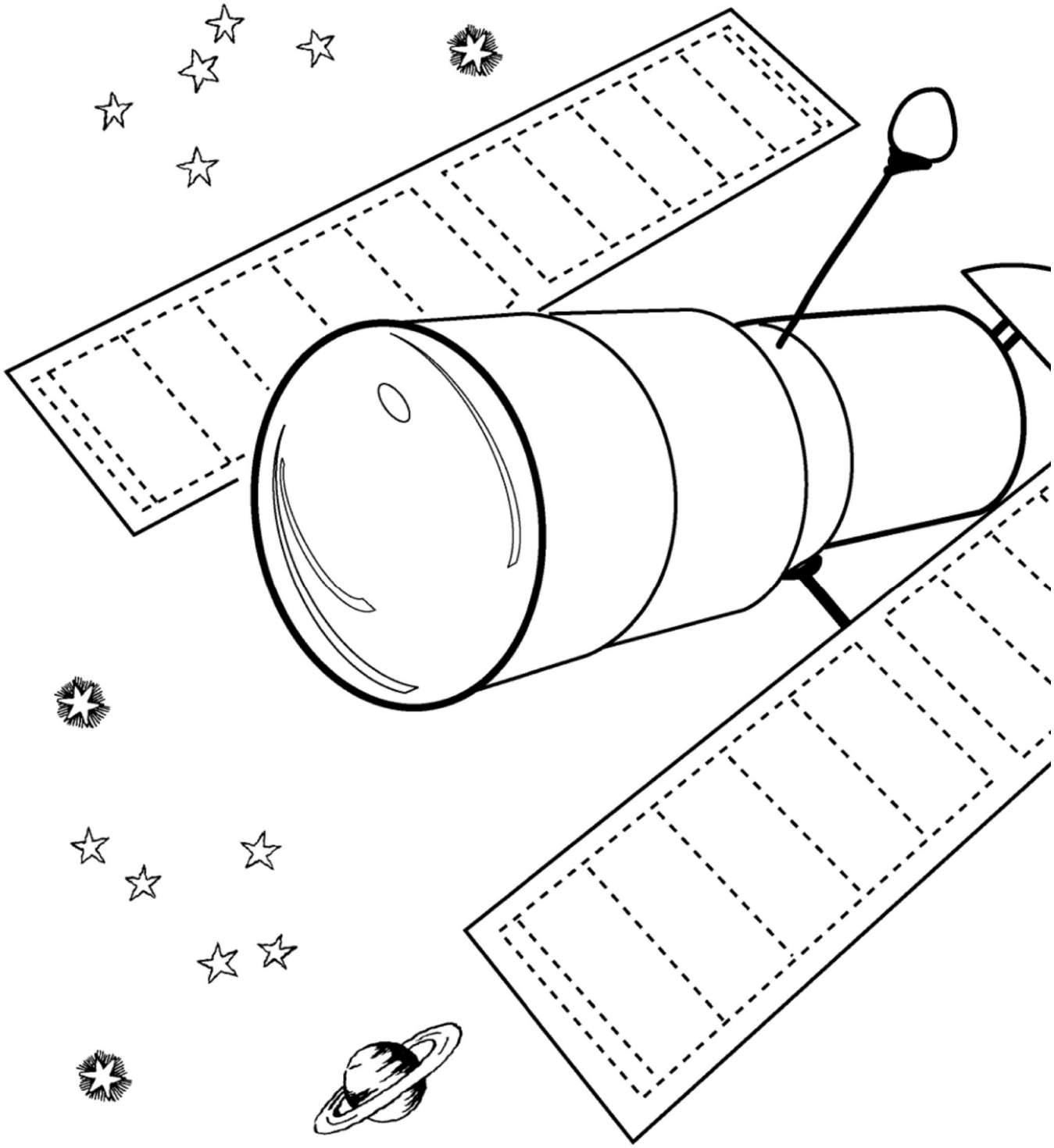


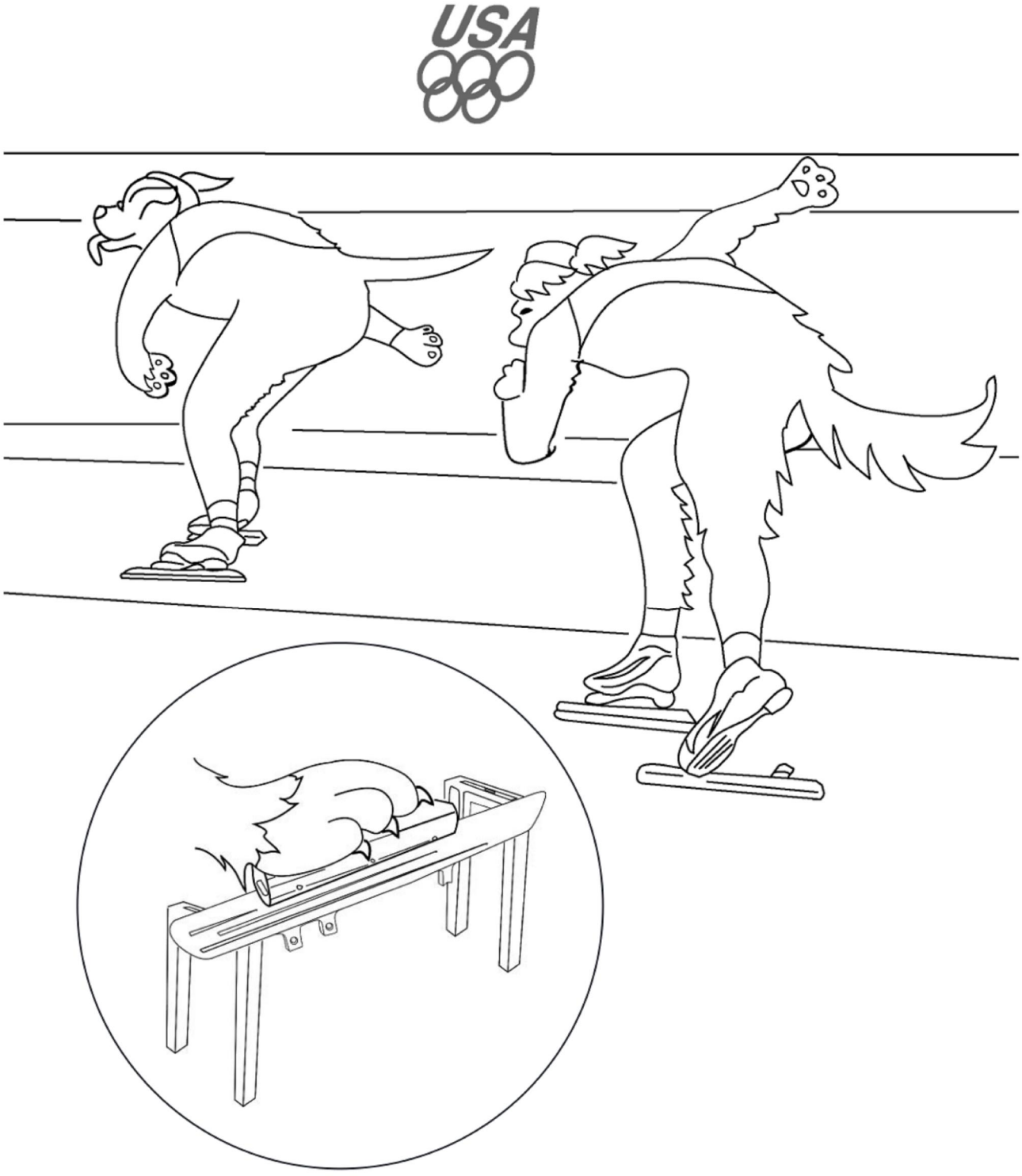
NASA uses this unmanned vehicle to gather information about the atmosphere around planets and other things in space.



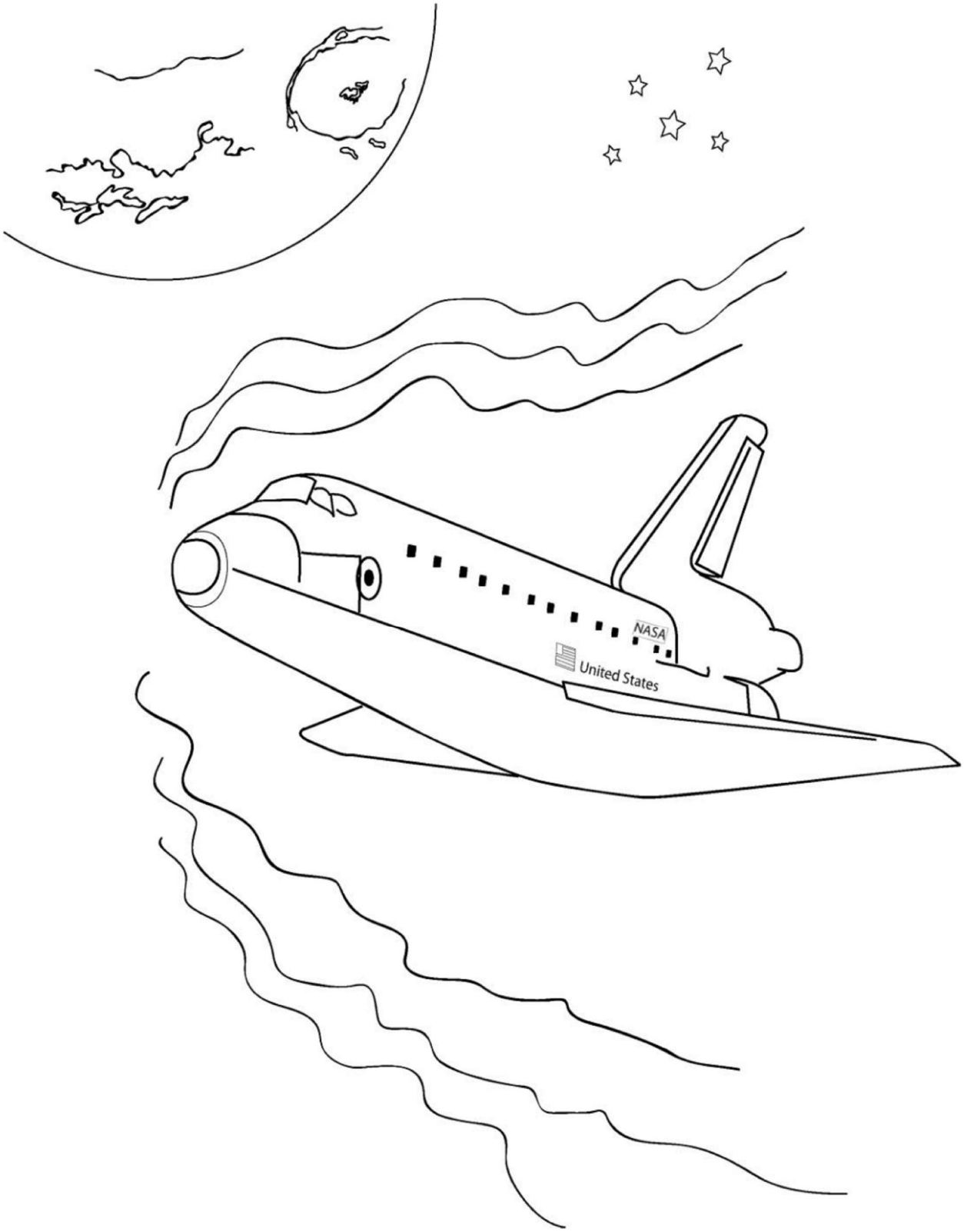
Space Pup can fly the unmanned vehicle over forest fires using a remote control. This lets us gather information about the fire without putting someone in danger.



NASA uses a special polishing technology to polish mirrors used in space telescopes like the Hubble!



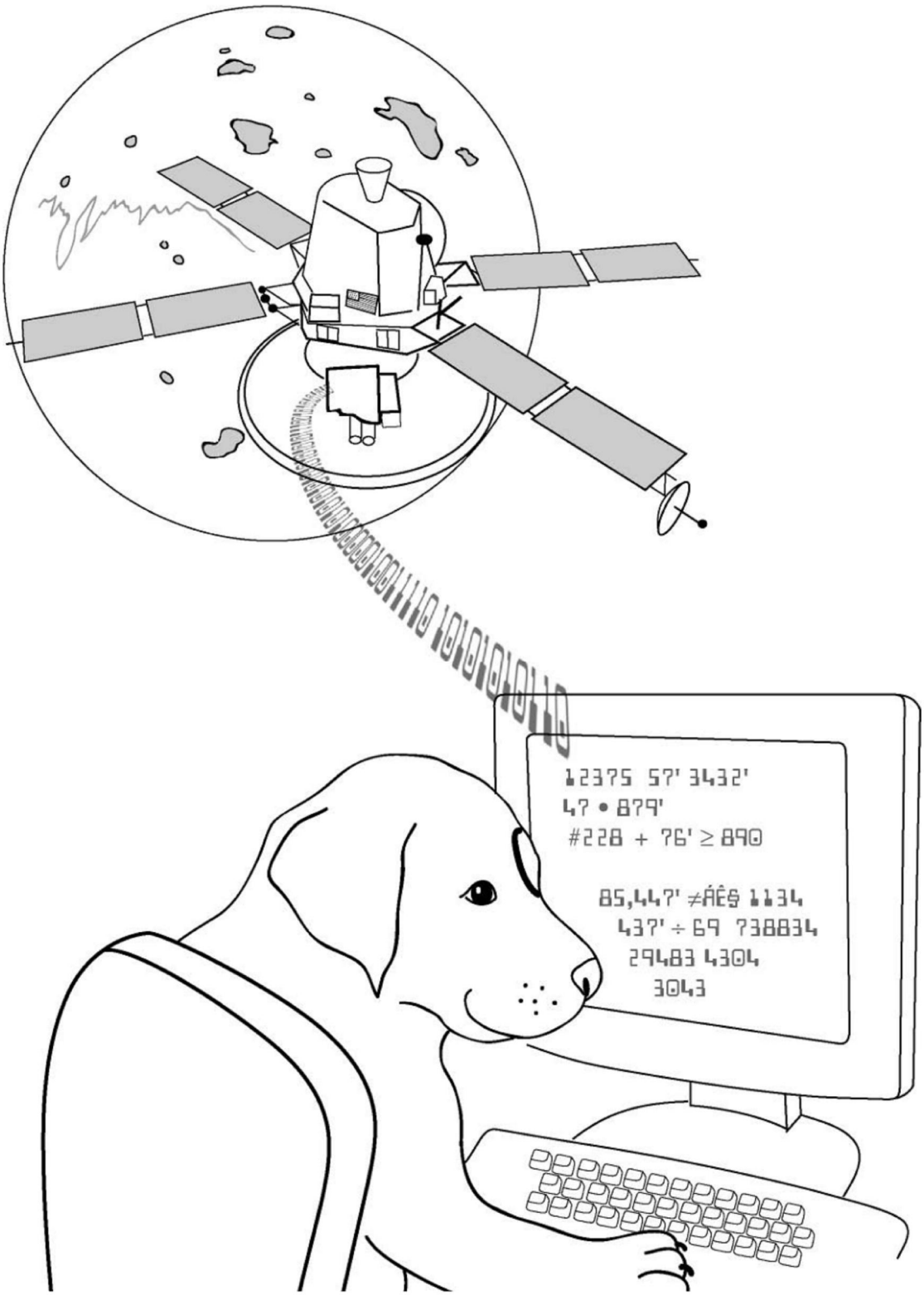
We can use this polishing tool to smooth the surface of ice skate blades to make them go super fast!



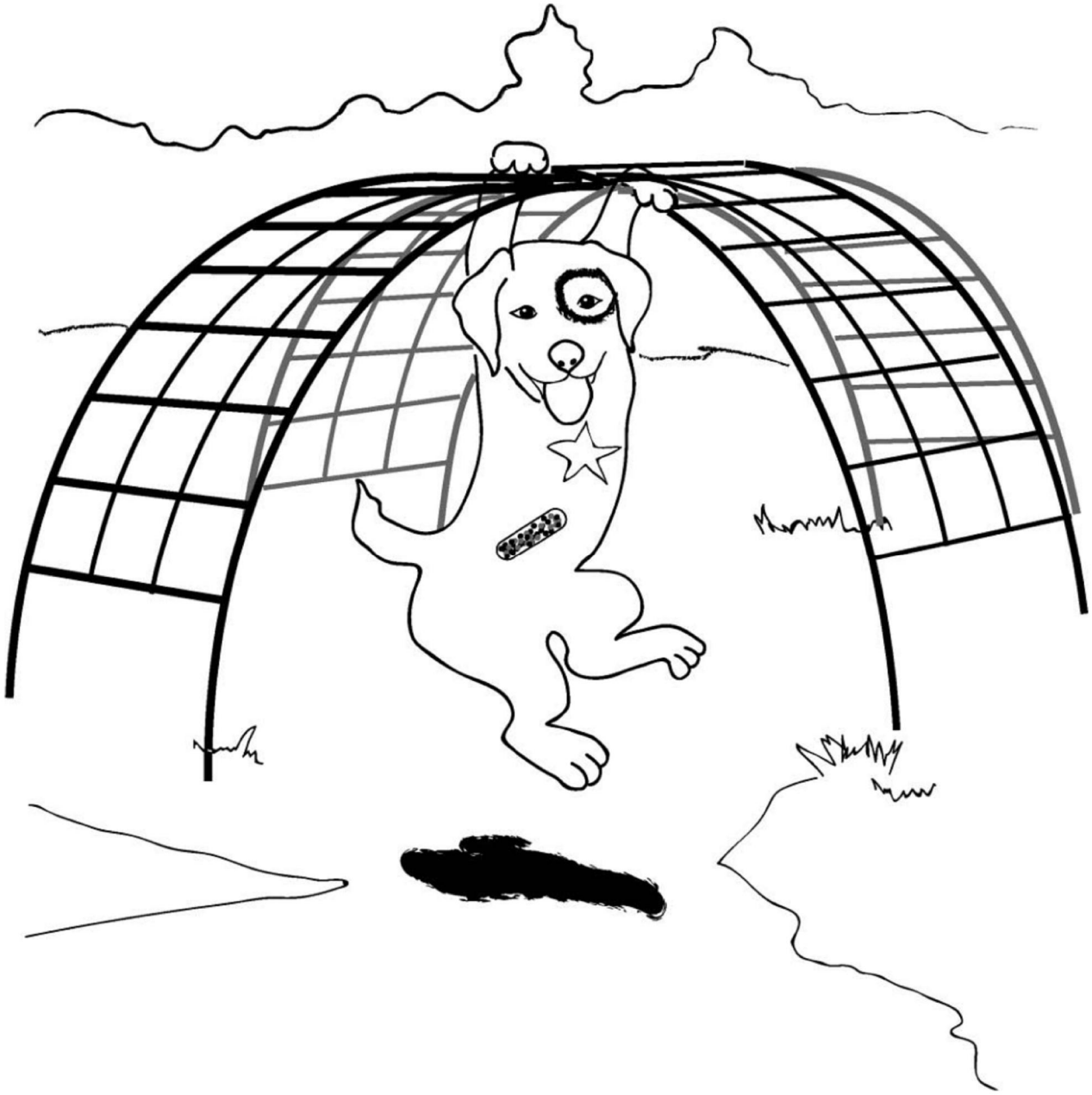
NASA uses this capillary [kap-ə-'lar-ē] pumped loop warmer technology to control the temperature of their spacecraft.

A **capillary** is a tiny tube.

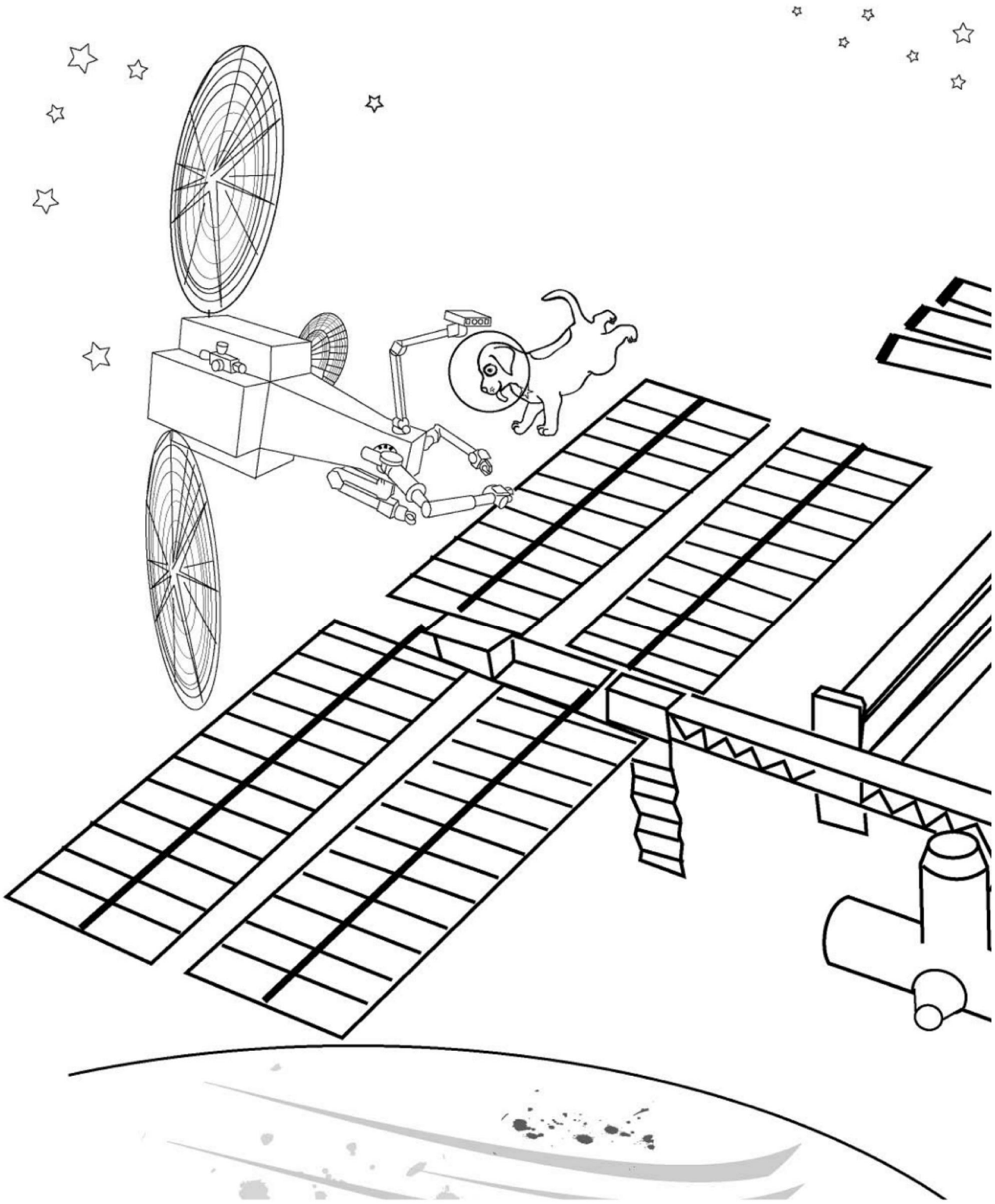
Space Pup can keep his hands or feet warm and toasty even in the coldest places wearing gloves with capillaries (tubes) that carry heat from warm places on his body to the cold places on his body. His friend, Rex, wishes he had some of those gloves!



Telemetry [tə-'lem-ə-trē] is when a device, known as a telemeter [tə-'lem-e-tər], measures something and sends the information by radio to another location. NASA used this technology in life science experiments on the Mars Viking space probe.



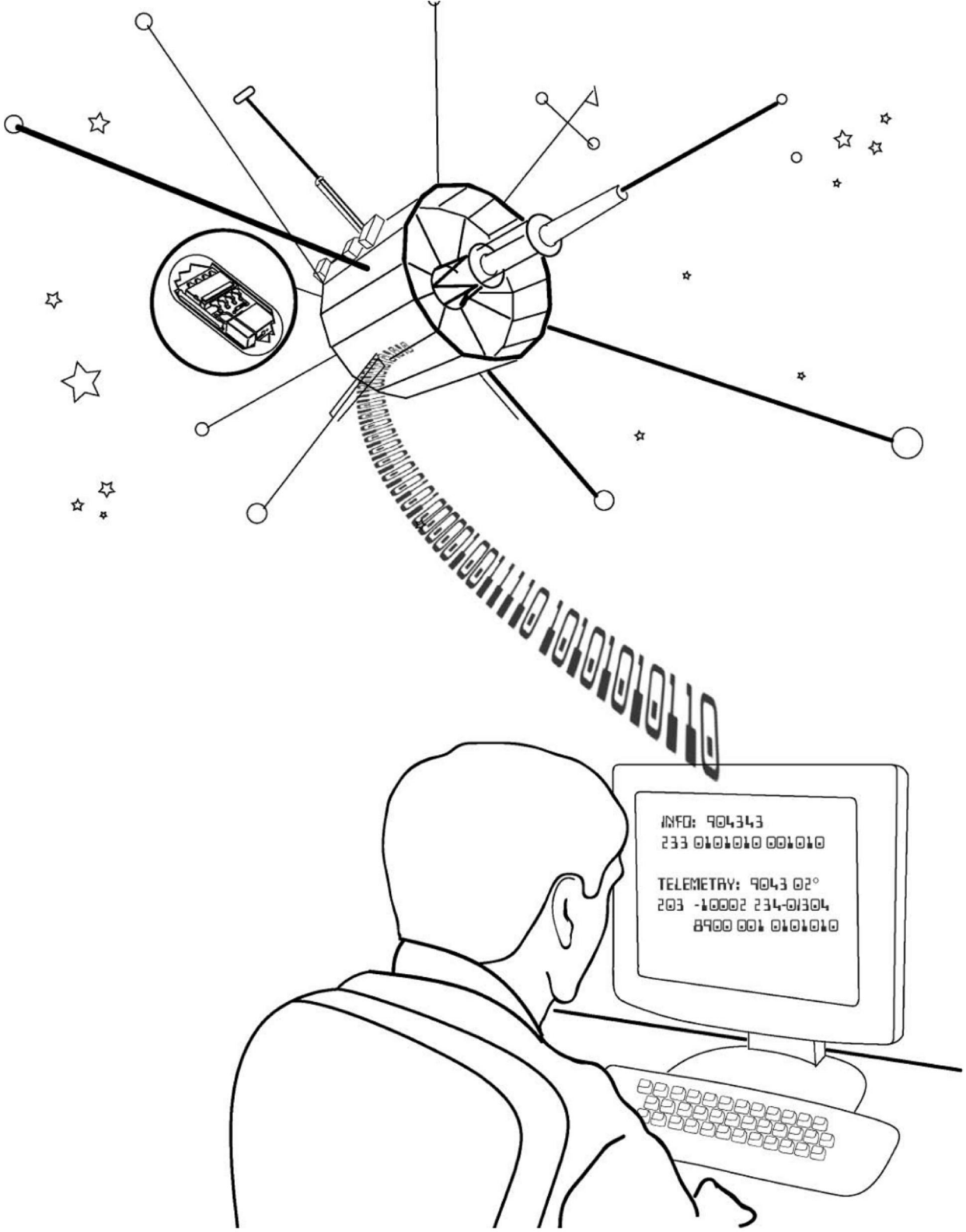
A PIMS is a small medication system that can be put inside someone's body to give them medicine from the inside. Space Pup's doctor put a PIMS in his body so he gets the right amount of medicine right when he needs it. Using the **telemetry** technology from Viking, the doctor can also change the amount of medicine that Space Pup gets.



NASA uses this capaciflective [kə-'pas-ə-flək-tiv] sensor on robots that do work on spacecraft. The sensor allows the robots to "see" a person or object so they can avoid running into them while working on the ship.

how we use the technology: 3-D capacitive interactive display

This cool interactive monitor uses the same type of sensor that allows the robots to "see". Space Pup can use his hands to control his computer game WITHOUT touching the screen or a mouse!



NASA has developed tiny electronic chips — not to be confused with potato chips! — to improve communication between satellites, spacecraft, and scientists on earth.

The same types of tiny chips helped engineers create this temperature monitoring pill. By swallowing this temperature monitoring pill, Space Pup gives his doctor a constant reading of his temperature and heart rate while he goes about his usual business.

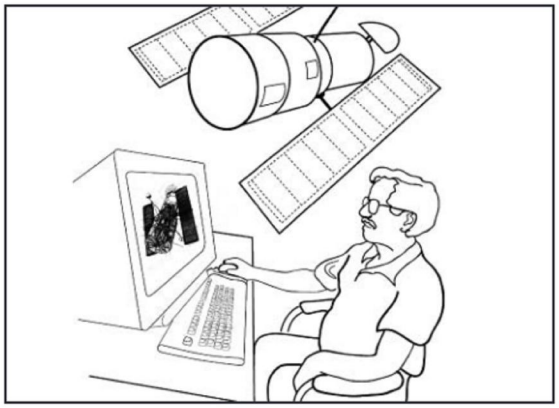
Heart rate is how fast your heart is beating.

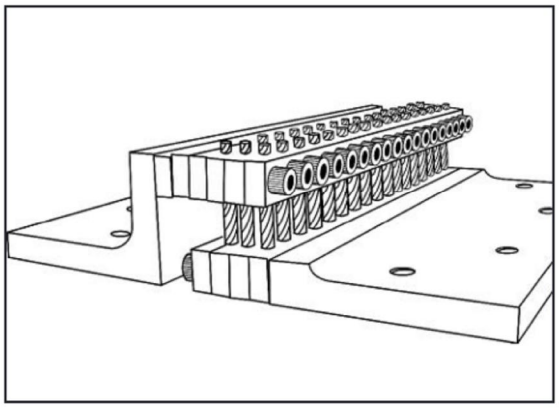
Find-a-word

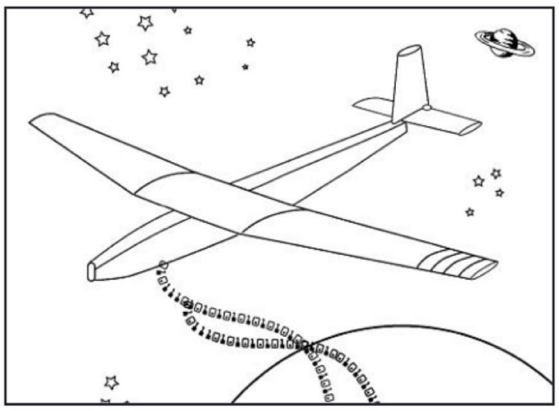
C I N O R T C E L E T N U Z C
Y U R E K W F X N U K T A T I
G G G D X O L A A G I G L O R
O P Q X G H S N R L I U I B C
L P K V B C O C I C E N V O U
O F J P I R L Z F C E E E R I
N N T E T O A C F R A C I E T
H B N S A T E L L I T E A Q R
C C A S I R E H T A E W P P G
E O R O E K K R Z V K Z D C S
T J N V O L E I S B T Z A Q P
T A X E B B B F M V X J B F Q
P I S L P G H A X Z C A J X M
T V X T F P D Q C H U R V J Q
G K I C Z V J C S T L L G U R

astronaut
cables
circuit
electronic
engineer
robot
satellite
science
spacecraft
technology
weather

Match the technologies





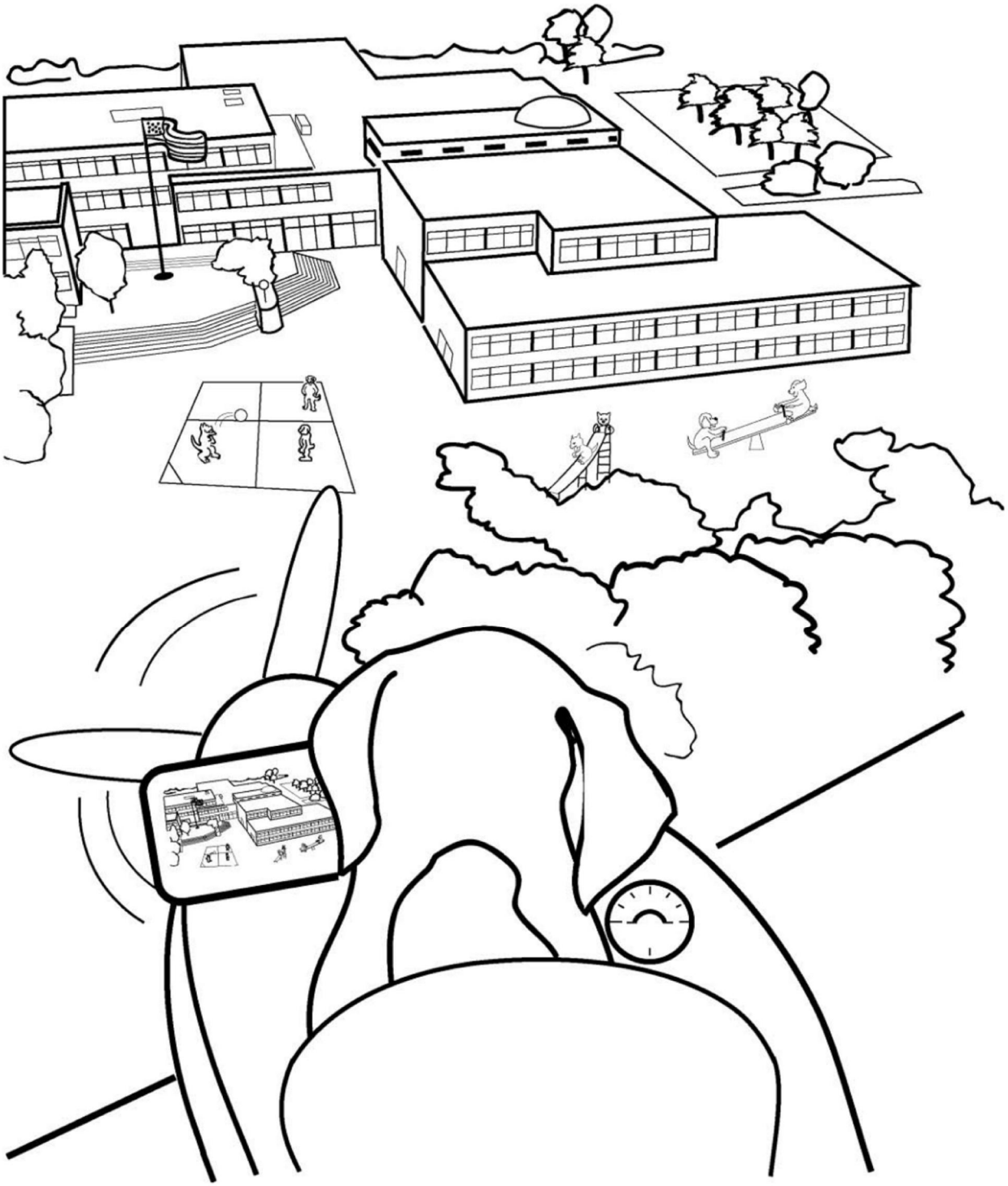


Match NASA's use for the technologies on the left to the technology developed for our use on the right.

NASA uses this software on satellites to make three-dimensional maps of planets and other things in space

Three-dimensional means it looks more realistic, like some parts are further away than others.

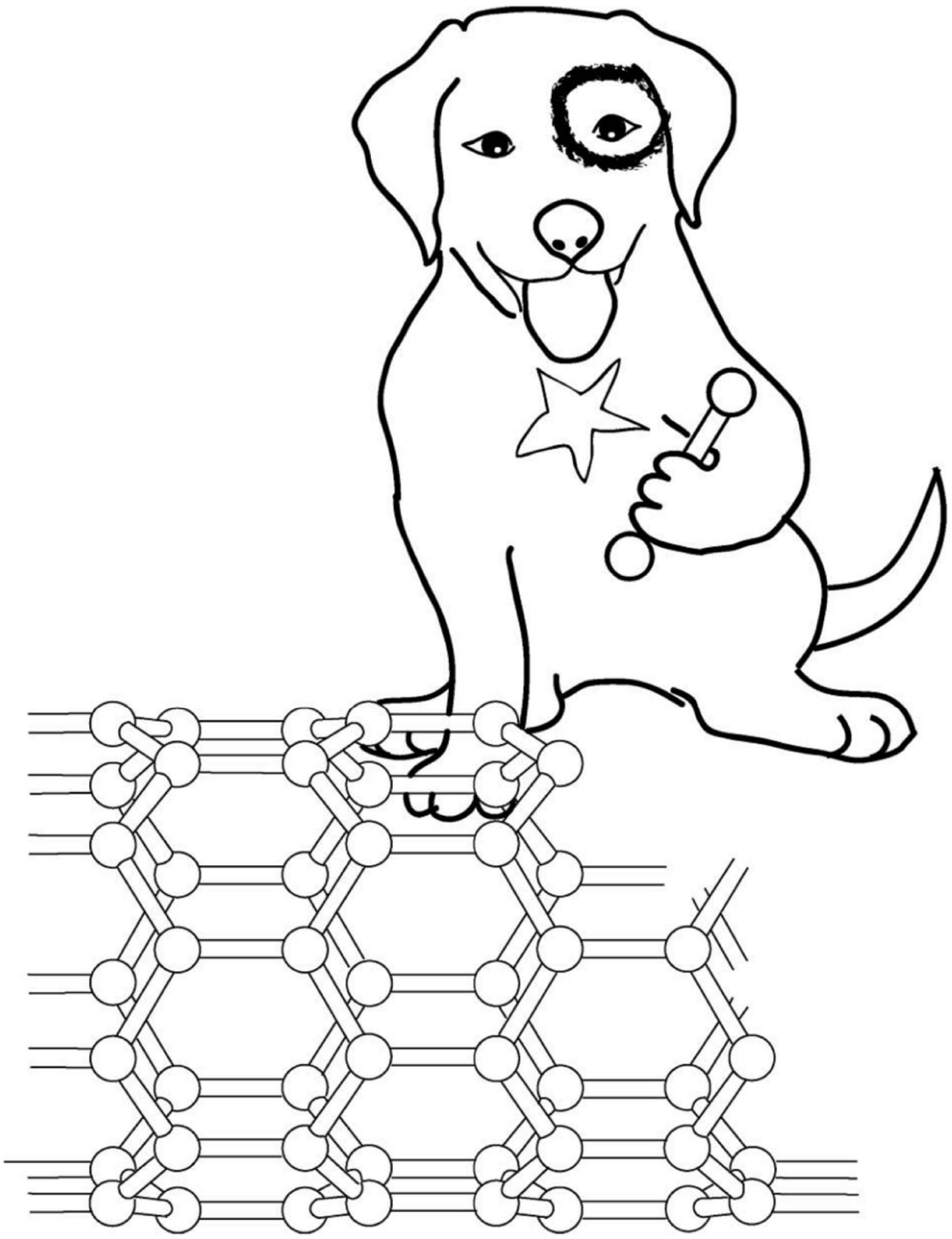
Photons ['fō-tän] are tiny particles of energy or radiation.



Using NASA's photon-counting altimeter software, Space Pup is making a three-dimensional map of his school.

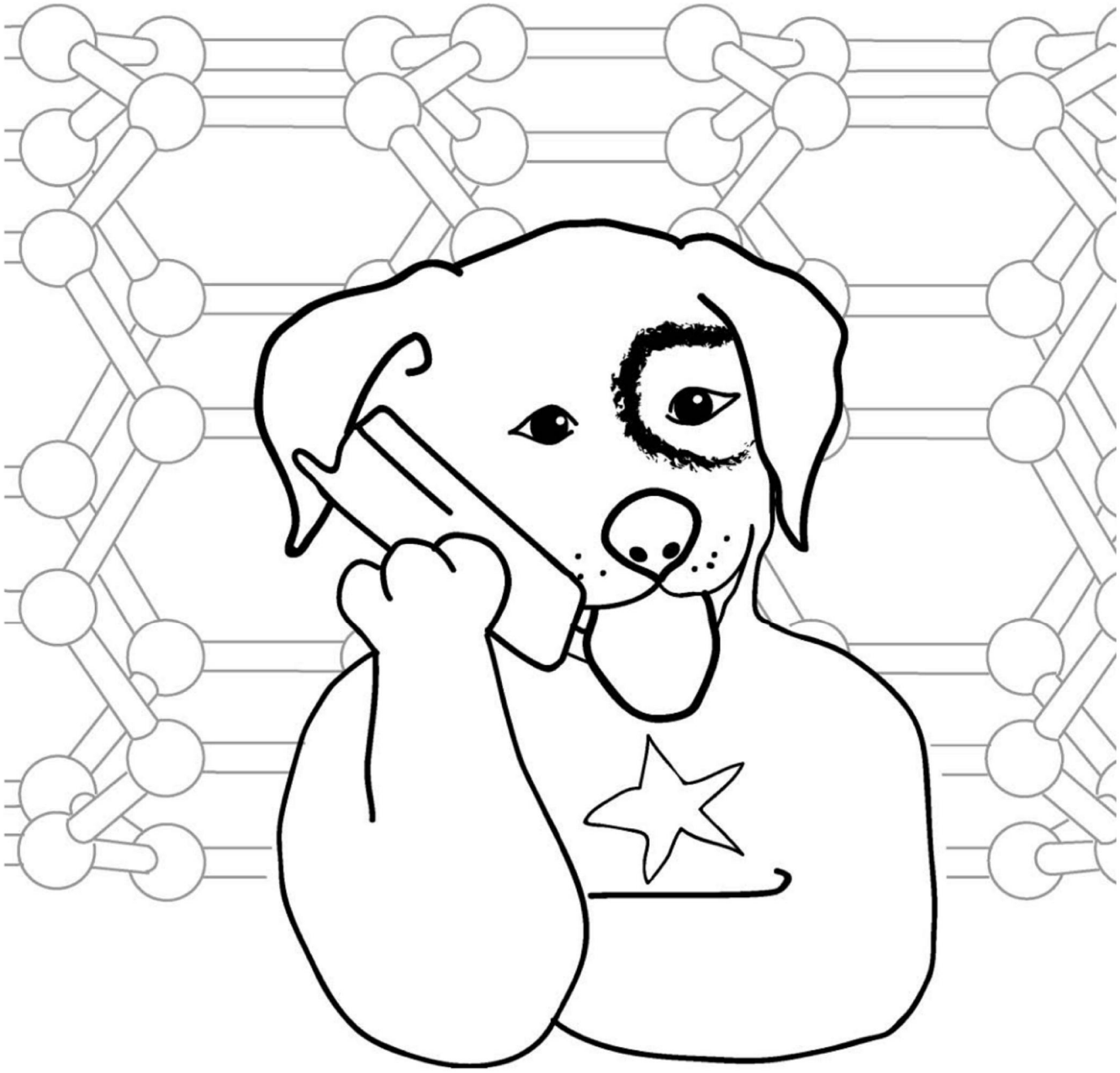
An **altimeter** is an instrument that measures altitude (how high something is).

Micro means "very small," so a **microaltimeter** is a very small instrument that measures how high something is.

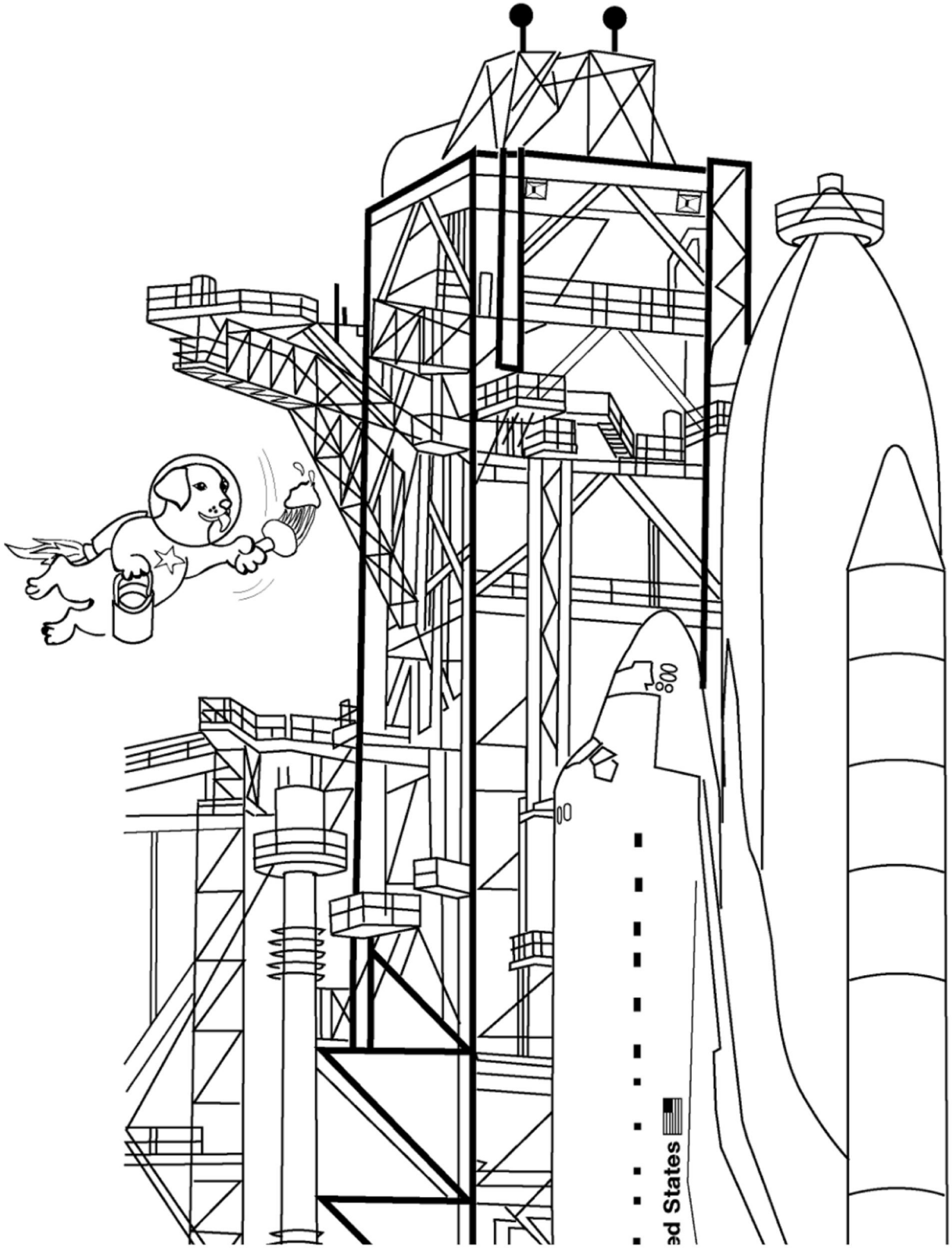


Carbon nanotubes ['nan-ō-tübz] are tiny tubes that are very strong and very good conductors of electricity and heat. They can be used as a type of fuel cell (like a battery) as well as for lots of other things. NASA came up with a new way to make carbon nanotubes that is a lot safer and also saves companies a lot of money.

Nano means one billionth! That's small—about 150,000 times smaller than a human hair!

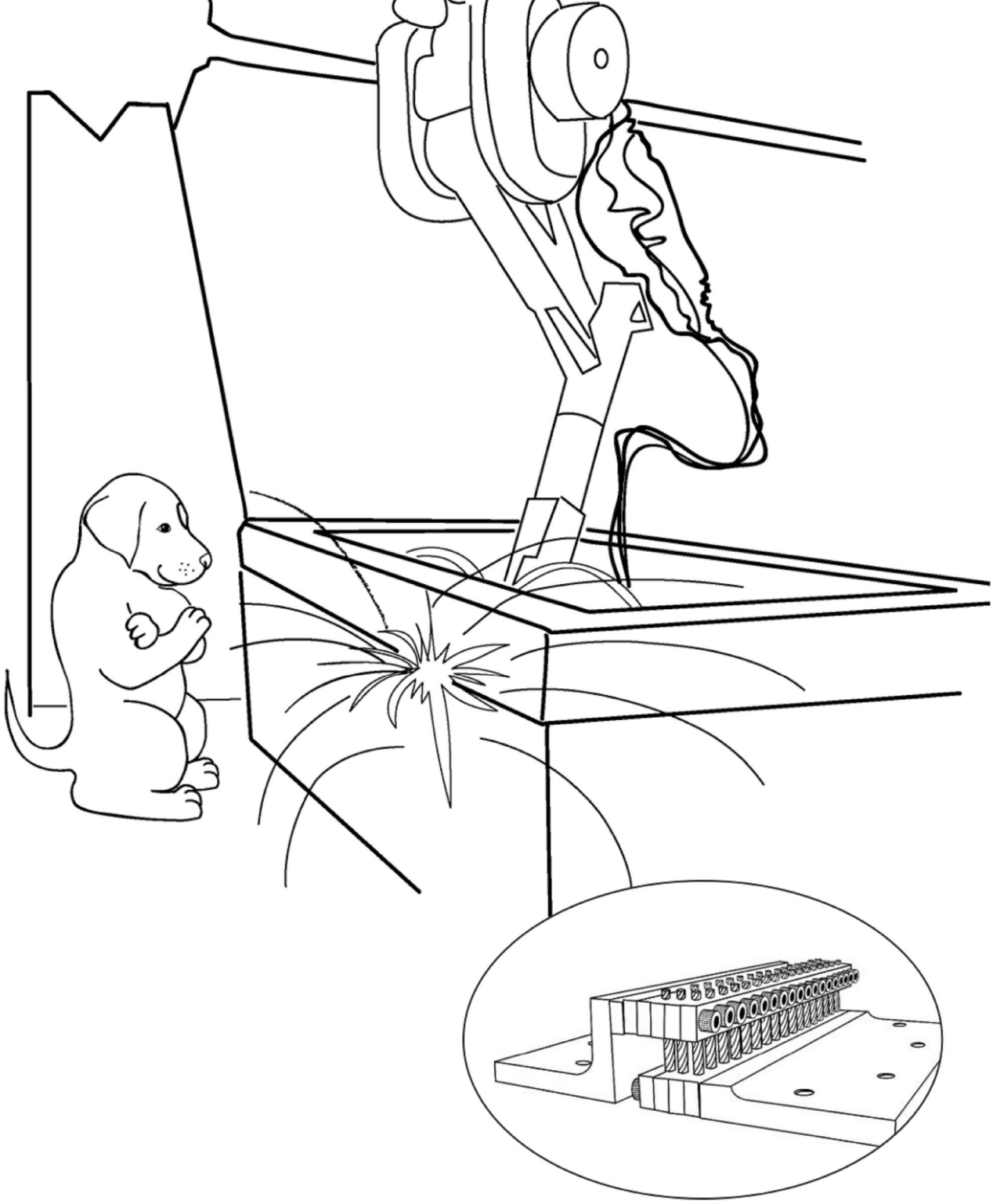


Because NASA came up with a better way to make carbon nanotubes, companies will be able to find new ways to use them. In the future they could be used to make better computers, cell phones, electronic toys, and lots of other things.



NASA developed this coating on gantries at rocket launch sites. Gantries are big vertical structures that support rockets. The coating helps protect the gantry from salt water corrosion and the effects of the heat from the rocket. This makes it last longer.

Space Pup can use NASA's coating to protect the Statue of Liberty from rust and pollution.



NASA developed this very strong and flexible cable mechanism to help scientists control the flight and movement of spacecraft and other machines.