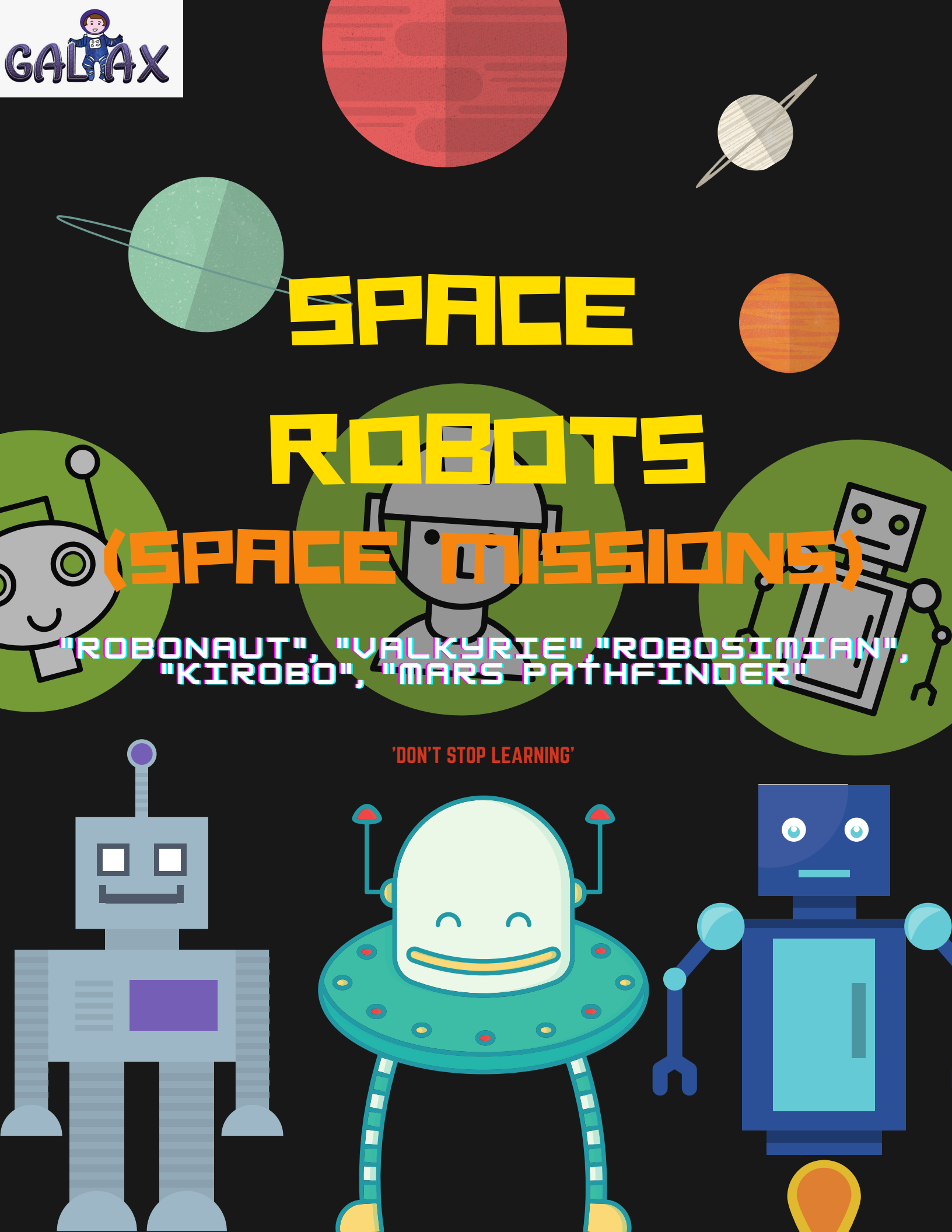


The background is a dark space scene. At the top center is a large red planet. To its right is a smaller planet with rings. To its left is a green planet with rings. Below these is an orange planet. In the center, behind the main text, is a green circle containing a robot head. To the left and right of this are green circles containing other robot parts. At the bottom are three large robots: a grey one on the left, a white one in the center, and a blue one on the right.

SPACE

ROBOTS

(SPACE MISSIONS)

"ROBONAUT", "VALKYRIE", "ROBOSIMIAN",
"KIROBO", "MARS PATHFINDER"

'DON'T STOP LEARNING'

AS HUMANITY MOVES FORWARD IN ITS EXPLORATION OF SPACE, WE WILL HAVE TO EXPECT MORE AND MORE EXTREMELY DANGEROUS MISSIONS. SO, THE PRESENCE OF A ROBOTIC ASSISTANT, WHO WILL BE READY TO PARTICIPATE IN EVERY DANGEROUS MISSION, HAS BECOME OF UTMOST IMPORTANCE, ESPECIALLY DURING THE IMPLEMENTATION OF LONG-TERM TRIPS TO OUTSIDE THE PLANET. THEREFORE, NASA HAS DEVELOPED ROBOTS THAT ARE ABLE TO TRAVEL TO OUTER SPACE BEFORE HUMANS, WHICH WILL REDUCE THE GREAT DANGER THAT HUMAN ASTRONAUTS COULD FACE IN DIFFICULT .MISSIONS



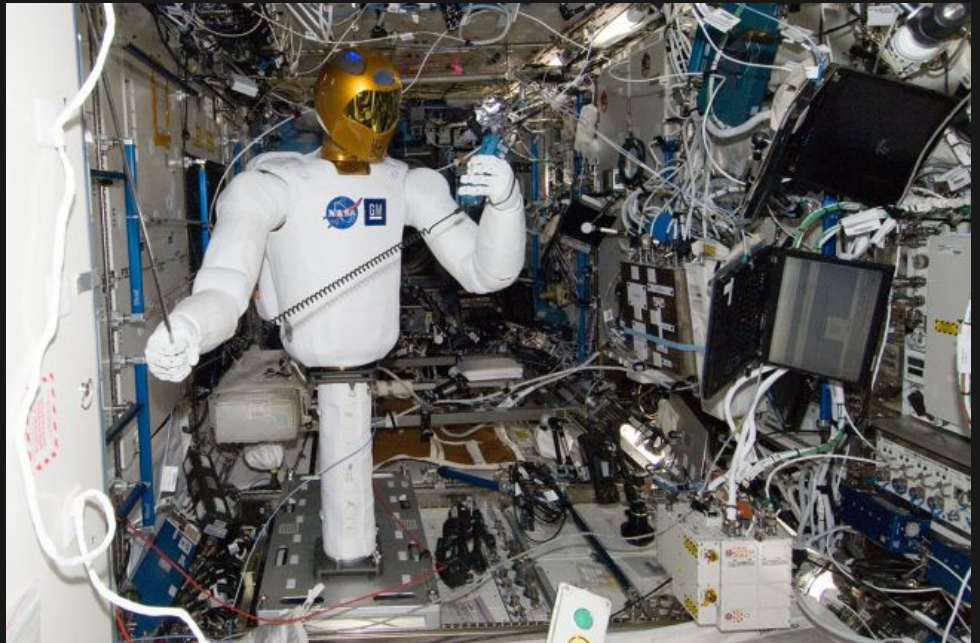
Robonaut (NASA)

ROBONAUT IS A NASA ROBOT. ENGINEERS DESIGNED ROBONAUT TO BE HUMANOID. THIS MAKES IT EASIER FOR ROBONAUT TO DO THE SAME JOBS AS A PERSON

ROBONAUT COULD HELP WITH ANYTHING FROM WORKING ON THE INTERNATIONAL SPACE STATION TO EXPLORING OTHER WORLDS. ROBONAUT HAS A ,HEAD

TORSO, ARMS AND HANDS LIKE A PERSON. CAMERAS IN THE .HEAD PROVIDE VISION

ROBONAUT IS CALLED A DEXTEROUS ROBOT BECAUSE ITS HANDS AND FINGERS MOVE LIKE A PERSON'S. NASA PRODUCED THE FIRST VERSION OF THE .ROBOT IN 2000



**SINCE THAT TIME, ENGINEERS HAVE CONTINUED TO
IMPROVE
ROBONAUT. THE NEWEST MODEL IS CALLED ROBONAUT
2, OR R2, AND IT FLEW TO THE
SPACE STATION ON THE SPACE SHUTTLE DISCOVERY IN
2011. THE PEOPLE WHO CONTROL R2
CAN GIVE IT A SIMPLE TASK TO DO, AND R2 CAN
FIGURE OUT HOW TO DO IT. R2'S
SOFTWARE CAN BE UPDATED TO ALLOW IT TO DO NEW
.TASKS**



Valkyrie (NASA)

THE NASA VALKYRIE IS ONE OF THE MOST ADVANCED HUMANOID ROBOTS IN THE WORLD. VALKYRIE IS DESIGNED TO WORK IN ENVIRONMENTS TOO HAZARDOUS FOR ASTRONAUTS, AND IS THE THIRD AND NEWEST ITERATION OF NASA'S ROBONAUT WHEREAS THE FIRST TWO, R1 AND R2, ARE USED TO PERFORM REPETITIVE TASKS ON THE ISS, VALKYRIE IS BEING DEVELOPED TO MINE RESOURCES, BUILD HABITATS AUTONOMOUSLY ON THE SURFACE OF MARS, COMPLETE DISASTER-RELIEF MANEUVERS AND WORK ALONGSIDE ..ASTRONAUTS



THE HUMANOID HAS ON-BOARD COMPUTING AND SENSING AND A 1.8KWH BATTERY. VALKYRIE'S HEAD IS FITTED WITH A PERCEPTUAL SENSOR BUILT BY CARNEGIE ROBOTICS MULTIGENE SL. IT ALSO FEATURES "HAZARD CAMERAS" IN THE TORSO. EACH UPPER ARM FEATURES FOUR SERIES ELASTIC ROTARY ACTUATORS, AND COMBINED WITH THE FOREARM, HAS SEVEN JOINTS. THE ROBOT HAS 44 DEGREES OF BODY FREEDOM, WEIGHS 300LBS, IS 6FT 2IN TALL AND RUNS ON TWO INTEL CORE I7. IT IS NOW BEING DEVELOPED AT VARIOUS UNIVERSITIES AROUND THE WORLD TO ALLOW .COLLISION-FREE MOVEMENT



RoboSimian (Nasa)

**ROBOSIMIAN CREATED BY
ENGINEERS AT NASA'S JET PROPULSION LABORATORY
,.(JPL) IN PASADENA, CALIF
ROBOSIMIAN IS A STRANGE FOUR-LEGGED MACHINE THAT
LOOKS LIKE AN UNHOLY CROSS
BETWEEN A SPIDER AND A CHIMP. THE ROBOT CAN WALK
ON ALL FOURS, OR FOLD IN ITS
HIND LEGS AND SIT BACK ON ITS WHEELED HAUNCHES TO
.WIELD ITS TWO DEXTEROUS ARMS
THE ROBOT IS SET TO COMPETE IN THE DEFENSE
ADVANCED RESEARCH PROJECTS AGENCY
(DARPA) ROBOTICS CHALLENGE**



THE CHALLENGE SETS OUT TO SPUR THE INNOVATION OF ROBOTS FOR RELIEF WORK IN THE WAKE OF NATURAL AND MAN-MADE DISASTERS. ROBOSIMIAN'S UNIQUE DESIGN MADE SOME TASKS MORE DIFFICULT THAN, BUT ITS LONG STURDY ARMS AND DEFT HANDS HELPED THE ROBOT PICK UP VALUABLE POINTS IN ACTIVITIES SUCH AS CLEARING AWAY DEBRIS AND TURNING VALVES. WHAT MAKES ROBOSIMIAN STAND OUT, JPL OFFICIALS EXPLAINED IN THE STATEMENT, IS THE ROBOT'S ABILITY TO GO OVER DIFFICULT TERRAIN AND PERFORM TASKS REQUIRING EXTREME DEXTERITY. AMONG ITS ATTRIBUTES IS A LIDAR (LIGHT DETECTION AND RANGING) DEVICE THAT LETS ROBOSIMIAN SKETCH OUT ITS ENVIRONMENT IN .THREE DIMENSIONS



KIROBO ROBOT

KIROBO IS JAPAN'S FIRST ROBOT ASTRONAUT, DEVELOPED BY UNIVERSITY OF TOKYO TO ACCOMPANY KOICHI WAKATA, THE FIRST JAPANESE COMMANDER OF THE INTERNATIONAL SPACE STATION. KIROBO ARRIVED ON THE ISS ON AUGUST 10, 2013. CREATED BY ROBOT DESIGNER TOMOTAKA TAKAHASHI, THE KIROBO ROBOT HAS A SPECIAL MISSION TO HELP SOLVE THE PROBLEMS BROUGHT ABOUT BY A SOCIETY THAT HAS BECOME MORE INDIVIDUALIZED AND LESS COMMUNICATIVE. KIROBO CAN SPEAK LIKE A HUMANOID, WAVE HAND, STAND ON ITS OWN AND ADAPT TO LOW GRAVITY. ALSO, KIROBO HAS VOICE AND SPEECH RECOGNITION, NATURAL LANGUAGE PROCESSING, SPEECH SYNTHESIS AND TELECOMMUNICATIONS, AS WELL AS FACIAL RECOGNITION AND VIDEO RECORDING. SO KIROBO ROBOT CONSIDERS THE FIRST TALKING HUMANOID ROBOT ASTRONAUT HAS TAKEN OFF IN A ROCKET TO OUTER SPACE.



Mars Pathfinder

MARS

PATHFINDER ROBOT WAS SENT BY NASA FOR SCIENTIFIC RESEARCH IN A ROBOTIC VEHICLE

SOJOURNER, NAMED AFTER SOJOURNER TRUTH. IT WAS THE FIRST ROBOTIC MISSION TO

PROBE OUTSIDE THE EARTH-MOON SYSTEM. IT BECAME SUCCESSFUL IN GIVING US INSIGHTS

ABOUT THE ENVIRONMENT ON MARS. LAUNCHED ON DECEMBER 4, 1996, AND LANDED ON JULY

THE MARS PATHFINDER WAS FITTED WITH THREE DEVICES THAT ,1997 ,4 MADE

OBSERVATIONS. FIRST, AN ALPHA PROTON X-RAY SPECTROMETER (APXS), THAT ANALYZED

THE COMPONENTS OF THE ROCKS AND SOIL. SECOND, THREE CAMERAS (TWO BLACK AND

WHITE AND ONE COLOR) TO HELP THE ROVER NAVIGATE AND PROVIDE IMAGES OF ITS

SURROUNDINGS TO UNDERSTAND MARS GEOLOGY



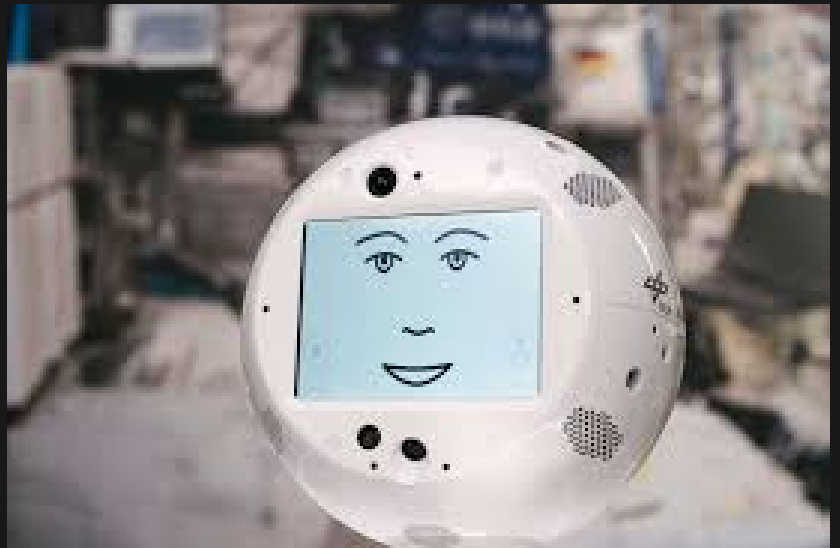
**THIRD, ATMOSPHERIC STRUCTURE
INSTRUMENT/METEOROLOGY PACKAGE THAT
GAVE INFORMATION OF THE ATMOSPHERIC LAYERS OF
MARS DURING ITS DESCENT AND
LANDING. IT ENDED ITS MISSION ON SEPTEMBER 27,
1997. MARS
PATHFINDER RETURNED 2.3 BILLION BITS OF
INFORMATION, INCLUDING MORE THAN 16,500
IMAGES FROM THE LANDER AND 550 IMAGES FROM THE
ROVER, AS WELL AS MORE THAN 15
CHEMICAL ANALYSES OF ROCKS AND SOIL AND
EXTENSIVE DATA ON WINDS AND OTHER
.WEATHER FACTORS**



CIMON Robot

CIMON

CREW INTERACTIVE MOBILE COMPANION) IS THE FIRST) ROBOT WITH ARTIFICIAL INTELLIGENCE TO FLY IN SPACE. CIMON WAS BUILT BY AIRBUS FOR THE GERMAN SPACE AGENCY AND RUNS A VERSION OF IBM WATSON'S ARTIFICIAL INTELLIGENCE IT IS A HEAD-SHAPED ROBOT USED IN THE INTERNATIONAL SPACE STATION, HAS A VIDEO-SCREEN FACE, ALONG WITH A CAMERA AND A DIGITAL VOICE SO IT CAN TALK WITH THE ASTRONAUTS. CIMON IS ROUGHLY SPHERICAL AND WEIGHS 11 .LBS. (5 KILOGRAMS)



**THE
ROBOT CAN CONVERSE WITH PEOPLE, AND IT KNOWS WHOM IT
IS TALKING TO THANKS TO
FACIAL-RECOGNITION SOFTWARE. IT ALSO CONSIDERS AS A
;MOBILE ASTRONAUT ASSISTANT
ONCE ABOARD THE ISS, MON WILL BE ABLE TO FLY AROUND,
BY SUCKING AIR IN AND
EXPELLING IT THROUGH SPECIAL TUBES. WHEN CIMON WAS
DELIVERED TO THE SPACE
STATION FOR ITS FIRST TEST RUN ON NOV. 15, IT RESPONDED
TO THE COMMAND
WAKE UP, CIMON,” BY ASKING, IN WHAT CAN ONLY BE”
DESCRIBED AS A
.CHIRPY DRONE**

