

Group of small spacecrafts

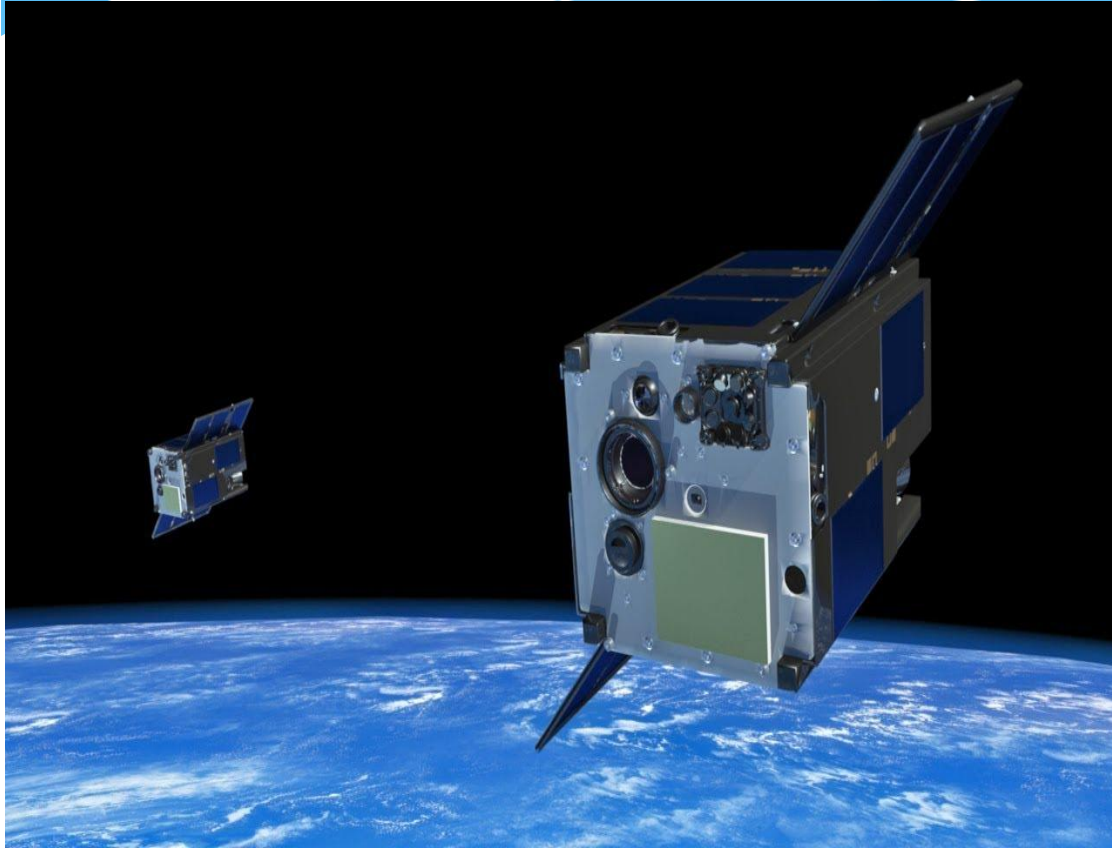
Spacecraft

- * A **spacecraft** is a vehicle or machine designed to fly in outer space. Spacecraft are used for a variety of purposes, including communications, earth observation, meteorology, navigation, space colonization, planetary exploration, and transportation of humans and cargo. All spacecraft except single-stage-to-orbit vehicles cannot get into space on their own, and require a launch vehicle (carrier rocket).



What a small spacecrafts

* The size and cost of spacecraft vary depending on the application; some you can hold in your hand while others like Hubble are as big as a school bus. Small spacecraft (SmallSats) focus on spacecraft with a mass less than 180 kilograms and about the size of a large kitchen fridge. Even with small spacecraft, there is a large variety of size and mass that can be differentiated



Group of small spacecrafts:

Minisatellite, 100-180 kilograms

Microsatellite, 10-100 kilograms

Nanosatellite, 1-10 kilograms

Picosatellite, 0.01-1 kilograms

Femtosatellite, 0.001-0.01 kilograms

Minisatellite

*The term "small satellite", ^[2] or sometimes "minisatellite", often refers to an artificial satellite with a wet mass (including fuel) between 100 and 180 kg ^{5][6]} but in other usage has come to mean any satellite under 180 kg ^{3]}

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Microsatellite

- * The term "microsatellite" or "microsat" is usually applied to the name of an artificial satellite with a wet mass between 10 and 100 kg ^{[2][5][6]} However, this is not an official convention and sometimes those terms can refer to satellites larger than that, or smaller than that. ^[2] Sometimes designs or proposed designs from some satellites of these types have microsatellites working together or in a formation. ^[12] The generic term "small satellite" or "smallsat" is also sometimes used, ^[8] as is "satlet". ^[13]

Nanosatellite

- * The term "nanosatellite" or "nanosat" is applied to an artificial satellite with a wet mass between 1 and 10 kg (2.2 and 22.0 lb).^{[2][5][6]} Designs and proposed designs of these types may be launched individually, or they may have multiple nanosatellites working together or in formation, in which case, sometimes the term "satellite swarm"^[20] or "fractionated spacecraft" may be applied. Some designs require a larger "mother" satellite for communication with ground controllers or for launching and docking with nanosatellites.

Picosatellite

* The term "picosatellite" or "picosat" (not to be confused with the [PicoSAT](#) series of microsattelites) is usually applied to artificial satellites with a wet mass between 0.1 and 1 kg (0.22 and 2.2 lb), [\[5\]](#)[\[6\]](#) although it is sometimes used to refer to any satellite that is under 1 kg in launch mass. [\[2\]](#) Again, designs and proposed designs of these types usually have multiple picosatellites working together or in formation (sometimes the term "swarm" is applied). Some designs require a larger "mother" satellite for communication with ground controllers or for launching and docking with picosatellites. The [CubeSat](#) design, with approximately 1 kilogram (2.2 lb) mass, is an example of a large picosatellite (or minimum nanosat).

Femtosatellite

- * The term "femtosatellite" or "femtosat" is usually applied to artificial satellites with a wet mass between 10 and 100 g (0.35 and 3.5 oz).^{[2][5][6]} Like picosatellites, some designs require a larger "mother" satellite for communication with ground controllers.
- * Three prototype "chip satellites" were launched to the [ISS](#) on [Space Shuttle Endeavour](#) on its [final mission](#) in May 2011. They were attached to the ISS external platform [Materials International Space Station Experiment](#) (MISSE-8) for testing.^[37] In March 2014, the nanosatellite [KickSat](#) was launched aboard a [Falcon 9](#) rocket with the intention of releasing 104 femtosatellite-sized chipsats, or "Sprites".^{[38][39]} [ThumbSat](#) is another project intending to launch femtosatellites in 2016.^[40]