The PocketSpacecraft.com Integrated eXploration Environment (PIXE)

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The PocketSpacecraft.com Integrated eXploration Environment (PIXE) is an integrated generic spacecraft design, simulation, manufacturing, and operations system for the low cost mass exploration of space by amateur and professional Principle Investigators (PIs). PIs use an online tool to design Thin-Film Spacecraft/Lander/Rovers (TF-SLRs) using a library of predefined spacecraft and mission components to specify TF-SLRs in quantities ranging from one to thousands per mission, each with a typical mass <1g, surface area <1m2, and <EUR 100 target cost per TF-SLR. TF-SLR designs and missions are verified by simulation, automatically manufactured using a hybrid printed electronics process, and integrated for launch into 0.5-3U Interplanetary CubeSat motherships capable of being qualified to COSPAR Planetary Protection Category IVa or better. The Interplanetary CubeSat is launched on a standard CubeSat rideshare to an orbit suitable for deploying the TF-SLRs, and acts as a communications relay until its end of life. Data is received on earth using adapted radio telescopes and CCSDS compliant ground stations, and forwarded to a central data warehouse for download by the PI. Individual elements of the concept have been demonstrated on earth and in orbit during 2013 and 2014. A full proof of concept mission 'Pocket Spacecraft: Mission to the Moon' has been traditionally and crowd funded and is being prepared for flight with the goal of achieving low lunar orbit in 2016.