To Apogee and Beyond: A Home-Grown Space Program

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The high power model rocketry field has become very paint-by-numbers. Enthusiasts are encouraged to buy a kit, put it together, buy a motor, launch it and recover it by parachute to earn a certification. Kit rockets are big, heavy and slow, and individuality consists mostly of cool paint jobs or re-creating historic rocket kits at different scales. Novel approaches to recovery, propulsion and airframe design are often frowned upon, discouraged or even prohibited. I applied enthusiast aerospace skills, research, CAD, 3d printing and hobbyist electronics like Arduino to design, build and launch high power rockets that are more powerful, capable and economical than kit products. I have been told not to “paint outside the lines”, to just buy and use kits and existing proven designs because they work without effort. However, using stock kits also forgoes any real learning or innovation. The rocket systems I engineered are built with typical model rocket raw materials, any inexpensive hobbyist 3d printer, and readily available enthusiast System-on-a-chip components and sensors. They fly faster, higher and have more capabilities than options costing much more. I developed additional technologies and systems adjunct to and beyond the core rocket, including a long-range radio telemetry system, a thrust test and measurement stand and a cold gas thruster for safe, non-flammable propulsive thrust-vectored vertical landing. My cold gas thruster, while not yet fully refined, still has about 3-4 times the total impulse of the commercially available engine it was tested against. All designs of mine that are able to be legally shared (i.e. non ITAR-restricted designs) are publicly and freely available (on my website) to anyone to encourage others to innovate and learn.

Awards Won:
Third Award of $1,000