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## Summary of Garvey Launch Activity

For the 3.3 project, CSA teamed with Garvey Spacecraft Corporation (GSC) and Stanford University to conduct launches of student-developed rockets with student payloads. Garvey was responsible for the development and launch of rockets. Stanford was responsible for the integration of student payloads for those launches.

GSC is a small aerospace R&D company focusing on the development of advanced space technologies and launch vehicle systems. GSC provides engineering, technical support, project management and hardware prototyping services to a number of private and DOD customers. Company-led projects focus on reusable launch vehicles (RLVs) and associated technology validation flight testing.

GSC was selected to support the project due to their extensive experience in working with California State University, Long Beach (CSULB) to develop and launch rockets with student-mentor participation. To support this project, GSC leveraged their cooperative program with CSULB, the California Launch Vehicle Education Initiative (CALVEIN). CALVEIN focuses on both hands-on hardware mentoring for future aerospace engineers as well as the low-cost development of candidate launch system technologies and services. Since getting started in early 2001, the CALVEIN work has resulted in eleven static fire tests and ten flight tests.

GSC, in association with CSULB, developed, integrated and launched three rockets (P7D, P8A and P12A) to fly student payloads.

- Provided secondary payload accommodations on the Prospector 7D flight test that enabled NRL and Cal Poly SLO to manifest their payloads
- Performed dedicated launch (P8A) which carried four payloads including a payload deployer system provided by Stanford, cRIO-based data acquisition by CSULB, wireless networking system by NASA Ames, and a commercial education payload provided by Epsori Space Systems
  - P8A was launched in Sep07, and effort involved approximately 40 students with 8 students fulfilling key roles in the lab or at the launch site, or both.





- Performed dedicated launch (P12A) which carried four payloads including an inertial measurement unit from University of Kentucky, RF telemetry experiment from Santa Clara University, data acquisition package from Saratoga High School, and on-board camera and RF experiments from CSULB
  - P12A was launched in Oct08, and the effort involved over 40 students with 8 students fulfilling key roles in the lab or at the launch site, or both.





GSC/CSULB rocket launches were an outstanding real-life engineering experience.



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These low cost launches, although they do not reach space, provide an almost full experience of being involved in a launch program.

Two dedicated flight opportunities allowed students to engage and participate in hands-on aerospace work. Students were able to apply their classroom learning to real-life situations including problem solving, innovating, streamlining, and systems engineering. Giving students a hands-on educational experience, like developing launch vehicles and providing responsive launches to fly payloads, improves student motivation and promotes innovation. Additionally, for the GSC work on this project, having students with direct involvement in launch vehicle development and integration enabled more cost-effective solutions in addition to providing that hands-on, real-world experience for the future workforce.

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