MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Advancements in Materials Applications and Rapid Prototyping (9)

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GDB - THE OPEN SOURCE SOLUTION TO SPACE APPLICATIONS

Abstract

Introduction: The GDB is a space tolerant, open source prototyping platform, optimized to decrease time spent moving from prototype to a MVP. "Our World Needs Space", in fact most people use it everyday without even thinking about it. The success of the GDB is dependent on Earth based RD being spun-off to create space products. We at Sol-X believe that this is the only viable market flow direction for commercial space products.

Purpose: We will highlight the technical innovations and testing that made the GDB possible, briefly explore the business model that makes it viable, and roll out the open source architecture of the GDB that promotes knowledge-sharing.

Methodology: Design innovations in thermal spreaders, black white solder mask, Via paste fill, solder chemistry, thermally conductive vibration proofing epoxy, and low level radiation shielding have already been completed to achieve future MIL-STD 883 rating. The GDB is currently at a DoD Technology Readiness Level (TRL) of 5. With in-process redesign work, scheduled (August 2014) thermal-vacuum, vibration, and total ionizing dose testing, and $10,000 in additional funding the GDB can achieve a TRL of 8 by December 2014. GDB's rapid prototyping capability appeals to large innovating technology firms with Skunk Works teams, small technology firms, and the 43.6 million secondary and post-secondary students with limited design time and budgets. Partnerships with universities to sell low-cost, academic versions for student design teams will lead to broad appeal initially, with long term profits coming from commercial applications and extreme environment electronics industry. To encourage the reuse of our designs, especially in open-source hardware projects, Sol-X releases design files under the Creative Commons Attribution 3.0 license. We release software for the GDB on the Propeller Object Exchange and GitHub under the MIT license.

Results: Implementation of a soft launch is currently underway, remaining on schedule to be the keynote hardware sponsor for the June 27, 2014 Evolution Expo in Oakland, CA.

Conclusions: The GDB's rich design capabilities will empower engineers, designers, teachers, students and small businesses to develop for any extreme environment (desert, radiation spill, ocean floor, burning building, high chair spill). The GDB also intends to replace the Arduino Uno as the preferred high-level prototyping environment. Compared to the Uno the GDB is up to 85x faster, 74% smaller, has integrated high power drivers (capable of handling 12x the current), and more flexible Input / Output configurations.