NASA SBIR 2011 Phase I Solicitation

X13.01 Smart Phone Driven Blood-Based Diagnostics

Lead Center: JSC

Participating Center(s): ARC

As user applications pervade the field of telemedicine, smart phones provide a robust, reconfigurable platform capable of communications, computations and various functions (i.e., imaging, video, power source, signal processing) that will continue to expand at an accelerated pace. By leveraging this technology, NASA seeks to exploit the smart phone for blood-based diagnostics to develop an analytical device that can determine basic metabolic (Chem8), blood gas (PaO_2, $PaCO_2$, SaO_2, HCO_3, pH), cardiac (troponin I, CK-MB, total cholesterol, HDL, LDL, VDL, triglyecerides and lipoproteins) and liver/renal (total bilirubin, direct bilirubin, ALP, ALT, AST) panels. These panels are representative of the operational and research requirements for space exploration related point of care diagnostics.

The diagnostic device must interface to a smart phone that will drive the device's electronics and/or optics; or use the built-in features of the phone to interrogate the diagnostic device. The described diagnostic component is to be no larger than the phone itself. The microfluidic device must also be reusable or extremely compact if disposable, and minimize reagent consumption. Other requirements to consider are analytical times in two minutes or less, strategies for operational capability up to 144 hours on battery power and a long shelf-life (> 36 months).

The Phase I effort will seek to demonstrate the feasibility of one diagnostic panel in the smart phone format. The Phase II effort will demonstrate at least two of the above stated panels in an analytical component that interfaces to a cell phone, and provides a path towards FDA approval or similar.

NASA Deliverable: Functional Diagnostic System