RNET Technologies (i.e., RNET), located in Dayton, Ohio, was founded in June 2003 as a "C" Corporation organized under the laws of the State of Delaware. The overall mission of RNET is to develop leading-edge software products that will meet the needs of the DOE, DOD, NASA, Prime Contractors and other Commercial Companies. To meet this mission, RNET is pursuing R&D and Product Development in HPC (high performance computing).

RNET received its first set of two Phase I SBIR contracts in 2004. As of November 2018, RNET has received 18 Phase II SBIR/STTR contracts of which three are on-going while the remaining have been completed. Five of the Phase II SBIR projects have been funded by the Air Force, three have been funded by NASA, one by DARPA, and the remaining nine have been funded by the DOE.

As of October 2018, RNET has received more than 40 Phase I projects from the Air Force, Navy, MDA, NASA, NSF, DARPA, SOCOM, and DOE.

In addition to the SBIR/STTR projects, RNET has also supported a non-SBIR BAA-type support contract (F8650-10-D-1750) named CIRE (Center for Innovative Radar Engineering), which focuses on "next generation" GHz and THz frequency radars. Moreover, RNET has received a Phase III contract ($100K) from Sandia National Laboratories, on WattProf HPC power monitoring product.

As a company, we have strong expertise to develop advanced software for High Performance Computing applications in several domains.

The first Phase II SBIR completed by RNET was funded by the Air Force (FA8650-05-C-4303). It developed an innovative "virtual objects based compression (VOBC)" video compression software package. We received Phase II Enhancement funding of a $100K that included $50K funding from DARPA to enhance the capabilities of the VOBC software and to investigate its use in UAVs. We were able to generate $29K revenue by conducting video processing work for a small company that was developing an innovating 3-D video technology. In addition, we also generated $337K from an Air Force funded video/image processing system for a mobile IED detection system that also used Android platform. This Android work led to generation of $4K from a research group at the Ohio State University.

The second Phase II SBIR we completed, which was also funded by the Air Force (FA8650-06-C-1019), developed 2 GHz/pixel sampling ROIC (read-out integrated circuit). Based on this expertise, we were able to work with a small company named Traycer, which was developing a ROIC/Sensor as part of a Tera-Hertz camera system. We designed and built off-chip ROIC hardware including a high-speed, low-noise signal amplifier and digitizer board, and this project generated $20K in revenues.

The third Phase II SBIR we completed was funded by the DOE (Grant DE-FG02-05-ER84163). In this project, we designed and built a 10 Giga-bit Ethernet SmartNIC. This NIC is based on the OCTEON-Plus 12 core processor from Cavium Networks. It also has 2 giga-bytes of on-board memory. The innovation is offloading and we needed to develop a range of network-level and application-level offload engines (and the required drivers and firmware) including encryption and SSL offload engines for Globus/GridFTP, and these were accomplished in the next two STTR/SBIR projects (Grants DE-FG02-08-ER86360 and DE-SC-0002182) that were completed. We have also invested about $60K in building about 25 SmartNICs. Our plan is to loan these SmartNICs to potential customers in the DOE, universities, and the Industry. We have also invested an additional $70K to develop a series of 10, 20 and 40 giga-bit SmartNICs based on the next-generation OCTEON-II processor which has 32 cores running at almost 1.5 GHz. All the

offload engines that we have developed for the OCTEON-Plus processor based 10 GigE SmartNIC will also be easily portable to the OCTEON-II based SmartNICs.

In another completed DOE Phase II SBIR project (DE-SC-0002434) we have optimized the PETSc (portable extensible toolkit for scientific computing) library for emerging architectures including multi-core processors and GPUs. As part of that project, the team investigated algorithms, data structures, and techniques to enable applications based on the PETSc library. PETSc is an open source product, and thus commercial sales of the optimized PETSc library are not feasible. RNET is pursuing non-SBIR contracts from the Air Force as part of commercialization.

RNET has also developed hardware and software tools as part of DOE STTR Grant DE-SC-0004510 for fine-grain monitoring of power consumption when applications run on compute nodes in a HPC cluster. The first release of this product is ready and several evaluation toolkits have been distributed to potential customers.

On an Air Force funded Phase II STTR (FA9550-12-C-0028)) we have made optimizations to the Kestrel, an Air Force CFD and CSD simulation code. These optimizations have been included in the production Kestrel release. In addition, RNET is pursuing additional opportunities for Phase III funding to develop additional optimizations.

We are still in the early commercial stages of sveral other Phase II projects. As part of a NASA Phase II (NNX14CG06C) we are developing FPGA optimization tools using empirical tuning. We are pursuing two commercialization routes. The first is licensing through a major FPGA vendor such as Xilinx, and the second is Phase III NASA funding to apply to tool to NASA FPGA designs. An improved GUI was recently developed for this project, and released in August of 2018. As part of a DOE Phase II project (DE-SC0011322) we have developed HD TomoGPR, a novel below ground imagining system for fine root analysis using tomography and Ground Penetrating Radar. This system will be sold to domain scientists and marketed to other market segments (e.g., concrete and bridge health analysis). We recently completed an initial experiment in cooperation with DuPont/Pioneer and are pursuing a non-SBIR project to adapt the product for runway analysis. The initial prototype is being delivered to PNNL. As part of another DOE Phase II project (DE-SC0011312) we have developed optimizations to BigData platforms. Joint sales opportunities are being explored with major Big Data players including Lexis Nexis and Hortonworks. We have been award the Yarn Ready certification for a Map Reduce like API. These tools will be released on RNET's website. Finally, we are just beginning a Phase II project developing an automated linear solver selector to improve the runtime, accuracy, stability, and power of scientific simulations. This tool will be integrated into government applications and commercialize as a tool to be integrated into third-party commercial applications at companies such as ANSYS. Finally, we have recently commenced a DOE Phase II to develop CloudBench:NE, a web based simulation, provenance, and sharing workbench for nuclear engineering using NEAMS tools.

Small Business Name: **RNET Technologies, Inc.**

					Sales and Revenue					Investment					
Grant/ Contract Number	Year of Award	Project Title	Status	Award Amount	SP	SF	SO	LR	Total Award Sales	IS	IF	AI	VC	OI	Total Award Investment
FA8650-05-C-4303	2005	Data Compression	Completed	$ 750,000	$ 33,155	$ 437,700	$ -	$ -	**$ 470,855**	$ -	$ -	$ -	$ -	$ -	**$ -**
FA8650-06-C-1019	2006	Parallel Array Sample Hold Read Out Integrated Circuit	Completed	$ 750,000	$ 19,656	$ -	$ -	$ -	**$ 19,656**						
DE-FG02-05-ER84163	2006	Interoperability between Ultra High Speed Networks and Traditional IP Networks	Completed	$ 750,000	$ -	$ -	$ -	$ -	**$ -**						
DE-FG02-08-ER86360	2009	Creating Scalable Petascale File Systems Using Application-Aware Network Offloading	Completed	$ 750,000	$ -	$ -	$ -	$ -	**$ -**						
DE-SC-0002434	2010	Accelerating Parallel Numerical Libraries to Petascale and Beyond	Completed	$ 1,000,000	$ -	$ -	$ -	$ -	**$ -**						
DE-SC-0002182	2010	Enhancement of GridFTP Performance through Network Reservation Integration & hardware Offloading	Completed	$ 1,000,000	$ -	$ -	$ -	$ -	**$ -**						
NNX-10-C-B47C	2010	Radiation Mitigation Methods for Reprogrammable FPGA	Completed	$ 600,000	$ -	$ -	$ -	$ -	**$ -**						
DE-SC0004510	2011	HPC Application Energy Profiling for Energy Optimization	Completed	$ 750,000	$ -	$ 100,075	$ -	$ -	**$ 100,075**						
FA8650-11-C-1160	2011	Advanced ROIC Technology for SLS Photodetectors	Completed	$ 742,474	$ -	$ -	$ -	$ -	**$ -**						
FA8650-12-C-5118	2012	Fault Tolerant ROIC	Completed	$ 749,999	$ -	$ -	$ -	$ -	**$ -**						
NNX-12-C-A84C	2012	Rad-Hard and ULP FPGA with "Full" Functionality	Completed	$ 749,999	$ -	$ -	$ -	$ -	**$ -**						
FA9550-13-C-0017	2013	Scalable Multi-Tiered CFD and CSD Codes for Kestrel	Completed	$ 750,000	$ -	$ -	$ -	$ -	**$ -**						
NNX-14-C-G60C	2014	OrFPGA: An Empirical Performance Tuning Tool for FPGA Designs	Completed	$ 749,999	$ -	$ -	$ -	$ -	**$ -**						
SC 0011322	2015	Ground Penetrating Radar (GPR) System and Algorithms for Fine Root Analysis	Completed	$ 1,499,999	$ -	$ -	$ -	$ -	**$ -**						
SC 0011312	2015	iNFORMER: A MapReduce-like Data-Intensive Processing Framework for Native Data Storage and Formats	Completed	$ 1,000,000	$ -	$ -	$ -	$ -	**$ -**						
D16PC00183	2016	Performance Portable Framework for Developing Graph Applications	Ongoing	$ 1,000,000	$ -	$ -	$ -	$ -	**$ -**						
SC 0013869	2016	Automated Solver Selection for Nuclear Engineering Simulat	Ongoing	$ 1,000,000	$ -	$ -	$ -	$ -	**$ -**						
SC 0015748	2017	Cloud-based Scientific Workbench for Nuclear Reactor Simu	Ongoing	$ 1,000,000	$ -	$ -	$ -	$ -	**$ -**						