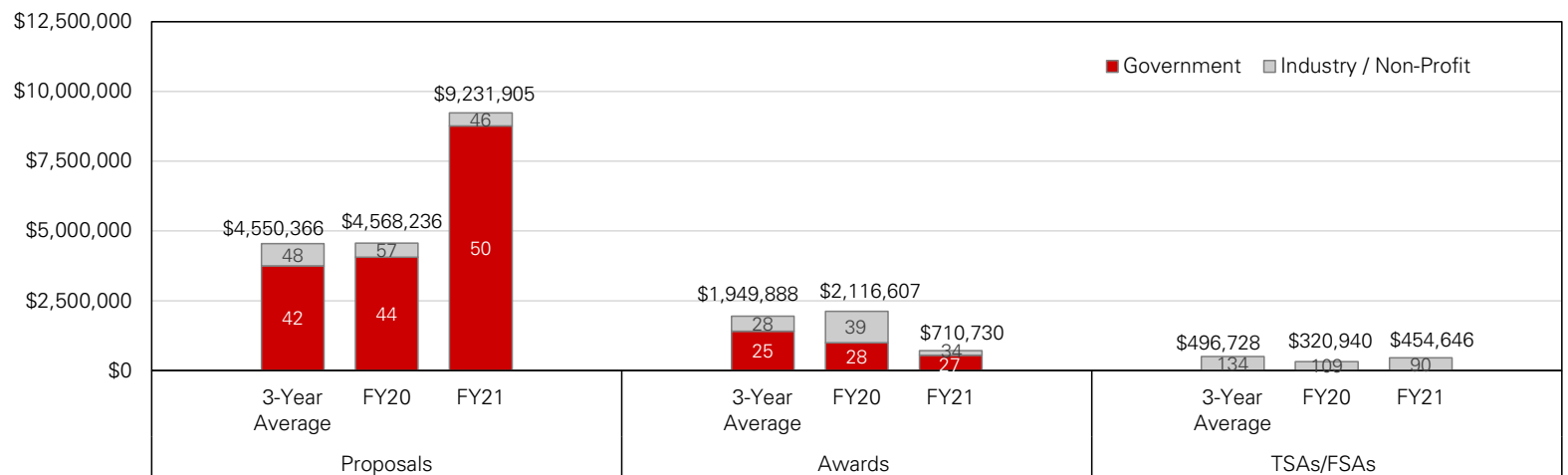


The research programs in the Wilson College of Textiles at NC State University are innovative, life-saving, creative, global and thriving. The college also provides tech service to all stakeholders and supports the economic development of the State and beyond. This newsletter gives a brief overview on the research and tech service activities of the faculty, staff and students during the first quarter of Fiscal Year 2021.

FY21 vs. FY20 vs. Three-Year Average (Q1)



NUMBERS TO DATE (FY21 Q1)

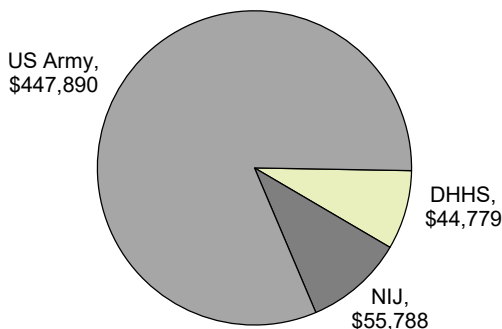
Research Awards Received (\$710,730)

- Federal: \$548,457 | DHHS, NIJ, US Army
- Industry/Non-Profit: \$162,273 | Elevate Textiles, Inc., EPRO Advance Technology, Kaneka America's Holding Inc., NWI, R. J. Reynolds Tobacco Co.

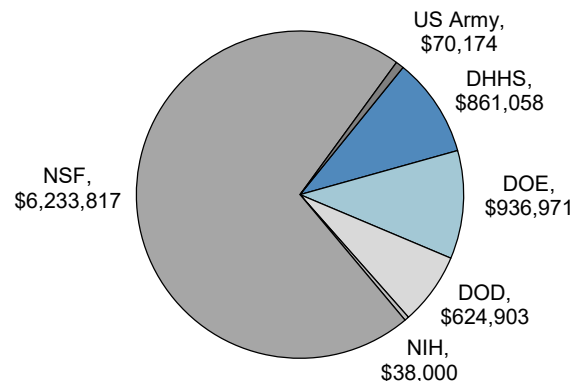
Research Proposals Submitted (\$9,231,905)

- Federal: \$8,764,923 | DHHS, DOE, DOD, NIH, NSF, US Army
- Industry/Non-Profit: \$466,982 | Cotton, Inc., Elevate Textiles, Inc., EPRO Advance Technology, Kaneka America's Holding Inc., Lion Group, Inc., Sony, Templeton World Charity Foundation, Wake Forest University, UGPN

FY21 Q1 Federal Awards by Agency



FY21 Q1 Federal Proposals by Agency



NUMBERS TO DATE (FY21 Q1) Cont.

Inter-college Research Proposals (4)

- Wilson College share: \$4,442,964
- With COE, COS, PCOM

Inter-college Research Awards (4)

- Wilson College share: \$287,292
- With CALS, CNR, COE

Inter-department/unit Research Proposals (2) \$178,718

Graduate Student Support

- 72 Ph.D. Student RAs (Avg Stipend: \$17,490 / year)
- 21 M.S. Student RAs (Avg Stipend: \$12,867 / year)

RESEARCH AWARDS ABOVE \$50,000 (FY21 Q1)

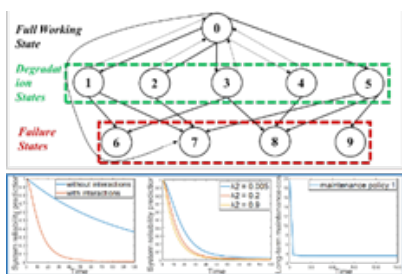
1. Andre West, Marian McCord, Richard Roe, Charles Apperson, Emiel DenHartog, US Army, \$275,292.
2. Jesse Jur, University of North Carolina System Office (US Army - Army Research Office), \$172,598.
3. Nelson Vinueza Benitez, Washington State University (National Institute of Justice), \$55,788.
4. Wei Gao, Eunkyong Shim, The Nonwovens Institute, \$50,000.
5. Eunkyong Shim, The Nonwovens Institute, \$50,000.

RESEARCH HIGHLIGHTS

WholeGarment® Knitting of Military Clothing with Bite Protection against Mosquitoes. The objective of this research for the U. S. Army's Deployed War Fighters Protection Division (DWFP) is to develop an Army Combat Uniform (ACU) using seamless WholeGarment® technology that is bite-resistant from vector insects and create a predictive model to select structural design parameters for the production of comfortable, durable and bite-resistant knit fabrics. Professors Andre West (Textiles), Emiel DenHartog (Textiles) Michael Roe (Entomology), Charles Apperson (Entomology) and Dr. Kun Luan (Textiles) are working together to develop these new garments to offer an economical, sustainable and accessible approach to mechanically prevent proboscis penetration without the use of harmful chemical pesticides thus reducing disease exposure for deployed military.



Black knitted fabric being tested with "Arm in Cage" and 50 female mosquitoes.



State transition diagram of software and hardware interactions

Empirical study of factor identification in smart health-monitoring wearable device was conducted by Prof. Mengmeng Zhu and her team to comprehensively identify 123 factors from various perspectives, and further determine the important features that interest customers based on statistical inference and machine learning. Many system failures occurred from interactions of software and hardware (I-SH); however, I-SH are often neglected in modeling system reliability due to mathematical complexity. Prof. Zhu and her team developed a new mathematical framework of modeling complex system reliability (CSR) considering I-SH, and two imperfect maintenance policies for complex system. A new diagram of categorizing I-SH states was proposed. Based on Markov process, a new mathematical framework of modeling CSR incorporating newly proposed diagram was developed. Moreover, the steps of finding the optimal cost were theoretically illustrated for the two long-term imperfect maintenance policies.