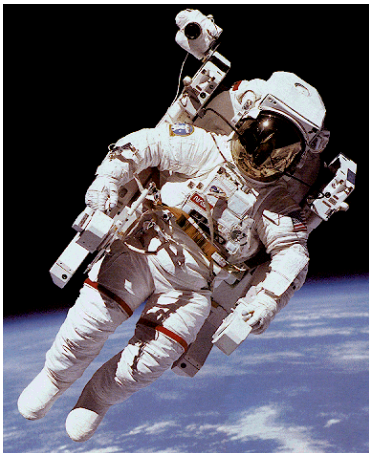
IMPROVING PROTECTIVE EQUIPMENT FOR HAZARDOUS OCCUPATIONS

Firefighters, police officers, military personnel, healthcare professionals, pesticide handlers, and many others perform their jobs in hazardous environments. Though these workers wear protective gear, it is often poorly ventilated, bulky, and difficult to get on and off, impeding performance and causing injuries. Improving protective gear is key to keeping workers, and the citizens who depend on them, safe.

Scientists at land-grant universities across the U.S. are working together to improve protective gear. Through collaboration, researchers are able to draw on each other's expertise, make the most of limited resources like cutting-edge tools, gather and compare data from more populations, and make significant advances. Over the last five years, group members developed reliable ways to use body scan and motion capture technology to evaluate gear issues for firefighters, mountain rescue workers, and pesticide handlers. Colorado State University used these tools to identify apparel and footwear needs for physically disabled and overweight people. Other researchers developed state-of-the-art textiles and sensors for innovative protective gear. The group's work has led to new international standards and size and fit guidelines for enhanced safety, comfort, and performance.



University of Minnesota evaluated ways to transport and contain body moisture in microgravity. This will help researchers design materials that reduce exposure to sweat in spacesuit gloves.

Cornell University is working on sensors to detect toxic and flammable gases. These sensors could be used in protective clothing in mines and buildings where gases may be present.

Buffalo State College and others are creating guidelines that ensure firefighter gear offers maximum protection and fits well even for women and shorter firefighters.

University of Hawaii-Manoa and Buffalo State College are developing a hood to better protect firefighters' necks.

University of Minnesota designed a glove that vibrates when a gap or space is detected, helping firefighters navigate buildings when visibility is low.

With a contract from the U.S. Army Natick Soldier Center, University of California developed nanofiber-coated fabrics for the outer layer of military uniforms. These fabrics block hazardous particles, like chemical warfare agents, but are still breathable and lightweight.

Sensors that detect perspiration and camouflage body heat could eliminate the need for extra insulation or surface coatings in infrared camouflage.

Colorado State University is collecting data on the fit and performance of protective garments for medical workers.

Cornell University designed easy-to-use, easy-to-make garments for Ebola workers. The hood with facemask and visor prevents fogging and allows easy eye contact and visible expressions when interacting with patients.

University of Minnesota is designing a hospital gown that makes patients more comfortable. University of Hawaii-Manoa is making a gown for stroke patients that is easy to get on and off.

Oklahoma State University developed wireless sensors that can be used in garments to track cardiorespiratory dynamics and make health prognoses. University of Minnesota developed a textile-based sensor that detects spinal curvature, helping doctors and patients treat back issues.

University of California created self-decontaminating wipes that could help prevent the spread of infectious diseases.

University of California developed highly sensitive sensors for two popular fumigants. These low-cost sensors are easy to use and could improve the health and safety of farm workers or residents living close to fields.

Cornell University created a flexible membrane that absorbs chemicals and could be incorporated in protective clothing for agricultural workers.

University of California is studying fabrics that reduce heat stress, which is common among California farm workers.

University of Maryland Eastern Shore, Cornell University, and Washington State University survey findings led to labeling recommendations and a website to help pesticide applicators use gloves properly.

University of Maryland Eastern Shore has led the development of international test and performance standards for protective clothing and gloves used by pesticide handlers.

University of Minnesota is improving sensors that can be integrated comfortably into everyday clothing and sense body postures and movements.

Kansas State University developed bacteria-resistant and highly repellent, self-cleaning fabrics, which could reduce the laundering needs of protective gear and conserve water.

Oklahoma State University designed duty belts that will improve posture and comfort when officers are seated for long periods of time in patrol cars.

This multistate research project (Personal Protective Technologies for Current and Emerging Occupational and Environmental Hazards, 2012-2017) is supported by the Multistate Research Fund through USDA-NIFA and by grants to project members from the following institutions: Baylor College, Buffalo State College, University of California-Davis, Colorado State University, Cornell University, University of Hawaii, Iowa State University, Kansas State University, University of Maryland Eastern Shore, University of Minnesota, University of Missouri, Oklahoma State University, University of Oregon, and Washington State University. This project has been renewed through 2022. Learn more: bit.ly/NC-170

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