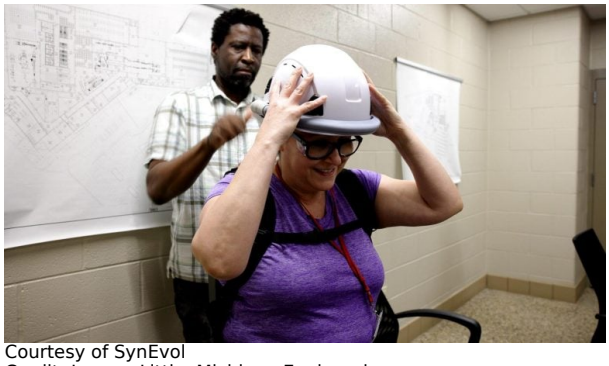
99.8 % of Aerosol Viruses are Blocked by a Wearable Air Curtain

Posted by Okachinepa 07/09/2024



Courtesy of SynEvol
Credit: Jeremy Little, Michigan Engineering

Using nonthermal plasma to assure air purity, Taza Aya has designed a hard helmet with an air curtain that blocks almost all pollutants from reaching the face. This novel gadget, which has demonstrated efficacy in testing, is intended for businesses requiring robust respiratory protection and is scheduled for release in 2025.

99.8% of aerosols can be kept from getting to a worker's face by creating an air curtain that shoots down from the hard hat's brim. The device, developed by University of Michigan startup Taza Aya, may provide a fresh approach to worker protection for those employed in sectors where the spread of respiratory diseases is a risk.

The efficiency of the air curtain emanating from nozzles at the brim of the hat and curving to envelop the face was demonstrated by independent, third-party testing of Taza Aya's invention. However, the air curtain itself needs to be cleared of pathogens in order to properly guard against them in the space. Herek Clack, a U-M associate professor of civil and environmental engineering and co-founder of Taza Aya, has conducted prior research that demonstrates how their approach can eradicate and destroy 99 percent of airborne viruses in lab and agricultural environments.

"Our air curtain technology uses treated air as a barrier in which any pathogens present have been inactivated so that they are no longer able to infect you if you breathe them in," Clack explained. "It is precisely designed to protect wearers against airborne infectious pathogens." "Our level of protection against airborne germs is virtually unprecedented, especially when combined with the enhanced ergonomics it also offers."

Fire is what's known as a thermal plasma, and although we might not think of it that way, it has been utilized for sterilizing throughout history. Highly energizing, electrically charged molecules and molecular fragments that have a comparable effect without the use of heat make up nonthermal, or cold, plasmas. Before the ions and molecules reach the curtain nozzles, they immediately stabilize and turn into regular air.

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Credit: Jeremy Little, Michigan Engineering

In Taza Aya's prototype, the nonthermal plasma module, air handler, electronics, and battery pack are all housed in a backpack that weighs around ten pounds. Air is drawn into the module by the handler and treated there before it reaches the nozzle array of the air curtain.

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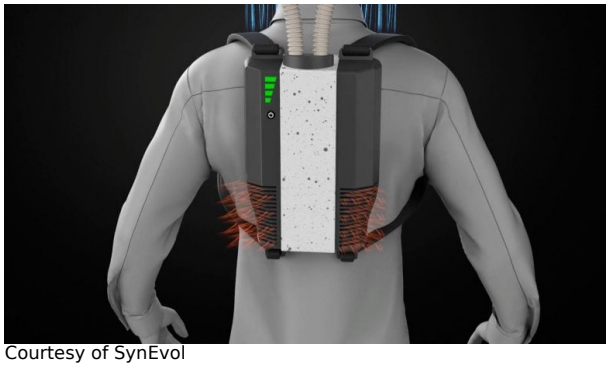
Following the COVID-19 pandemic, Taza Aya's progress coincides with a summer in which the U.S. Centers for Disease Control and Prevention (CDC)

has recorded four human cases of bird flu testing positive. Due to labor shortages during the pandemic, agriculture experienced difficulties in the production of meat, which directly affected prices, the availability of certain products, and the length of the supply chain.

Taza Aya has been doing user experience testing with employees at Michigan Turkey Producers, a Wyoming, Michigan-based processing facility that handles birds humanely, in recent months. Hundreds of workers live at the plant, and many of them interact directly with turkeys while at work.



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The primary method of labor protection in such large-scale agricultural activities up to this point has been paper masks. However, masks further hinder workers' capacity to communicate on a noisy manufacturing line where many speak English as a second language by masking voices and concealing facial cues.

Vice president of technical services at Michigan Turkey Tina Conklin stated, "During COVID, it was a problem for many plants—the masks were needed, but they prevented good communication with our associates."

Furthermore, a tight seal over the mouth and nose is necessary for successful filtration, and this seal might alter minute by minute throughout the course of a workday. Additionally, masks have to be taken off when workers eat since they can obscure safety eyewear. All of those issues are avoided by Taza Aya's technology.

During his years as a U-M researcher, Clack investigated the application of nonthermal plasma for cattle protection. He swiftly shifted his focus to how the technology might be utilized for personal protection against airborne infections after COVID-19 emerged in early 2020.

Taza Aya won the Invisible Shield QuickFire Challenge, which was organized by Johnson & Johnson Innovation in collaboration with the US Department of Health and Human Services, in October of that same year. With as little disruption to normal life as possible, the program aimed to promote the development of technology that could shield humans from airborne viruses.

The CEO of Taza Aya, Alberto Elli, stated, "We are pleased with the study results as we embark on this journey." "This practical experience with product development and user testing will enable us to launch the Worker Wearable with success in 2025."
