NOT YOUR TYPICAL HACKER
Sixth Russ Prize recipient cracks the code of the human genome

Leroy Hood is a man after one very big thing: paradigm changes. He got there by spending a lot of time on very small things: DNA.

Hood, a bioengineering pioneer, was awarded the sixth Fritz J. and Dolores H. Russ Prize in February by the National Academy of Engineering for developing the automated DNA sequencer. His invention made possible the sequencing of the human genome in just more than a decade instead of a century.

“The human genome project transformed biology as perhaps no other science project has ever done,” Hood says.

The Russ Prize, created by Ohio University with a gift from alumnus Fritz Russ and his wife, Dolores, recognizes a bioengineering achievement in widespread use that significantly improves the human condition. It is the top bioengineering prize in the world.

“One of the University’s greatest sources of pride is the Russ Prize—a vision Fritz and Dolores had decades ago,” notes Ohio University President Roderick J. McDavis.

An inventor, scholar, and visionary, Hood—who calls himself a cross-disciplinary scientist—has been a pioneer in bringing engineering to biology through his invention and commercialization of many of the key analytic instruments in use today. His successful application of these instruments has addressed fundamental problems in modern biology and medicine.

To date, more than 1,000 genomes have been revealed using the automated DNA sequencer, transforming many areas of biology. The advancement also led to expressed sequence tagging, which ultimately helped to predict gene function, and the ability to identify genes involved in diseases. Hood’s work also has led to a change in how pharmaceutical companies make drugs.

Dennis Irwin, dean of the Russ College of Engineering and Technology at Ohio University, notes that the invention of the automated DNA sequencer is unique in the history of the Russ Prize because of its application to forensic science.

“The sequencer has enabled the development of important drugs that are crucial to the realization of personalized medicine and therefore have saved lives. It’s also true that many people wrongly accused of crimes have been exonerated and been given back their lives,” he says.

President and co-founder of the nonprofit Institute for Systems Biology in Seattle, Washington, Hood and his colleagues today are using advances in genomics, proteomics, and molecular diagnostics to pioneer advances in diagnostics, therapeutics, and prevention—in order to focus increasingly on promoting wellness rather than merely treating disease.

He predicts another sea change—in healthcare as we know it—with the advent of what he terms “P4” medicine (predictive, preventive, personalized, and participatory), made possible by his work.

“This revolutionary new medicine will have important societal implications by sharply turning around the ever-escalating costs of healthcare—and will have important medical implications because the twin visions of P4 medicine are wellness quantified and disease demystified,” Hood explains.

Previous Russ Prize recipients are Elmer Gaden (2009), engineering and commercialization of biological systems for large-scale manufacturing of antibiotics and other drugs; Yuan-Cheng “Bert” Fung (2007), the father of biomechanical engineering; Leland C. Clark Jr. (2005), inventor of biosensors; Willem J. Kolff (2003), the father of artificial organs; and Earl E. Bakken and Wilson Greatbatch (2001), inventors of the heart pacemaker.