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ScienceDirect

Journal of the Franklin Institute 351 (2014) 110–116

Journal of The Franklin Institute

www.elsevier.com/locate/jfranklin

The 2011 Benjamin Franklin medal in engineering presented to Dean Kamen

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Received 6 June 2012; received in revised form 6 June 2012; accepted 6 June 2012
Available online 15 January 2013

Abstract

Dean Kamen was chosen for a Benjamin Franklin Medal for his resourcefulness and imagination in creating inventions that are assisting disabled and handicapped people to improve their quality of life and health.

Introduction

Dean Kamen barely finished high school and did not finish college, yet he is being called the 21st Century Thomas Edison. He was born in 1951 in Rockville Center Long Island, New York. From a very young age he was known as a "tinkerer". At 5 years of age he claims to have invented a way to make his bed without running from one side to the other. His experience in high school was mediocre but he did graduate.

By the time he was a teenager he was being paid for his inventions, most of which he perfected in his parents' basement. Before he graduated high school he was earning about $60,000 a year, which was more than his parents' combined incomes.

After high school he matriculated at Worcester Polytechnic Institute. While at WPI he was more interested in inventing than in studying. During his time at WPI his older brother, Barton, a medical student, commented that patients who needed round-the-clock medications, but did not need hospitalization, were forced to come to a hospital to receive the dosing they needed. Dean Kamen became intrigued with this problem and invented the

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0016-0032/$32.00 © 2013 Published by Elsevier Ltd. on behalf of The Franklin Institute
http://dx.doi.org/10.1016/j.jfranklin.2012.06.014

AutoSyringe, a portable device that could be worn by patients and have timed doses injected as necessary. This device freed the patients from visiting the hospital and allowed them significant mobility. He left WPI in 1976 to found his own company called "AutoSyringe" to sell his medication device. He sold AutoSyringe in 1982 to Baxter International, an international health-care company and quickly became a millionaire.

Dean Kamen has enjoyed significant press coverage for his invention of the Segway, a personal transporter that runs on two wheels and moves in response to movement of the rider, lean forward and go forward, lean to the right and then go right, etc. Although heavily publicized the Segway has not become a marketing success for several reasons. Number one was that many cities in the world do not permit powered wheeled vehicles on city sidewalks and the crowning blow was when Disney banned the Segway from its theme parks.

Although Kamen had strong hopes that the Segway would reduce the number of automobiles on city streets his major impact has been in medical advances. As we have seen his first invention, the AutoSyringe made him a millionaire. After selling AutoSyringe he moved to Manchester, New Hampshire where he built himself a personal mansion, with all sorts of interesting features. His home is powered by a wind turbine, contains a fully equipped machine shop and foundry in the basement and a 25 t steam engine once owned by Henry Ford, which he personally restored.

When he moved to New Hampshire he organized his own company, DEKA (the first two letters of his names, combined). He created the company to be a "think tank" and fabricator of new inventions. The DEKA research facility is a vast network of brick buildings that are located on the banks of the Merrimack River. It is staffed by over 200 researchers, engineers and machinists who focus on developing products for other companies and also advancing Kamen's own products. Since then he and his company produced, among many other products, in 1993, a portable kidney dialysis machine the size of a phone book. This invention freed patients from having to visit the hospital or a dialysis facility to be treated.

In 1999, before the introduction of the Segway, he unveiled the Independence iBOT 3000 Mobility System, a stair climbing wheelchair. The iBOT is a motorized wheelchair that can move over any terrain. It can also climb curbs and stairs and stand upon two wheels so that the user can talk to a standing person, at eye level. The iBOT was approved for sale by the FDA in 2003 and soon went into production. At that time they were available at a cost of $29,000. People who bought the iBOT were required to go through a special training program on how to use the system.

As the iBOT got going Kamen turned his attention to the universal problem of contaminated water. According to the United Nations (at that time) six thousand people die each day from drinking water that is not clean or safe. His biggest challenge in developing this machine was to find a way to produce the energy needed to distill water to purify it. He decided to see if a Stirling engine would do the trick.

A sterling engine is a non-polluting device that plays heat against cold to create energy. It is a closed box with two chambers, one filled with gas. The gas filled chamber is heated externally which causes the gas to expand creating a pressure that drives a piston from the hot chamber into the cool chamber. The external heat can be from burning anything combustible, wood chips, grass, charcoal or animal dung. Two benefits come from this device. The heat is used to distill water and the moving piston is used to generate 300 W of