# The Transition of Robot Technologies from University Research to the Commercial Realm

Matthew Williamson
Director of Technology Development
Heartland Robotics

Many good ideas are generated in the academic world, and are increasingly protected with patents. However, the transition of these technologies to the commercial realm follows many varied paths, with a fairly low chance of success.

This presentation will argue that the primary reason for this is structural, due to differing rewards and incentives in the academic and commercial worlds. Academics do research and need to publish frequently. They are rewarded based on the elegance and novelty of ideas, where those ideas do not have to be practical. If they have an implementation, the level of sophistication required is a demo for a conference paper. On the other hand, in the commercial world the idea needs to be practical, in the sense that there is a market for it, and the level of sophistication is much higher: the technology needs to work, work well and do so as inexpensively as possible.

This difference in reward structure makes sense – the academic world would not function if every paper had to fulfill the requirements of a product - but it means that many of the riskier aspects of taking a technology to market are not addressed. For example, the size of the market, and how to reach it, the right team to develop it, the funding to develop it, and a host of technical issues, how well the technology works, how reliable it is and how cheaply it can be produced.

The talk uses a number of case studies drawn from the presenter's personal experience in academia and industry, in the fields of robotic actuators and computer security, to examine these structural issues.

The example of the Series Elastic Actuator (a robotic actuator that was invented by the presenter in the 1990s and has recently been commercialized by three independent companies) is used to motivate the technical challenges of turning an idea into a prototype, and that prototype into a product. The talk will describe in detail the actuator properties, and chart its history from idea to commercialization.

The presentation will also cover the business challenges, legal and intellectual property issues and the influence of luck. The conclusion includes suggestions for ways for industry and academia to work together to increase the chances of successful technology transfer.