

# Introduction

Have you ever seen videos of early generations of humanoid, walking robots? Designed by expert engineers, with thousands of dollars worth of tech and an equal investment of time in designing and troubleshooting, these robots nevertheless found the simple task of walking a sometimes insurmountable challenge.

<https://www.youtube.com/embed/g0TaYhjpOfo>

A video compilation of robots falling down at the DARPA robotics challenge from [a 2015 article by Erico Guizzo and Evan Ackerman](#).

The field of humanoid robotics has made enormous progress in the time since these videos were recorded. But these early generation robots demonstrate the extreme difficulty of mimicking the seemingly simple achievements of animal motor systems, including those of humans. A key requirement for a motor system to function properly is that all the "motors" (muscles, in the case of our body) work together in coordinated way. In this activity, you'll simulate different muscles of the knee joint contracting together in different patterns of coordination to find out how this coordination produces smooth, controlled motions and can even help protect joints from injury.

