

# Photo-Actuation: Determining the Effect of Blue Light on the Actuation of Micro-Beads by *Serratia marcescens*

Erica Sadler

Biomedical Engineering

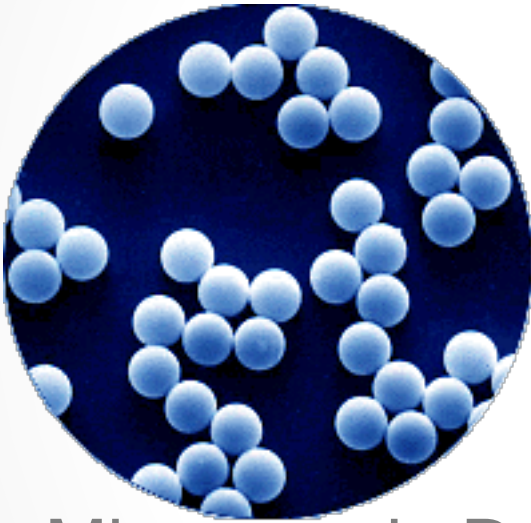
Cornell University

Advisor: Dr. Vijay Kumar, PhD

SUNFEST

# What is a MicroBioRobot?

- A MicroBioRobot can be thought of as two pieces:



1: a Microscopic Device  
(fluorescent polystyrene  
micro-beads, 3 $\mu$ m diameter)

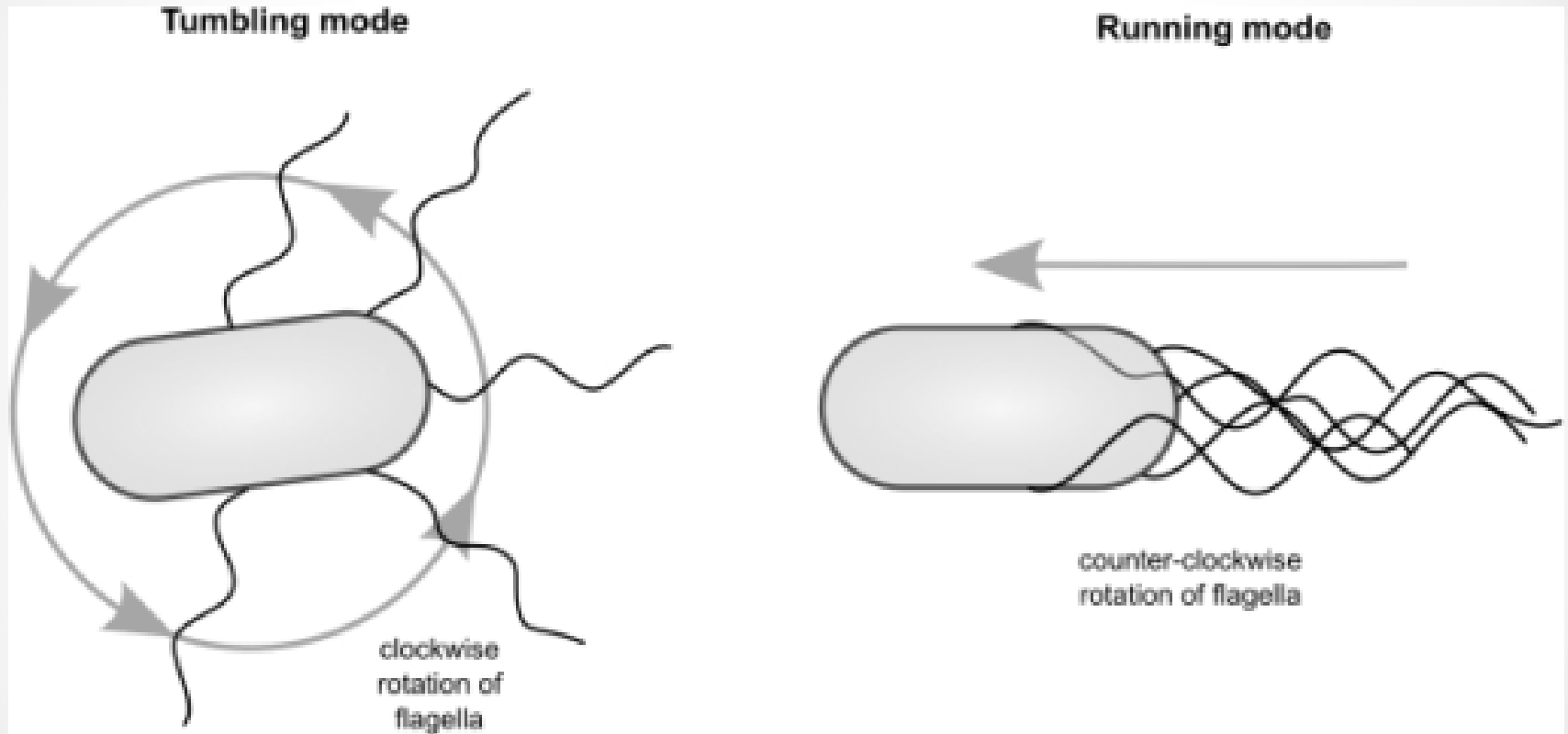


2: Flagellated Bacteria  
(in our case, *Serratia  
marcescens*)

<http://www.polymicrospheres.com/>

<http://www.gettyimages.com/detail/photo/color-enhanced-tem-of-negatively-stained-high-res-stock-photography/128628776>

# How Do Flagellated Bacteria Move?



[http://openi.nlm.nih.gov/detailedresult.php?img=3000427\\_pcbi.1001004.g001&req=4](http://openi.nlm.nih.gov/detailedresult.php?img=3000427_pcbi.1001004.g001&req=4)

# Why Create a MicroBioRobot?

- The small scale
- No external power source
- *Serratia marcescens* are fairly harmless bacteria

# Blue Light Results

- Blue light causes *Serratia marcescens* to tumble more frequently
- As a result, the MicroBioRobots moved significantly less when illuminated by blue light