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# Supplementary Material Information - A

## pili-driven bacterial turbine

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- 2 **Figure S1** Turbine angle  $\alpha$  as a function of time  $t > 50000$  s after the simulations started for three cases:  
3 Small Pili-turbine detachment rate  $\tau_{\text{det}}^{(\text{turb})} = 2$  s, larger  $\tau_{\text{det}}^{(\text{turb})} = 50$  s and no attachment of pili to the  
4 turbine. The turbine seems to be constantly rotating and does not exhibit extended periods without motion.
- 5 **Figure S2** Number of cells that are attached to the turbine via its pili, number of pili attached to the turbine  
6 and number of pili per cell attached to the turbine as a function of time for two different cases: pili-turbine  
7 detachment rate  $\tau_{\text{det}}^{(\text{turb})} = 2$  s and  $\tau_{\text{det}}^{(\text{turb})} = 50$  s. We find that for  $\tau_{\text{det}}^{(\text{turb})} = 50$  s the highest number of pili  
8 and cell are bound to the turbine. Additionally, we observe an initial phase where the number of attached  
9 cells and pili increases before reaching a plateau. This corresponds to the phase where randomly distributed  
10 cells move into the vicinity of the turbine and binding to it randomly.
- 11 **Movie S1** Movie of turbine in a bath of twitching bacteria with pili-turbine detachment time  $\tau_{\text{ret}}^{(\text{turb})} = 50$  s.  
12 **Movie S2** Movie of turbine in a bath of twitching bacteria with pili-turbine detachment time  $\tau_{\text{ret}}^{(\text{turb})} = 2$  s.  
13 **Movie S3** Movie of turbine in a bath of twitching bacteria that do not bind to the turbine with their pili.  
14 **Movie S4** Movie of turbines with binding properties specified in Fig. 5.