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Arboreal solutions: diodes, pumps, and diggers inspired by trees¹

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Many natural systems have evolved to perform certain tasks – climbing, sensing, swimming – as perfectly as possible within the limits set by the laws of physics. This observation can be used both to guide engineering design, and to gain insights into the form and function of biological systems. In this talk we will consider both of these themes in the context of trees. Beginning with the roots, we examine the role of flexibility in moving through granular substrates. Next we discuss fluid transport in tall plants and finally we apply our findings to the design of engineered solid state pumps and diodes.

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