

Slug Bug Science Unit Outlines

The Middle School Slug Bug Science unit is a standards based, multidisciplinary unit in which students learn about neuroscience, mechanical engineering, neuromorphic engineering, robotics, biology and electronics as they design and construct a real walking robot. The seven/eight middle school lessons are presented at the introductory level and can be modified to fit the teaching style of the individual teacher or the curriculum of the school. Complete with lab sheets and supplementary teacher lecture information, this science unit is flexible and easy to implement. Teachers can expand or combine lessons to meet their students' needs and the time available.

The Middle School, grades 6-8, unit consists of seven or eight basic lessons organized into the areas of Mechanics (M), Biology (B), and Electronics (E). The lessons offered are:

Introduction to Neuromorphic Engineering
E-1 Basic components of Electronics
B-1a Introduction to neurons and how they function and/or
B-1b Build a neuron with electronic components
M-1 Build a Slug Bug
M-2 Build a Slug Bug (continued)
B-2 Tritonia Sea Slug Swim model
M, B, and E final lesson, "It walks" putting a brain on the Slug Bug

The High School level Slug Bug/build a brain lessons teach about neuroscience in a hands on way, while focusing on the analogies between a robot and a biological brain. Students delve deeper into the world of neuromorphic engineering when they actually build a robot brain using electronic components. Once they fully understand the workings of their robot brain it is mounted on the Slug Bug body and used to create walking locomotion.

High School, grades 9-12, unit consists of seven or eight lessons that build on each other.

Introduction to Neuromorphic Engineering and Build a Slug Bug body
Build a Slug Bug body (continued)
Build a neuron, analogies between electric and biological parts
Build a synapse, analogies between sending messages, chemical and electric methods of delivery.
Connect two or more neurons, demonstrate lateral inhibition
Connect neuron to muscle (motor)
"It walks" final lesson, put the brain on the Slug Bug to create locomotion.