

**Talcott Mountain Science Center**

**Topic** Bioengineering

**Home School Science**

**Instructor** Pellino

**Home Links**

**Date** 11 October 2024

**Here's some information about the activities your student did with us. Links at the bottom will help you explore further. Enjoy!**

### **What did we do (content, skills, data collection)?**

From Limbs to Actuators

- designing and building powered appendages
- measuring speed and force

Digital Measurements

- Vernier Logger - force (hand grip)
- Vernier Logger - motion sensor for distance, speed, acceleration
- GPS speed measurements

Identified and explored parameters for limbs and athletic engineering - strength, fitness (cardio) and flexibility.

### **How did we do it (materials & methods)?**

From Limbs to Actuators

- we built second level appendages with LEGO Technic - powered by Mindstorms motor/generator pairs
- applied limit switches to control degrees of freedom and range of motion

Digital Measurements

- Used Vernier LabQuest data collectors with the strain gauge / grip meter to test muscle fatigue and relative strength of muscle sets.
- Used Vernier LabQuest data collectors with the Motion2 detector to measure position, movement, velocity, acceleration and correlate the last two.
- Walk / run with handheld "raw" gps units to gauge speed, average speed, moving averages, moving and stopped times.

### **Where can we find out more?**

[https://www8.garmin.com/manuals/webhelp/eTrex\\_10\\_20x\\_30x/EN-US/GUID-5F9C0E72-E6B7-457C-B85F-325B6E7C9669-homepage.html](https://www8.garmin.com/manuals/webhelp/eTrex_10_20x_30x/EN-US/GUID-5F9C0E72-E6B7-457C-B85F-325B6E7C9669-homepage.html)

<https://www.vernier.com/files/manuals/md-btd.pdf>