Edgar Spalding, Ph.D.
Friday, September 27, 9:45-10:30 a.m.

Machine vision for quantifying dynamic phenotypes in mutant and naturally varying populations

Our Phytomorph project strives to improve technologies for quantifying growth and development in order to produce more reliable and detailed phenotype data sets. We employ parallelized and automated image capture and computational analysis to extract phenotype information from time lapse images. The primary roots of Arabidopsis and maize seedling are good subjects for this approach because their simple cylindrical shape facilitates the image processing step and their responses to environmental perturbations such as reorientation with respect to gravity are rapid enough to be studied in a few hours. One study to be described in this talk utilized a bank of CCD cameras to monitor Arabidopsis seedling roots every 2 min for 8 h. Because of the high-degree of automation it was feasible to measure the responses of a population of recombinant inbred lines in order to perform quantitative trait locus (QTL) mapping. By adding a time axis to the phenotype data and therefore to the resulting QTL map, it was possible to determine *when* particular loci start and stop to influence variation in the gravitropic response. Predictive models linking seed and seedling phenotypes quantified by machine vision is another topic that will be discussed.