Despite automation advances in other areas of agriculture, particularly crops that can be grown uniformly such as field crops, the primary tools of workers in the tree fruit industry are still buckets, ladders, and hand tools. This talk will sketch out some of the issues involved in tree fruit production and how those issues impact the development of autonomous solutions for various orchard tasks. I describe the ongoing work at USDA-ARS-AFRS on the tree pruning task and new automation area of phenotyping of fruit trees. These two areas are similar from the computer vision perspective in that they require shape models to be estimated from sensor data. I will detail how shape models are constructed using robots and cameras in laboratory as well as in field conditions.