drone facts

LSU AgCenter
Research · Extension · Teaching

Selecting the Right Computer for Drone Mapping

By Randy R. Price, Dennis Burns, Jimmy Flanagan, R.L. Frazier and Luciano Shiratsuchi

Drones are a new technology available to farmers and consultants that allow a farmer or consultant to collect overhead images of farm field and land areas. Still, because of the 400-foot flying height stipulated by the Federal Aviation Administration for recreational flyers (www.faa.gov/uas), only 4 to 6 acres can be recorded while looking straight down per image. A user must assemble multiple images — 50 to as many as 800 — together to create a single mosaic of the farm field. This image is called a mosaic because multiple images are put together to create the single image. Online services exist for this process, but they typically require a monthly subscription or per acre fee, so some uses prefer to purchase their own software and computer to perform this process. Typical software packages for this operation are Agisoft Metashape or PhotoScan and Pix4D. These programs sometime have advantages over online services, letting the user to have more flexibility in the analysis procedure. Still, because of the 3D rendering and point-to-point matching method in which these program work, intense computing power is needed to perform the stitching operation, and some computers can take from 6 to 12 hours to perform this process. For this reason, the LSU AgCenter has been researching the computer resources necessary for this operation. Research has shown (Figures 1 and 2) that processor size — the number of cores or threads — processing speed are the two most important parameters that determine how fast a mosaic will be created on your computer. For this reason, computers purchased for this purpose should contain the best and most expensive processor available because these processors have the largest numbers of cores and fastest processing speeds. All other computing resources — the amount of RAM, display card size and hard drive space — had very little to do with the mosaic process, and large monetary expenditures in this area did not greatly affect the stitching process. Note that some newer A.I. software may utilize more of the graphics card for mosaic purposes, but at time of writing, this amount was still only 5% of the main processor's time. For this reason, computers built or purchased for drone imagery mosaic and stitching operations should emphasize attaining the largest and fastest processor at that time. To help ensure that you get this, you can save money on the other components, utilizing less RAM, older display cards, for example, and use the money saved on these components to attain a better processor core. In one case, we were able to save $800 on RAM and the display card cost, applying that savings to the main processor, allowing us to get the third-best processor made at that time. The components used in this computer are listed in Table 1. Note that some prices are now cheaper. This computer could process 60 acres of fields in 6 to 10 minutes.

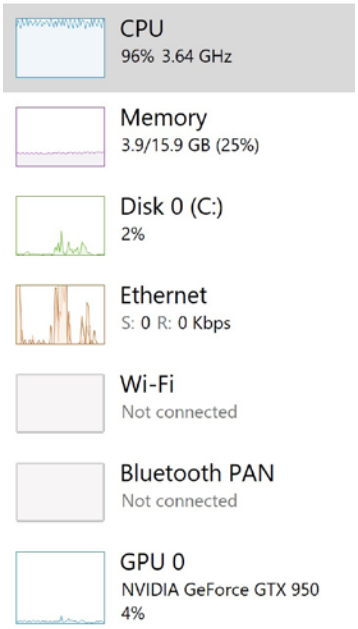

Figure 1: Typical CPU usage during a mosaic process.

Even faster times can be achieved with newer processors, such as the Intel I9 and the AMD Ryzen Thread Ripper 29XX series, but increases in speed margins will be realized to a much lesser degree because since processing times will go from 6 to 3 minutes, but you may still gain in other areas, such as larger field evaluations, etc. During our tests, the AMD processors had better heat rejection capabilities than the Intel processors, fewer crashes and a better cost-to-performance ratio. Older processors,

such as the Intel I7 series, worked well but had longer processing times — up to two times longer — than the equivalent AMD processors. Dual-processor computers (servers) worked well, but only provided similar results to monetarily comparable single-processor computers and needed twice as much RAM, heat sinks and more power for battery-powered operation. Generic gaming computers worked well but tended to be slow in the mosaic process because more emphasis was given to the display card needed for 3-D gaming at the expense of better main processor.

Using this information, you build your own computer for drone stitching processes, or be better informed of the computers and components needed to provide fast mosaic processing.

Table 1: Drone Imagery Computer

Component	Description	Cost
Processor	AMD Ryzen Thread Ripper 1950X (16 cores/32 threads)	$1,000
Motherboard	MSI X399	$250
Hard Drive	Seagate 1 Terabyte SSD drive	$200
Power Supply	EVGA 850E	$250
Display Card	Pony GTX 950	$250
RAM	16 gigabyte Corsair DDR4	$200
Heat Sink	Corsair water cooler	$125
Operating System	Windows	$170
	Total	$2,445

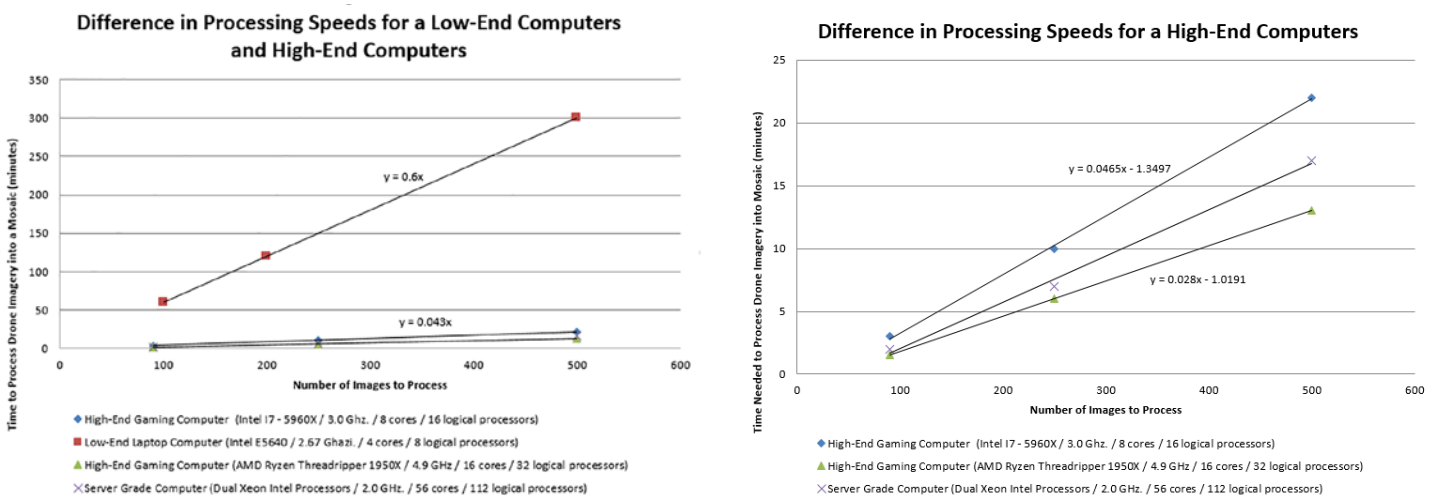

Figure 2: Computing times for four different computers using Agisoft Photoscan.

For questions about this fact sheet or other drone imagery topics, you can contact the authors above or contact:

Dr. Randy R. Price, LSU AgCenter, 8105 Tom Bowman Drive, Alexandria, LA 71302

Phone: 225-936-7593 Email: rprice@agcenter.lsu.edu

William B. Richardson, LSU Vice President for Agriculture
Louisiana State University Agricultural Center, Louisiana Agricultural Experiment Station, Louisiana Cooperative Extension Service, LSU College of Agriculture
Pub. 3708 (online only) 12/19