



## Aqueti's Aware2 Camera FACT SHEET

### Who is Aqueti?

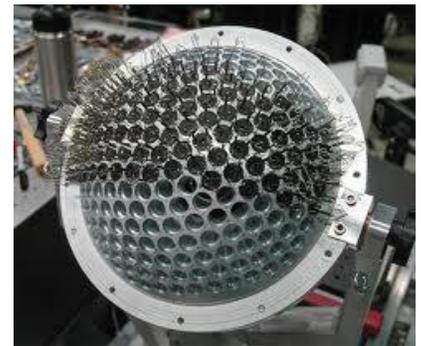
Aqueti (pronounced *a-kyoo-a-tee*) is a Durham, NC-based company focused on developing new approaches to taking and sharing pictures – on a big scale. The company manufactures and markets patented gigapixel cameras and resultant imaging services. Aqueti was founded in 2013 as a spinoff of Applied Quantum Technologies, a research and development company created as a transition vehicle for Duke University research.

### What is the Aware Camera?

Aqueti has developed the Aware line of cameras that use the patented multi-scale optical design concept which enables event photography, broadcast media and physical security companies to achieve unprecedented resolution and field of view. The Aware family cameras capture images with a panoramic field of view, up to 120° from a single image, with optics of such resolution that you can zoom in the on images with detail similar to a telephoto lens. It pairs directly with our content service, called Zoomcast, which gives consumer access to these images along with the ability to explore close-ups of anything in the photograph.

### Key points:

- Aqueti will release cameras ranging from 500 megapixels to 10 gigapixels.
- Resolution on the first available camera (Aware2) is approximately 7.5 times better than 20/20 human vision over a 120 degree horizontal field. Alternate designs of this technology provide resolution up to 30 times better than human vision -- reaching the resolution limit of the atmosphere.
- Unlike earlier panorama cameras, the Aware2 camera takes the whole picture at once.
  - All stitching and blending is done in the camera electronics immediately.
  - Access to the pictures is as limited by the time it takes to upload the 3 GB photo.
- Aware2 has the potential to capture up to 1.01 gigapixels of data in a single snapshot, which is about 1,000 megapixels.
- The Aware 2 consists of 150 “micro-cameras,” each of which captures 14 megapixels. The largest Aware cameras have up to 1000 micro-cameras.



*Figure 1 Dome that mounts the 100's of micro-cameras*



- A typical microcamera consists of a ~1 cm aperture relay lenses with an integrated focus mechanism, a 14 megapixel detector array and tightly integrated sensor read-out and image processing electronics.
- A shared objective lens gathers and routes light to the microcameras that surround it.
- Each one of the microcameras captures information from a specific area of the field of view, each with enough overlap to have no gaps in the final image.
- A computer stitches the captured information into a single, highly detailed image that is 55,000 x 18,000 pixels either on the spot or later.
- If you were to print the images captured by the Aware2, at full resolution on a 150 dpi printer, would be 30 feet wide by 10 feet tall.
- Supporting products include image hosting and tagging software, image storage infrastructure and custom image integration into websites and mobile applications.

### **How is this different from other Gigapixel cameras?**

First, Aqueti is offering more than just the camera. In fact, for the first full year our focus will be on providing access to images that we shoot or are shot by the few others that purchase a camera. There is currently no other digital gigapixel imaging solution that offers instant access to zoom-able images. Typically, images are available the next day when panned robotic heads are used.

It is the Aware2 camera that makes for this unique experience, and therefore it's key to identify what differentiates the Aware from its competitors:

1. Aqueti offers an order of magnitude improvement in imaging capability.
  - Aware is the only camera that takes a panorama shot with only one photograph. There are two other solutions available: one requires a fisheye camera, which distorts the picture when zooming and has limited resolution; the second requires the photographer to pan across the scene, which can take up to 10 minutes to capture, an hour to upload, and 24 hours to Photoshop.
  - We offer up to 10 gigapixels from a single aperture. Other manufacturers of high-end cameras offer significantly less. For example, the Hasselblad H4D-60 camera offers 60 megapixels; the largest Nikon is the D800 which has 36 Megapixels. The camera closest to the Aware is the ARGUS-IS, a 1.8 gigapixel military grade camera system used in drones which uses four 450 megapixel cameras, which costs millions of dollars and weighs hundreds of pounds. In contrast, Aware cameras can scale from 100's of megapixels to 10 gigapixels with smaller costs and weight per pixel.
2. Aqueti's camera takes the shot all at once
  - This makes it faster: others require approximately 24 hours before the photograph is available, due to the time it takes to stitch the images. With the Aqueti camera,



the image can be made available to view and zoom in on as quickly as it can be uploaded... nearly immediately with high-speed Internet access.

- Before Aqueti, photographers recording a large event would snap hundreds of photos from an SLR on a robotic mount, and then digitally stitch them into one big image. Shooting the entire scene often takes 10 minutes, resulting in a mosaic of images taken at different times -- and often displaying people with multiple appendages (reflecting movements over the time shot.)
3. Aqueti will offer economies of scale to lower the price of a gigapixel camera.
- The Aware2 micro-cameras are all identical and can be produced in high volumes to achieve economies of scale. Micro-cameras for higher resolution systems share many components with the Aware2 micro-cameras, enabling a scalable manufacturing platform. In current cameras, costs increase exponentially as the sensor size is increased.

### **How big is this camera?**

The Aqueti camera is 2' wide x 1' high x 2' deep. About 20 percent of the camera is made of the optical elements. The balance is made of a self-contained cooling system and the electronics and processors that assemble the information. At full-resolution and full-frame rate, the camera can output all 22 gigabytes/second over an optical fiber output. As more efficient and compact electronics are developed, the age of hand-held gigapixel photography will follow.



*Figure 2 First engineering prototype developed at Duke University in 2012*

### **Can't I replicate this with Another Camera?**

In order to achieve the same output as the Aware10 camera, you would need to combine numerous conventional SLR cameras. The lens system alone would require 500 of the best 500mm SLR lenses; it would measure 12' wide x 10' tall x 1' deep; and would cost approximately \$5 million.

### **How big is the picture it captures?**

Once compressed, the pictures from the Aware2 average three gigabytes.

### **Who is the Target Audience for the Camera?**

*For the Camera:* We see applications in commercial security, high end photography, interactive broadcasting and more. Photographs will be taken of sports events, festivals, corporate events, large weddings, concerts, and anywhere large numbers of people gather.

*For the Content Service:* Aqueti's Zoomcast imaging services allow for photos taken with Aware cameras to be uploaded and shared, both through custom sites and via social media. Aqueti provides online access to images via mobile devices, resulting in global consumers creating a new



social media where they share and print the “I was there” moment. Consumers can access ultra-high resolution photographs, tag themselves and interesting regions of images, and share them almost instantly. We see huge opportunities for media companies to provide unique, interactive imagery to viewers of major events that will engage the user with a unique experience.

### **What’s the future of the Camera – Greater than 10 GP?**

We do not expect the camera to ever expand beyond 10 gigapixels over a 120 degree field-of-view for ground-based imaging, as this is reaching the resolution limit of the atmosphere. Telescope designs that provide up to 50 gigapixels are being researched as a way of imaging the entire viewable sky from the ground at vertical atmospheric limits.

We plan to offer 2 different camera resolutions in mid-2014 with resolutions of ~2x and ~4x the Aware2 camera. In addition, there are plans to add video capabilities to all versions of the cameras.

We also expect to reduce the physical size of the unit over time, making it more portable for everyday use and further lowering the cost.

For more information, Contact:

Aqueti: Scott McCain  
[info@aqueti.com](mailto:info@aqueti.com)

Media contact: Ann Revell-Pechar  
[ann@arevell.com](mailto:ann@arevell.com); 919-909-1097