February 10, 2016 Meeting

The February 10, 2016 Waterloo Technical Society (WTS) meeting was called to order by Vice President James Stevenson at 7:25 pm.

A total of 32 were in attendance.

Treasurer's Reports. Treasurer Ken Friend reported a beginning balance of $1,525.08 with income from 4 membership dues of $40 and expenses of January's speaker dinner of $18 and purchase of badge holders for $8.99 leaving a balance of $1,538.09. Still outstanding is the purchase of the public address system for $377.92, leaving $1,160.17 available for use by the Society. A total of 11 honorary and 58 paid members gave a membership roster of 69 members.

Old Business. Vice President Stevenson requested that members invite speakers for the 2016-2017 year. Potential topics have been suggested:

1. Explanation of where recycling goods go and how they are processed. Common problems with material.
2. Current concrete road paving techniques, problems from the road engineers view point. Steve Crouse suggested Joe Owen of Kerry Cunningham Construction might speak on this topic.
3. Crop spraying by airplane problems, effectiveness, what crop problems are handled that way.
4. History of original land surveying.
5. History of manufacturing in Waterloo and Cedar Falls.
6. History of railroads in Waterloo and Cedar Falls, especially the WCF&N electric line.
7. History of mining in Iowa: Coal, Galena, Lead, Fracking sand.
8. Aerial photo services .

If anyone knows someone who could speak to those topics please let President Dorhout know.

New Business. The sponsor of the UNI Solar Boat Team, Dr. Sadik Kucuksari, requested support from the WTS for this year's boat. Derek Eagles moved that $300 be given to the UNI Solar Boat Team. Seconded by Steve Crouse. Motion carried.

Nominations for next year's officers are now being solicited. If any member has interest in an office, notify President Dorhout.

Guest Speaker. Mr. Bud Stein, President of Engineering Studios Inc. (ESI) in Iowa City, and his team gave a presentation on The Use of Unmanned Aerial Vehicles (UAV) in Photogrammetry. His website is http://www.eng-studios.com/.

ESI has a staff of 30 who provide specialized services in building conditions documentation, phase scanning, Building Information Modeling (BIM) and construction management. They have offices in Iowa City and Waterloo, Iowa; Moline, Illinois and Dallas, TX. ESI has done work locally for several of the John Deere sites.

Mr. Stein opened his presentation with a review of metrology which is the broad subject of the study of measurement. Later he showed how the UAV and photogrammetry are subsets of the broader topic of metrology.



High Definition Phase Scanning. High Definition phase scanning is performed with a laser camera which gathers and measures ~500,000 individual laser points PER SECOND. These points are combined into a 3D image (a point cloud) that looks like a photograph.

HOW DOES ESI USE THE SCAN?

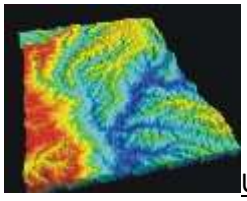
Using FREE software, the user can fly around their building and look at it from any angle and take measurements between items on the screen. Images can be printed for discussion or captured electronically and shared with others. So, in essence, the scan is a 3D model of your building with more detail than any human being could ever gather. This model is then used in planning, preliminary design, reverse engineering, construction, demolition, as builds and final design.

If your team uses AutoCAD or REVIT, the scan can also be imported into your software for users to draw over, trace or model the building elements. The scans can be used for:

-CLASH DETECTION
-DOCUMENTING EXISTING CONDITIONS
-SLAB FLATNESS
-CRANE RAIL LEVEL ANALYSIS
-3D MODELING

WHAT CAN BE SCANNED?

Anything can be scanned if it stands still. Buildings, parking lots, roads and bridges, equipment, property, accident sites, collapsed buildings, excavation sites, rebar prior to pouring, ceilings prior to closing them in, large pits, and piles of coal, gravel, salt and so forth. Scanning is also used to recreate ornate building elements, furniture, art or designs of any kind.



UAV Visual Measurement. High Definition Phase Scanning requires moving a stationary tripod several times to capture the total 3D image, but it is accurate to 0.1 mm (0.004 inch). Often there is a need to measure existing pipe locations and ducts in order to add or repair within a current structure. A visual image accurate to 3 mm (0.125 inch) is often accurate enough for these applications. Also, a customer may want to examine the condition of a surface that is not easily accessed by a human being. Drones can carry cameras and give real-time viewing analysis or for later measurement interrogation. An example of video used for visual examination of bridges or communication towers is shown in this short video, https://vimeo.com/117195057.

When contour mapping is needed to guide construction of housing, physical plants or road construction projects, drones with 1.5 mile ranges can be employed. A video of such a device is at this location, https://www.youtube.com/watch?v=lrQ9syoxMs8&feature=player_embedded.

Mr. Stein and his team demonstrated quadcopter drones ranging from $16 for a thumb-sized model up to a $2,000 model with the ability to carry a video camera and WiFi transmitter for surveying. Bud suggested that a curious beginner start with an inexpensive model, learn to control the vehicle without crashing into stationary objects, then gradually move up in price and features to acquire the skill and technology to use this equipment for personal or commercial projects.

UAV photogrammetry has found application in these industries with more to come:

- Oil & Gas
- Environmental & Landfill
- Public Agencies
- Waste management
- Disaster management
- Safety assessment
- Flooding change detection
- Erosion monitoring
- Volume calculation (stock piles)
- Research (geology, archaeology, etc.)
- Asset management

A caution for all, use this equipment in open spaces, away from commercial airways and private property such as wind farms or apartment buildings. The technology holds great promise for photogrammetry for personal and commercial owners. It can achieve in minutes what has been impossible or very complicated to achieve without drones having video capability.

Meeting Adjourned. Our March 9, 2016 meeting features Mr. Craig Schmeiser, Wheelift Program Manager for the Doerfer Companies, explaining the technology behind Wheelift Transporters and how they're being used to transport NASA's new SLS rocket as part of the quest to send man to Mars. Vice President Stevenson accepted a motion for adjournment at 8:55 pm.

Respectfully submitted,

James R. Stevenson, Vice President and Secretary