November 13, 2019 Meeting

The November 13, 2019 Waterloo Technical Society (WTS) meeting was called to order by President Stevenson at 7:20 pm. President Stevenson welcomed visitors and noted that this was the third meeting of the 106th year of the Society.

A total of 36 members and guests attended.

Treasurer's Report. Ken Friend reported a beginning balance of $1,117.47. With $160.00 income from paid memberships and expenses of $40.00 for the October speaker and guest meals this leaves a new balance of $1,237.47. Treasurer Friend's report stated a total of 7 honorary and 30 paid members yielding a membership roster of 38 members.

President Stevenson asked that all members consider organizations, businesses or individuals they know who are engaged in technology development or application where a donation from the Society would be important to their success. Vice President Crouse suggested that some of the money be used to pay for dinners of guests of members to help recruit new members. Members are to send suggestions with contact information and method of contributing to either Treasurer Ken Friend, FriendFamily@cfu.net, or President Jim Stevenson, JamesStevenson@cfu.net.

Introduction of Officers. Officers for the 2019-2020 year (year 106) were introduced:

President:	Jim Stevenson
Co-Vice Presidents:	Jerry Mohling and Steve Crouse
Treasurer:	Kenneth Friend and Paul Anderson
Dinner Reservations:	Derek Eagles and Steve Lang
Secretary:	James Stevenson
Publicity/Recognition:	Vacant
Auditing:	Bill Mitchell and Jim Garrett
Nominating Committee:	Ralph Marrero
Web Site:	Tim Schoenfelder

Old Business. The topics for this year were reviewed. The dates, speaker and topics for the 106th WTS are:

September 11, 2019, Communication Technology, Hillary Menken, Talk to Me Technologies
October 9, 2019. Photojournalism Drones. Daniel Hampe, KWWL.
November 13, 2019. Infrared Thermopile Sensor Arrays. Dr. Jeffrey Nie, UNI.
January 8, 2020. Education Technology, Schindler Tour. Dr. Leigh Zeitz, UNI.
February 12, 2020. University Avenue Reconstruction. Michelle Sweeney, AECOM.
March 11, 2020. Website Development. Marc Reifenrath, SpinUTech.
April 8, 2020. Electric Bicycles. Brent Johnson, BikeTech.
May 13, 2020. Hearing Devices. John Sperry, Wolfe Clinic.

New Business. No new business discussed.

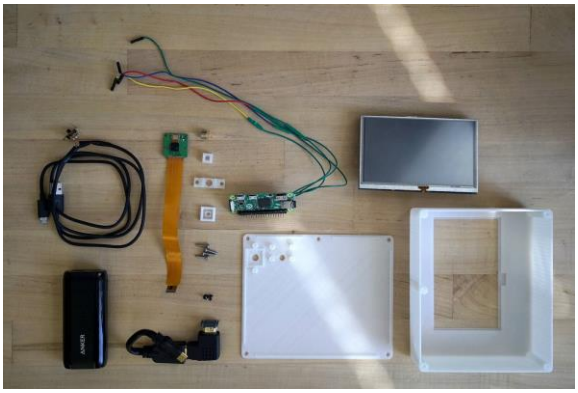
Guest Speaker. **Hong Nie** received his Bachelor and Master degrees in Electronic Engineering in 1993 and 1995 from Tsinghua University, Beijing, China, and his Ph.D. degree with specialization in wireless communications in 2004 from University of British Columbia, Vancouver, British Columbia, Canada. He is currently a professor at the

Department of Technology, University of Northern Iowa, Cedar Falls, Iowa, US, where he leads various research projects on wireless communication, digital signal processing, and Internet of thing. Before joining University of Northern Iowa in 2006, he worked as a senior electronics instructor and research scientist at the Engineering Department of Cape Breton University, Sydney, Nova Scotia, Canada from 2003 to 2006.

Infrared Thermopile Arrays.

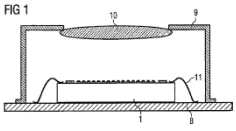


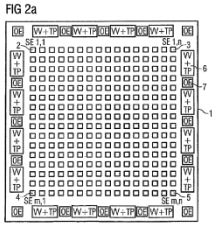
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The parts of Thermografree, prior to assembly. Counter-clockwise from the top right: screen/touch panel, Raspberry PI, IR sensor module and mounting bracket, visible camera, USB cable/power switch, battery, HDMI cable, case back and case front.

Infrared Thermopile Arrays can sense temperatures from -20°C to 1,000°C. Many have built-in lenses. Common arrays are 8x8, 16x16, 32x32 and 80x64. The arrays are about the size of a match head as shown above. Images capture heat of the object which can be color coded into 0 to 255 shades from deep purple to bright red.

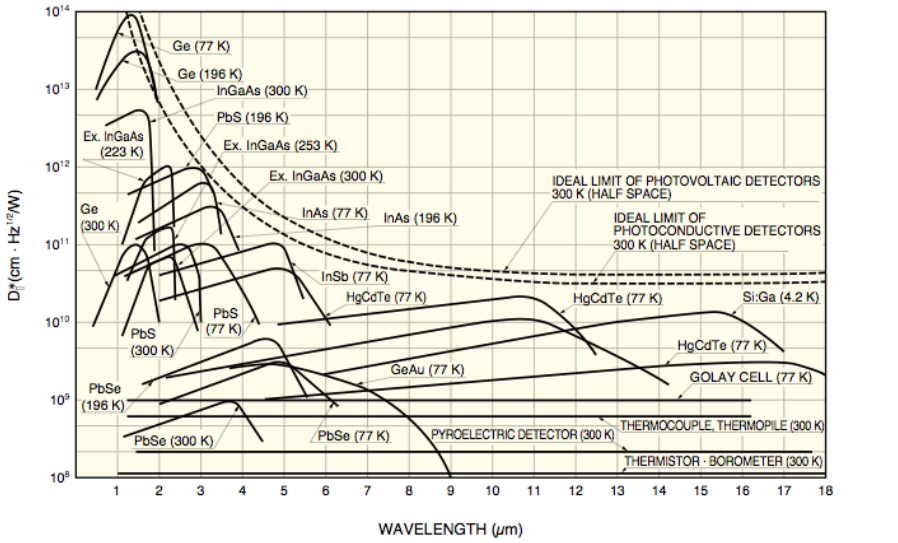




Dr. Nie presented information on three major applications of infrared thermopile arrays: Industrial Temperature Measurement, Medical or Health, and Fire Risk Reduction.

Industrial Temperature Measurement. Rapid response, less than one second, sensors are used where non-contact sensing is needed. This often occurs in process monitoring. Hot spots can be detected in high voltage switch gear to indicate power loss and need for cleaning to maintain power transmission. Cold spots in insulated walls and ceilings. The interest is in preventing costly problems from developing.

Medical or Health. Elderly are more prone to falls and resulting injuries requiring hospitalization and rehabilitation. Rapid response is required to minimize to consequences of the fall. Privacy of the individual prevents visual monitoring. By creating a system of monitoring points, the entire living area can be monitored including private areas like bathrooms. Thus using infrared thermopile arrays with artificial intelligence senior citizens can live more securely without losing privacy.



While the thermopile sensor has very low sensitivity, it does not demand cooling and it has a flat spectral response.

Fire Risk Reduction. Smoke detection is common in most homes and inns. But smoke occurs only after fire has started. By monitoring dwellings for changes in temperature, areas getting hot, before fire starts, the fire can be prevented. Cooking surfaces can be monitored for burners left unattended and through the Internet of Things the burner can be shut off before fire starts. Chemical storage in large containers can be monitored for container degredation and potential spillage onto other chemicals where a serious reaction can lead to poisonous gases and perhaps fires.

Price. Infrared cameras cost in the $10,000 price range. Infrared thermopile arrays cost (in lots of 1,000 units) $20 for a 32x32 array to $80 for a 80x64 array. Dr. Nie demonstrated the image captured by a Heimann 80x64 array and showed how the image could be tracked around the dining room.

More information and videos are available at http://www.Heimannsensor.com/

Meeting adjourned at 8:20 pm.

Next Meeting. The next meeting will be January 8, 2020. Dr. Leigh Zeitz will lead a tour of the UNI Schindler Education Center's Educational Technology classrooms.

Respectfully submitted,

James R. Stevenson, President and Secretary