

Firefly: A Bug Early Warning System / Precision Crop Health Monitor

Delivering unprecedented crop state comprehension through innovative high-density instrumentation and the power of the cloud

Canada – LEAN Systems and its technology partner, Proxilogica, are pleased to announce the start of pre-production testing of “Firefly” in collaboration with Agriculture and Agri-Food Canada at the Lethbridge Research Development Center (LeRDC).

The Firefly is a wireless and self-powered IoT imager the size of a credit card, purpose-built for early detection of disease and pest outbreaks in the cereal crops and horticulture industry.



The LEAN/Proxilogica team has worked in collaboration with AAFC-LeRDC for almost two years to explore economical digital imaging systems for indoor plant phenotyping pursuant to a three year material development agreement.

Dr. Anne Smith, a research scientist at LeRDC, together with her colleagues Drs. Jonathan Neilson and Charles Geddes has been developing inexpensive imaging platforms for digital image capture and image analysis protocols for plant phenotyping in growth rooms, greenhouses and laboratories. Drs. Smith and Neilson, over the last two years, have been collaborating with LEAN Systems to test their technology. The early systems, which were installed less than one month prior to reducing on-site presence in response to COVID-19 restrictions, showed:

- effective image capture over greenhouse plants
- the ability to upload images remotely to a central server
- provide regular downloadable images to the user
- apply image analysis protocols to automatically extract information on plant growth over time

Dr. François Eudes, Director of Research and Technology, LeRDC, says “digital imaging solutions in controlled growth environments have supported research programs during the pandemic and have given us a view of the future of distributed team work and data-intensive plant science.”

Dr. Keshav Singh, who recently joined the team at LeRDC, says “diversified applications of Firefly sensing technology over traditional agricultural industry will facilitate the digital ag revolution for global food security. It will involve further development of ground-sensing Firefly technology and possibly aerial platform (drone) applications for rapid field scouting. In the future this technology will help growers make critical decisions related to identifying types of pests and tracking micro-climates within a field much faster than ever before.”

AAFC is excited to continue working with LEAN Systems on the Firefly technology for automated image capture and extraction of plant phenotyping information relevant to rapid assessment of new varieties, the impacts of abiotic and biotic stresses, and for screening herbicide resistance in a variety of weed species.

Dr. David Southwell, CEO of Proxiloga Corporation, says behind the Firefly architecture are “large fleets of tiny imagers that maximize space coverage with enough on-board intelligence to pre-process and securely transmit data to the cloud where bird’s eye maps are then assembled. AI-boosted analytics functions may be performed at both edge and core, drastically reducing network traffic thereby enabling fleet scaling. We start in CEA spaces and will soon be ruggedizing and adapting the imagers for more demanding open field horticulture applications, including UAV platforms.”

“We are very excited about this technology and see the opportunity for a range of strategic B2B relationships to accelerate commercial evaluation and deployment as well as additional initiatives with research partners globally to expand the Firefly’s useful purpose” said Bill Halina, managing director of LEAN Systems.

About AAFC:

The Lethbridge Research and Development Centre (LeRDC) was established in 1906 in Lethbridge, Alberta and is one of the largest facilities within Agriculture and Agri-Food Canada's (AAFC) network of 20 research and development centres. LeRDC leads research on beef cattle production systems, crop production, and sustainable production systems under dryland and irrigated conditions associated with farming in a semi-arid climate.

Dr. Anne Smith is a research scientist at LeRDC who specializes in remote sensing applications for agriculture. Over the last 25 years she has conducted studies in cropping systems and grasslands using satellite, airborne, drone and ground-based multispectral, hyperspectral and radar systems.

Dr. Keshav Singh is a research scientist at LeRDC who specializes in the high-throughput proximal and aerial imaging technologies to study canola, legume and cereal crop phenomics. His work mainly involves agronomic data processing, image-cube analysis, algorithm development, crop mapping and analytics.

About Proxiloga:

Proxiloga was incorporated in 2017, built around a team of engineers with more than two decades of experience in technical computing with a vision to develop edge analytics devices. Firefly is the first technology to emerge from this campaign, aimed at improving productivity in precision horticulture.

About LEAN Systems:

LEAN Systems Limited Partnership (LP) was registered in the Province of Alberta on July 19, 2018 to help The Proxiloga Corporation fund development of proprietary technologies in the field of horticulture. The LP is managed by LEAN Systems GP Inc. who also provides business development support/advice to Proxiloga's leadership.

For more information:

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