

Las Cumbres Observatory & Sencha: Advancing Discoveries in the Universe with Sophisticated Robotic Telescopes

CASE STUDY

Sencha powers Las Cumbres Observatory's software user interface that controls and monitors a network of telescopes to support discoveries in Time Domain Astronomy.

Las Cumbres Observatory (LCO) is a privately funded astronomy institute with a mission to advance the understanding of the universe through science and education.

LCO has a network of twenty-three telescopes distributed around the world to observe and capture transient astronomical events. The observatory specializes in time domain astronomy, which means capturing events that change over time or occur without much warning, such as examining supernovae explosions, solar system objects, asteroid tracking, or finding planets around other stars (exoplanets).

The global network of telescopes allows LCO's astronomers to observe events through multiple telescopes and increases the chances of continuously capturing any dynamic phenomenon. In a traditional scenario, astronomers would be required to travel to the mountain site and station there for a few days to observe the desired phenomenon, log recordings, and crunch the numbers. LCO's twenty-three fully robotic telescopes stationed in seven different parts of the world provide the flexibility to perform celestial observations around the clock without any human intervention. Astronomers are able to submit their requests through a web interface, with which sophisticated scheduling algorithms will find the best global telescope and the appropriate time to make the observation and send back data when captured.

With the interface designed using Sencha's GXT product, LCO's operations team is able to control and monitor thousands of telemetric data points and telescope controls through a highly customizable and intelligent interface.



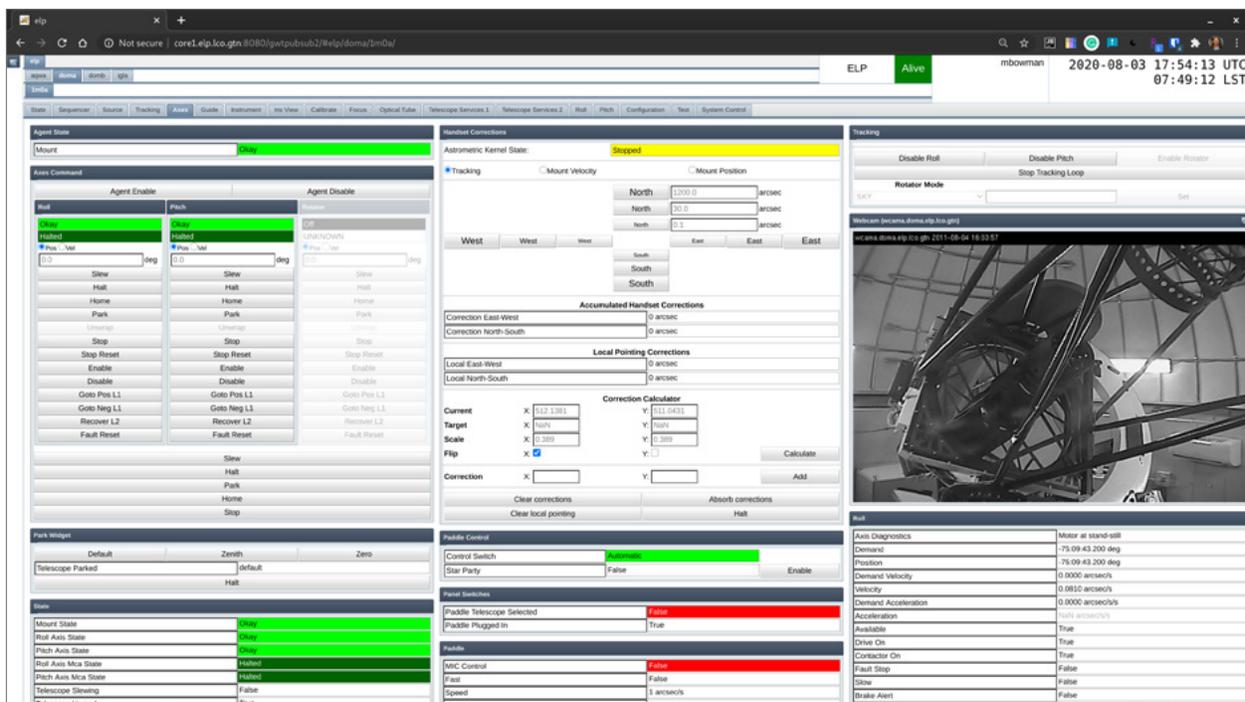
"We couldn't have created such a sophisticated control interface without Sencha GXT."

Mark Bowman, **Software Engineering Manager at Las Cumbres Observatory**

Robotic Controls via a Sophisticated Software Solution

Mark Bowman, Software Engineering Manager at LCO, and his team of engineers develop all aspects of the software responsible for enabling this research—right from the embedded firmware that moves the telescope mirrors all the way up to the web interfaces used by astronomers to plan their observations, and everything in between—including scheduler, databases, and engineering tools.

“We use GXT to power the Control Interface, to monitor telemetry and provide telescope control,” said Bowman. The software handles several events, such as the telescope position and tracking, science cameras, viewing the subsystem behavior, and manual observation, like pointing at a series of stars and running tests. The web interface designed using GXT is able to inject commands into the command stream that gets transmitted to the telescope and is able to display the recorded data from the database.

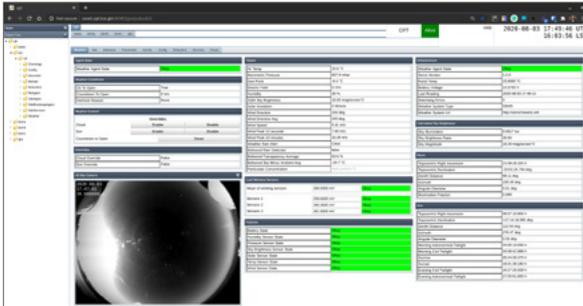


Controlling the telescope axes @McDonald Observatory, Fort Davis, Texas



"Our interface has thousands of telemetric items and controls, along with about a hundred or so buttons."

Mark Bowman, **Software Engineering Manager at Las Cumbres Observatory**

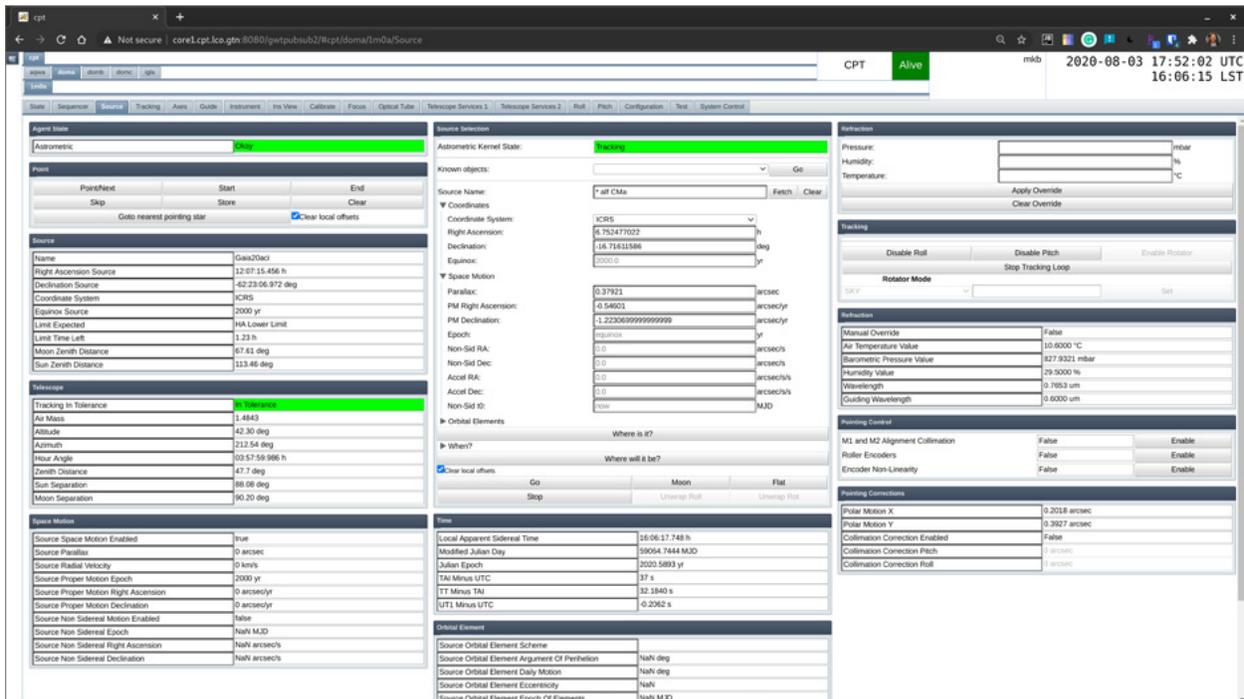


Weather monitoring at the Sutherland, South Africa location

The buttons change the state of the piece of software connected to the system and are reflected back in the telemetry. With the help of a solid GXT-powered interface, Mark's team is able to log in to any global site and control the telemetry portlets related to telescope-dome enclosures and the numerous telescopes within the site.

"The interface helps monitor controls such as power on/off status, weather related telemetry, opening/closing telescope enclosures or resetting faults, and thousands of similar controls," said Bowman.

For example, telescope-level manual observation is possible by entering a known object in the sky (e.g., the star Sirius) and fetching the celestial coordinates to remotely control the telescope to slew to that target.



Controls for accurately pointing the telescope located at Sutherland, South Africa

A Completely Customized Experience with Sencha GXT

The designed interface is completely customizable, so our users have the ability to move widgets, drag and drop, add variables, plot data, and perform many similar actions.

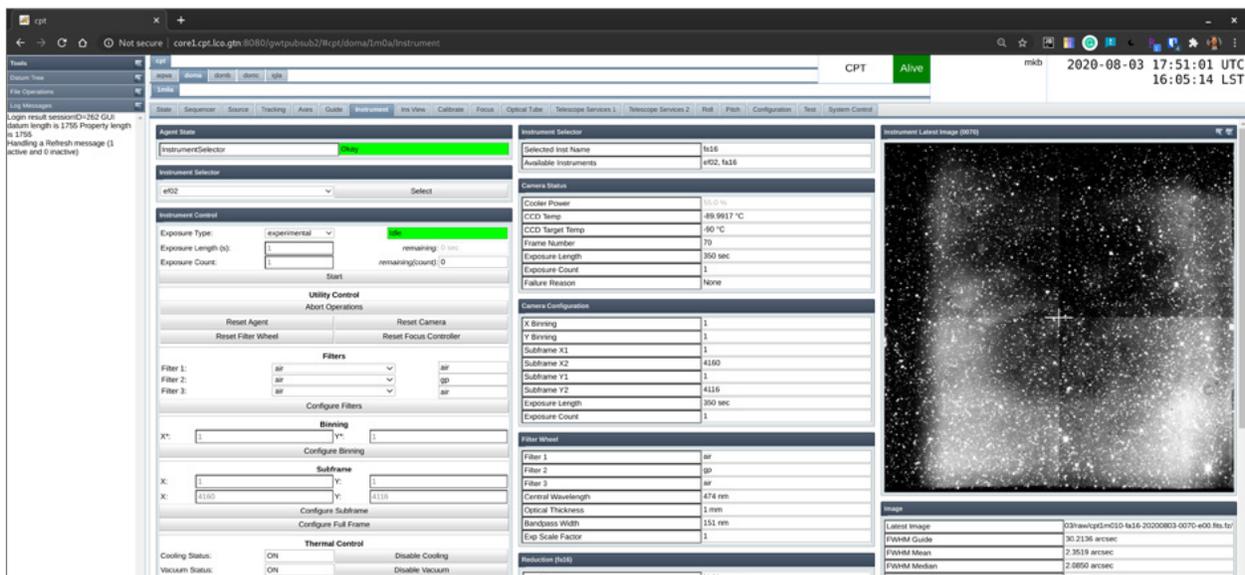
"GXT enables us to do all of those actions easily and provides the interface flexibility we need," said Bowman. The widgets and buttons give the LCO scientists full control over the robotic system. The controls are used right from the point when telescopes arrive on the site, when they are brought up and calibrated, to the day-to-day checking of the telescope pointing, tracking, and viewing the behavior of other related subsystems.

Mark first prototyped this interface several years ago, and an advanced version is being deployed globally at all seven telescope sites.



"We love using the Sencha product given the high level of abstraction. I can really grasp the concept of tab and tab items, and tree models. You really don't have to be a web developer to use the product,"

Mark Bowman, **Software Engineering Manager at Las Cumbres Observatory**



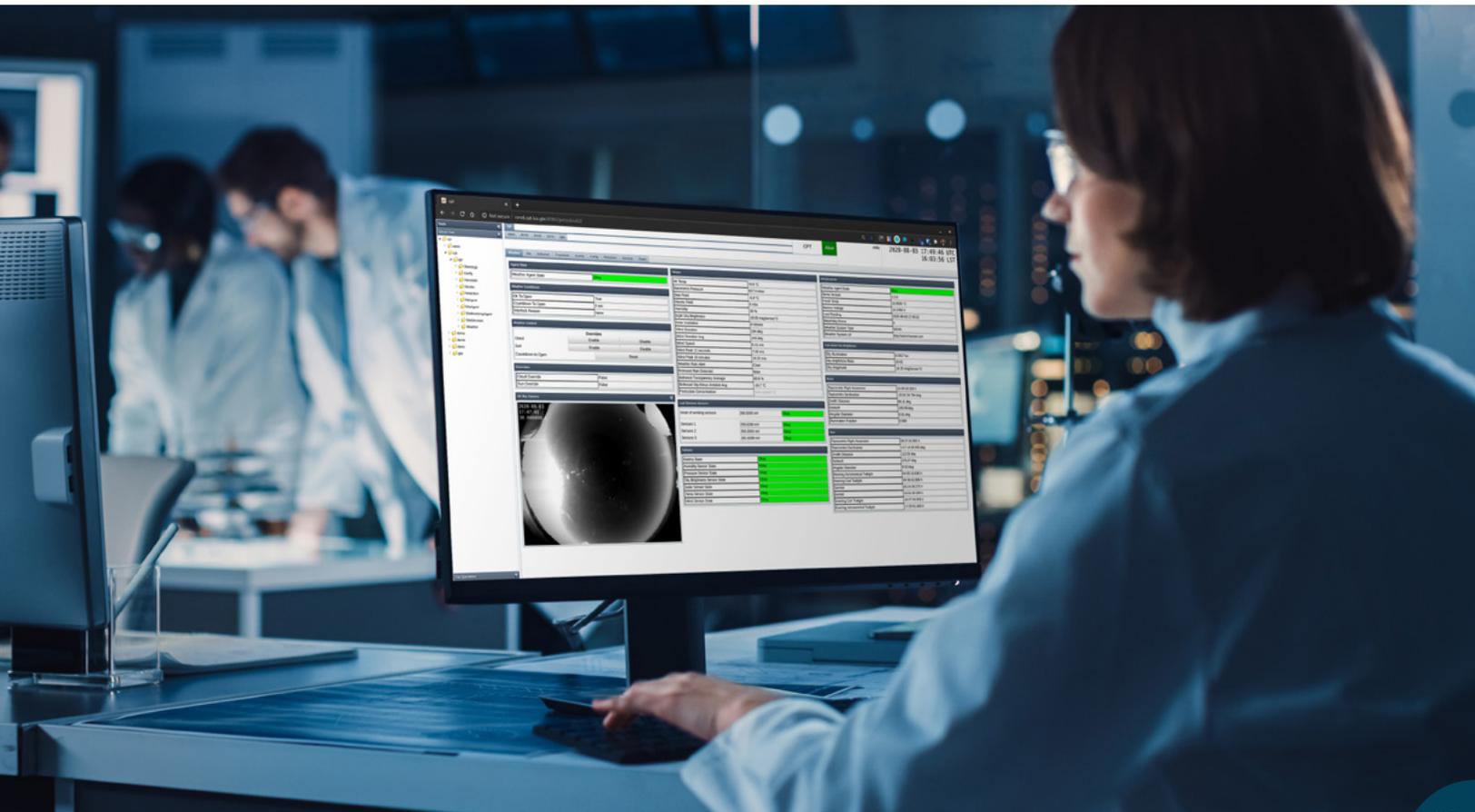
Controls for accurately pointing the telescope located at Sutherland, South Africa

Las Cumbres Observatory's robotic telescopes continue to provide valuable data to track current and future astronomical discoveries.

Pioneering Rapid Advances in Astronomy

Sencha is proud to power the software that enables scientists to observe spectacular phenomena such as supernovae and planets orbiting other stars, which opens up the door for new areas of astrophysics research.

With a solid mission to promote excellence in science, engineering, and education, LCO operates with the highest efficiency and productivity to spearhead some of the most astounding celestial discoveries.



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