TWINSCOPE

Abrar Alharbi, Aram Alqahtani, Aljawharah Ababtain, Ghadah Abotheeb, Hadeel Alhussiny, Nouf Abothnin, Sarah Alharbi, Taiba Alsharif

Department of Electrical Engineering, College of Engineering, Princess Nourah bint Abdulrahman University, P.O. Box 84428, Riyadh 11671, Saudi Arabia

Abstract

There are signals in space that whisper across time some in waves, others in warmth. TWINSCOPE is our response to these cosmic messages: a telescope that sees and listens at once, offering astronomers a multi-layered view of the universe. By combining a radio telescope operating at 1420 MHz with an infrared sensor sensitive to wavelengths between 700 nm and 1 mm, TWINSCOPE enables simultaneous detection of electromagnetic and thermal emissions. Simulations of mysterious emitters like GPM-J1839-10 reveal a hidden harmony between light and heat, pulse and glow. TWINSCOPE opens the door to a universe rich with unseen patterns reminding us that discovery begins when we learn to look and listen at the same time.

Introduction / Background

Deep within the unknown reaches of space, mysterious signals emerge signals that even today's advanced science struggles to fully understand. Phenomena like GPM-J1839-10 and other enigmatic objects send out steady radio pulses, over timeframes so long and unusual that they challenge what we know about the universe.

Our project, "TWINSCOPE," introduces an innovative concept: a dual-spectrum telescope capable of capturing radio and infrared signals at the exact same moment — aiming to catch the hidden events that could reshape our understanding of the cosmos.

By bridging two worlds of observation, we seek to speed up discovery and fill critical gaps in astronomical knowledge.

The journey of science begins with a signal… and we are here to capture it.

In the depths of space, mysterious objects like GPM-J1839-10 emit regular radio pulses that are difficult to explain.

Humanity's reliance on single-spectrum observation leaves behind critical scientific gaps.

Our project, TWINSCOPE, offers a new solution: merging radio and infrared detection into a single device to capture synchronized data and reveal the hidden secrets of the universe.

System Model / Methodology

1. **Multi-Spectral Sensing Model :**

This model integrates two types of sensors: a radio telescope operating at 1420 MHz and an infrared telescope covering wavelengths from 700 nm to 1 mm. The radio telescope detects low-energy signals like hydrogen emissions, while the infrared telescope captures heat, dust, and cooler objects. Combining both gives a more complete view of celestial bodies.

2. **Centralized Data Fusion Model**:

Data from both telescopes is sent to a centralized processing unit. This system synchronizes and analyzes the signals, allowing real-time correlation between radio and infrared data. Inspired by aerospace and defense systems, it enhances the ability to detect patterns that might go unnoticed if sensors operated independently.

3. **Electromagnetic Isolation Architecture:**

To prevent interference between the two sensors, we implemented electromagnetic isolation. This involves physical separation, shielding materials, and layout design to reduce cross-talk. Proper isolation is critical to ensure each sensor collects accurate and reliable data.

4. Systems Engineering V-Model

We adopted the V-Model framework for structured development of TWINSCOPE, covering phases from requirements and high-level design to integration and testing. A custom diagram can illustrate this process.

	Specification / Type	Purpose / Function	Notes
Radio Telescope Frequency	1420 MHz	Detects low energy hydrogen signals	Key spectral line for astromony
Infrared Wavelength Range	700nm- 1mm	Captures heat, dust, celestial objects.	Wide IR spectrum
Processing Unit	Raspberry Pi 4	Data fusion and real time analysis	Centralized control
Shielding Material	Copper tape and EVA foam	Prevent electromagnetic cross talk	Used in isolation layer
Structure Base	Wood with dual section design	Provides physical isolation of sensors	Reduces interference
IR lens material	ZnSe (Zinc selenide)	Focuses IR signals onto the sensor	Good IR transmission
IR Sensor	FLIR Lepton	Captures thermal/ infrared signals	Compact & efficient
Radio Dish Material	Aluminum	Reflects and focuses radio signals	Lightweight and conductive

Table 1. Components and Technical Specifications of the TWINSCOPE Model

Proposed Solution / Main Idea

TWINSCOPE is a novel astronomical device that combines a radio telescope (1420 MHz) and an infrared telescope (700 nm – 1 mm) in one integrated system. Its purpose is to observe the same celestial object across both spectra at once, revealing phenomena that single-spectrum tools might miss.

The design is based on three key models:

1. Multi-Spectral Sensing – Captures both radio signals from hydrogen and low-energy sources, and infrared data from dust, gas, and cooler stars.
2. Centralized Data Fusion – A central unit synchronizes and analyzes incoming signals in real time, enabling cross-spectrum pattern recognition.
3. Electromagnetic Isolation – Physical and electrical separation, along with shielding, prevents interference between the two sensors.

This approach helps uncover hidden links between radio and infrared signals, aiding discoveries like the mysterious object GPM-J1839-10.

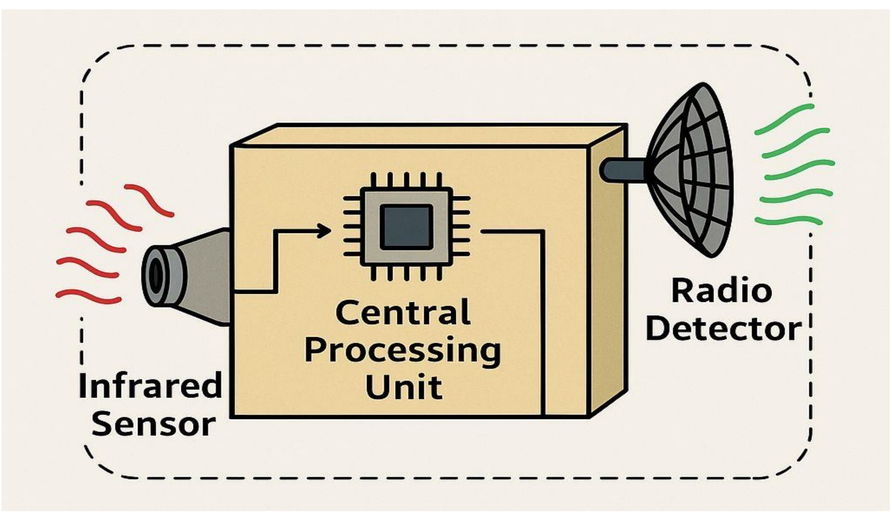


Figure 1. Working Mechanism of TWINSCOPE

Results / Simulation / Discussion

By simulating signals from an object like GPM-J1839-10, we observed:

- Repeating radio pulses at regular intervals.
- Increased infrared signals during radio peaks, suggesting a possible thermal link.

Key findings:

- Strong correlation between radio and infrared data.
- The two signals provide complementary insights, revealing hidden details.

These results support the TWINSCOPE concept, proving that simultaneous
multi-signal detection can uncover new clues about mysterious cosmic phenomena.

TWINSCOPE's advantage:

- Can detect both radio & infrared signals together (unlike most telescopes).
- Saves time & reveals hidden patterns between signals.
- Helps study mysterious objects like GPM-J1839-10 more deeply.

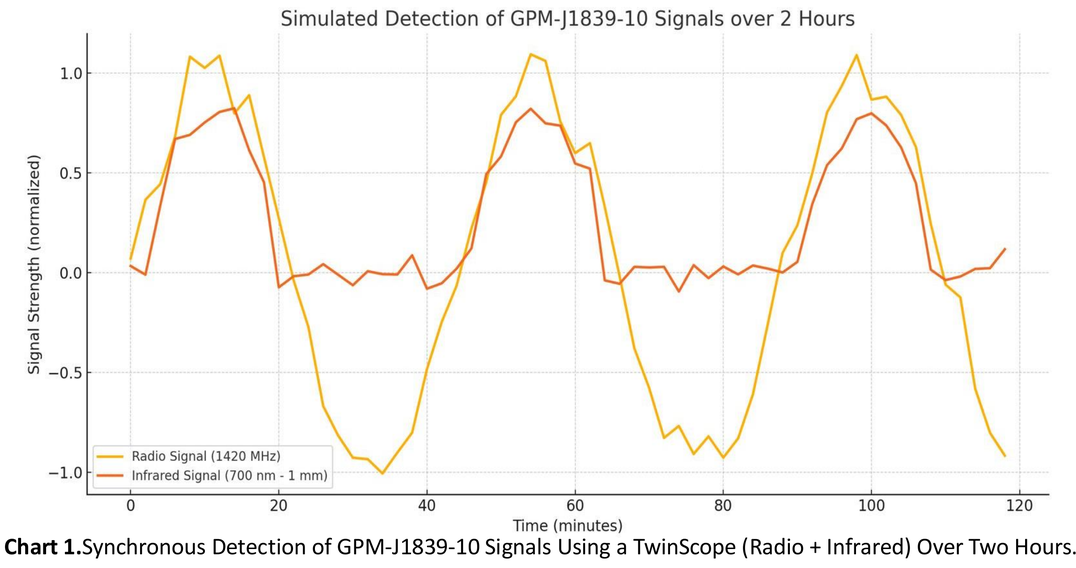


Chart 1. Synchronous Detection of GPM-J1839-10 Signals Using a TwinScope (Radio + Infrared) Over Two Hours.

Conclusions

In conclusion, TWINSCOPE represents a scientific breakthrough in astronomical observation. For the first time, two telescopes are integrated into a single device, combining two advanced technologies: a radio telescope that detects electromagnetic waves, and an infrared telescope that captures thermal radiation. This innovation bridges a significant scientific gap, enabling astronomers to observe the sky from multiple perspectives and uncover hidden cosmic phenomena. As we continue to gaze toward the heavens, TWINSCOPE stands as an intelligent bridge between the visible and the unseen, the light and the shadow, and between what we perceive and what remains concealed.

References

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