It is apparent that timely collection of high-quality optical and electromagnetic scientific data related to UFO events has been difficult to obtain. Individuals who are in the position to potentially record such events often do not have the appropriate equipment at hand. Even MUFON Field Investigators may not have the means to wait for hours, days or longer to capture an event and, at that time, record all of the necessary data in a verifiable way.

Even when photos or videos are recorded, they often lack verifiable associated meta-data such as the exact location of the camera and sensors, the azimuth and elevation of the where the camera is pointing, time of day, associated electromagnetic and gravitational perturbations at that time and so on. Also, even if a single camera captured such data, the track of an object, its location on or above the Earth and its altitude, could not be ascertained without combining the data of at least two such systems, placed some distance from each other.

The focus of the UFODAS development has been on resolving a portion of this issue by providing methods to recognize, track and photograph anomalous objects while simultaneously collecting data from multiple sensors. While this sort of capability has been investigated and other systems have been built, their design emphasis has not been on such low cost to make practical the kind of significant numbers to be deployed to have a practical impact on Ufology. By “low-cost” we assume a unit cost of perhaps $2000 or less. Thus, over the last five years significant progress has been made on an Unidentified Flying Object Data Acquisition System (UFODAS) that attempts to address this issue.

UFODAS consists of a Windows operating system-based personal computer and options of one or two cameras and other clusters of sensors. In addition, there is software to pull data and video, locally or over the internet, from multiple sensor locations and triangulate target objects. The system supports a wide-range of supported cameras including USB webcams up to sophisticated all-weather IP cameras with pan and tilt as well as optical zoom. The software architecture is designed to adapt to most any camera or Pan-Tilt-Zoom (PTZ) mechanism in the future by addition of a single software element, without modification to the main UFODAS software. In dual camera applications, one camera may be a non-PTZ type that views a wide field of interest including all-sky cameras. The second camera would be a PTZ camera directed to point at the object based upon its relative location in the field of view of the wide angle camera. The PTZ camera then independently tracks the object. Whether using one camera or two, the processor samples frames from the wide-field camera and through some fairly sophisticated image analysis, detects qualified moving objects. It then directs the pan-tilt head to point the telephoto camera at the object and collects images from it. The software is capable of acquiring an object of interest and smoothly tracking and zooming a moving object even with a single camera. Maintaining track while moving the camera, which causes the background to also move, was a significant part of the development effort.

The software architecture employed enables support for additional cameras, whether simple or sophisticated, including those with fast PTZ operation, higher resolution or non-visible spectrum devices.

Triangulation of a sighted target object requires accurate azimuth and elevation of the tracking camera. The optional MultiSensor Unit (MSDAU) is an embedded hardware and software subsystem that provides camera GPS coordinates and precise time as well as 3DOF magnetometer and DC accelerometer. The same sensors may be used to sense perturbations in those fields and include that data with a camera-based event or actually provide the initial trigger for subsequent data collection.

The software also provides a number of related functions which include:

- When a qualified event is detected, sends an email to a designated address with data that includes attached photos, GPS coordinates of the camera and object azimuth and elevation.
- Upload collected data to a Google Drive or Dropbox account.
- Saves automatically named photos and videos to folders it creates in local memory.
- Operational parameters can be adjusted by sending an email to an UFODAS-specific email address.
- A sophisticated Graphical User Interface (GUI) for user-friendly operation.

Ongoing development work includes:

- Additional methods to eliminate false alarms such as birds and aircraft including the use of deep learning methods.
- Real-time RF spectrum analysis option for the MSDAU with “video” capture of the changing spectrum recorded by an MC.
- MSDAU interface for acoustic sensors.
- MSDAU interface for radar data.
- Real-time track correlation with data from the flightrader24.com website to distinguish unknowns from aircraft.
- Use of an optical gradient filter to determine target spectrum
- Differential magnetometry to determine target magnetic field strength and direction

The UFODAS system architecture provides for an extremely broad set of configuration options to meet the goal of providing systems for every budget and type of case. UFODAS architectural components consist of:

- Mission Control (MC) GUI-controlled software. MC interfaces with other elements via the Internet to bring together, in one location, data from up to six Data Acquisition Units (DAUs). DAUs may be any combination of OTDAUs or MSDAUs.

- Optical Tracking Data Acquisition Unit (OTDAU). An OTDAU includes a GUI-controlled software element that provides an interface to many types of cameras for optical target acquisition, tracking and video storage. An OTDAU can either stand-alone or work with MC. Two OTDAUs and an MC form a comprehensive solution to tracking with triangulation and both OTDAU and MC local data storage.

- MultiSensor Data Acquisition Unit (MSDAU). An MSDAU consists of an all-environment enclosure with an embedded Raspberry Pi computer interfaced to nine different sensors including GPS, magnetometer, DC accelerometer, AC accelerometer, temperature and pressure. An MSDAU communicates with an MC over the Internet to provide all of this data in real-time. An MSDAU may also transmit data from other USB-interfaced sensors such as a Trifield meter.

- A combination of a PTZ camera mounted on top of a MSDAU which is then tripod or wall/poll mounted. In this configuration, data from the camera and sensors is combined into a single Ethernet cable for communication with MC. The MC then can be configured to use the co-located MSDAU data to locate the camera and collect multi-sensor data simultaneous with tracking events.

UFODAS cameras, the MSDAU, OTDAU and MC software as well as numerous installation and support options are available via the UFPDAP website. Four cameras are offered, each with unique capabilities and price levels ranging from a fixed lens, wide-angle unit, an All-Sky 360 degree camera to 12x and 30x PTZ models. OTDAU software allows the use of each type alone or in combination.