Image Analysis of a UAP Video[1]

Abstract: A video stream of a UAP is analyzed. Internal image content tends to discount fabrication via CGI techniques. Unique acquisition circumstances permit 3D scene reconstruction permitting estimates of the UAP's physical dimensions. UAP behavior characteristics tend to eliminate the possibility of known natural causes or human artifacts.

Data

The data analysis was conducted on a video file from MUFON case ID 34818. The file is identified as: http://www.mufoncms.com/files/34818_submitter_file1__Copy_of_VID_20111222_103632-1.mp4

The file is an 8.8 Mb MP4 video framed 720 X 480 with a compressed data rate of 3.033mbps recorded at 27 frames per second. The duration is approximately 22 seconds comprising approximately 620 frames, the majority of which contain the UAP within the field of view.

The file was apparently recorded on a t-mobile myTouch Android based cell phone.

All relevant metadata regarding origin, date, time, and other factors available to the file either were not recorded with the file or were deleted from the file retrieved for this analysis.

The reported recording date was December 22, 2011, and the approximate location was somewhere near the Indiana/Ohio border on a 4 lane freeway.

The recording was made from a moving vehicle which provides an extraordinarily unique opportunity for analysis.

The recording was made during the daytime under cloudy skies which do not permit independent geolocation through sun-angle shadows. Attempts to geolocate by traveling possible routes using Google maps/earth have to this point been unable to identify an exact match to the actual location.

The UAP event

The UAP event comprises four phases of activity.

During the first phase comprising the first 9 seconds of recording, the UAP consists of an extremely bright disc of light several degrees above the horizon with a discernable width. Associated with the UAP is an intermittent flash of light that occurs intermittently above the main UAP.

During the second phase comprising the next 5 seconds of recording, the UAP's associated flash appears to enlarge (approach), the main UAP appears to descend, and both objects appear to approach the vehicle.

During the third phase comprising the next 2 seconds of recording, the UAP apparently flies over the vehicle and the person making the recording reorients to the other side of the vehicle to continue the recording.

During the fourth phase which is the balance of the recording, the UAP apparently flies a course parallel to the vehicle on the opposite side of the vehicle.

Representative image showing the main UAP and associated flash

CGI/Fabrication Analysis

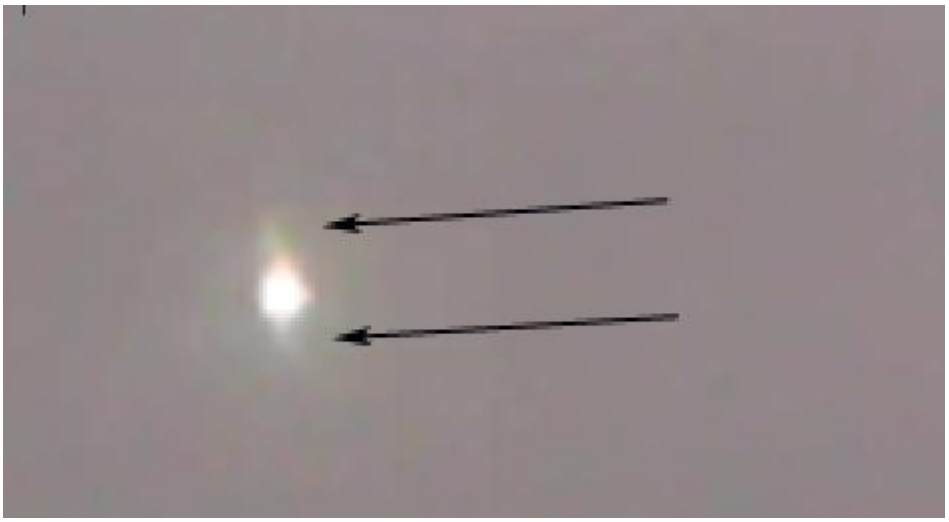
Prior to conducting further analysis, the first question asked was if this is a fabricated video—inserting a virtual object into a staged event is a relatively easy task with contemporary CGI software. The absence of metadata in the file makes this video suspect since the analyzed copy is clearly not the original recording.

The video was apparently recorded from a moving van of unknown make/model/year at apparently free-way speeds. The video was shot through the windows of the van which provide excellent information regarding possible fabrication.

The first focus for analysis was based on the characteristics of the window glass. The windows through which the scenes are shot are apparently a standard automotive safety glass, which consists of two panes separated by an adhesive layer. Such optical structures have a measurable refraction which tend to produce secondary refractions along the line of glass curvature from the refraction through the inner and outer layer. Essentially, a point source is directionally diffused.

All images are consistent with the object being imaged through a refractive medium as shown below:

Refractive elements in the image

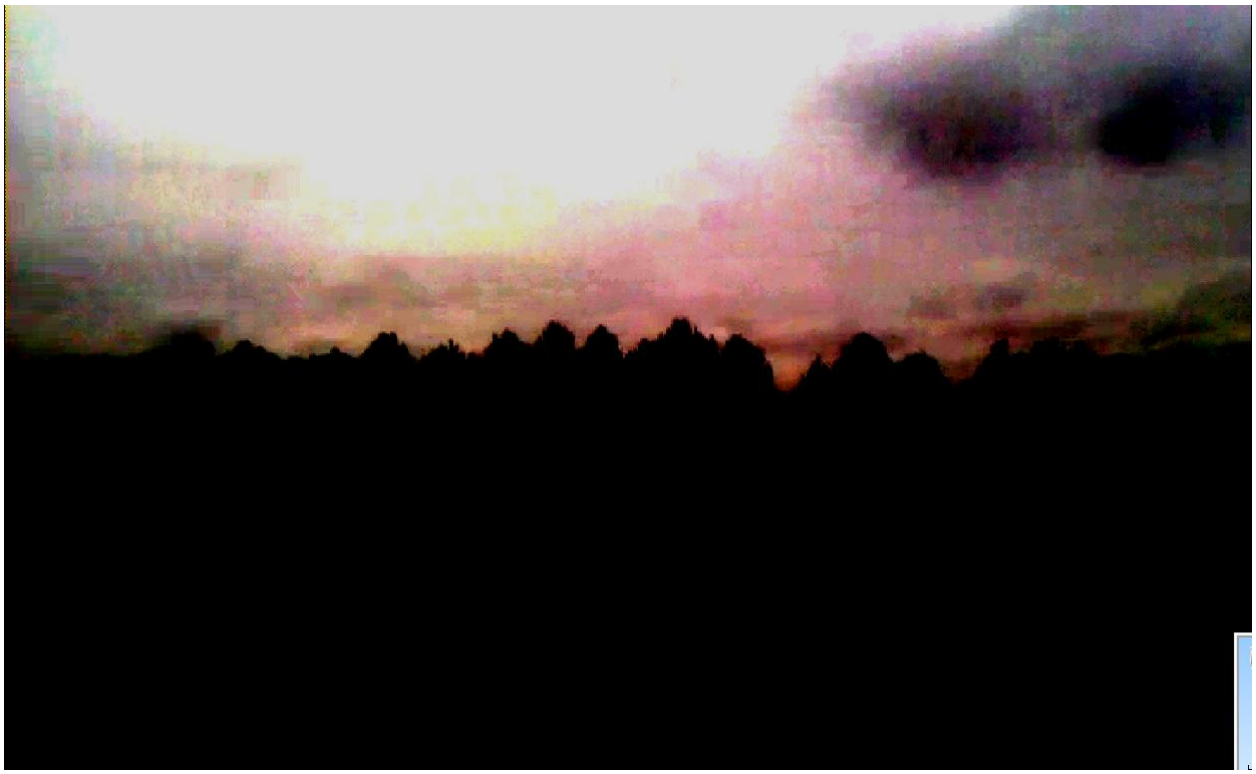


Upper and lower refractive "starbursts" are seen which are clearly distinct from the CCD/halo surrounding the image. This is characteristic of an image shot through a window which while possible to replicate with CGI software, would require extraordinary attention to detail.

A second non-CGI characteristic occurs as the UAP apparently overflies the vehicle and leaves the field of view.

The image below shows the last frame from the 2nd phase in which a portion of the UAP is visible. Also clearly visible are the window refractive properties as expected from a bright illumination source.

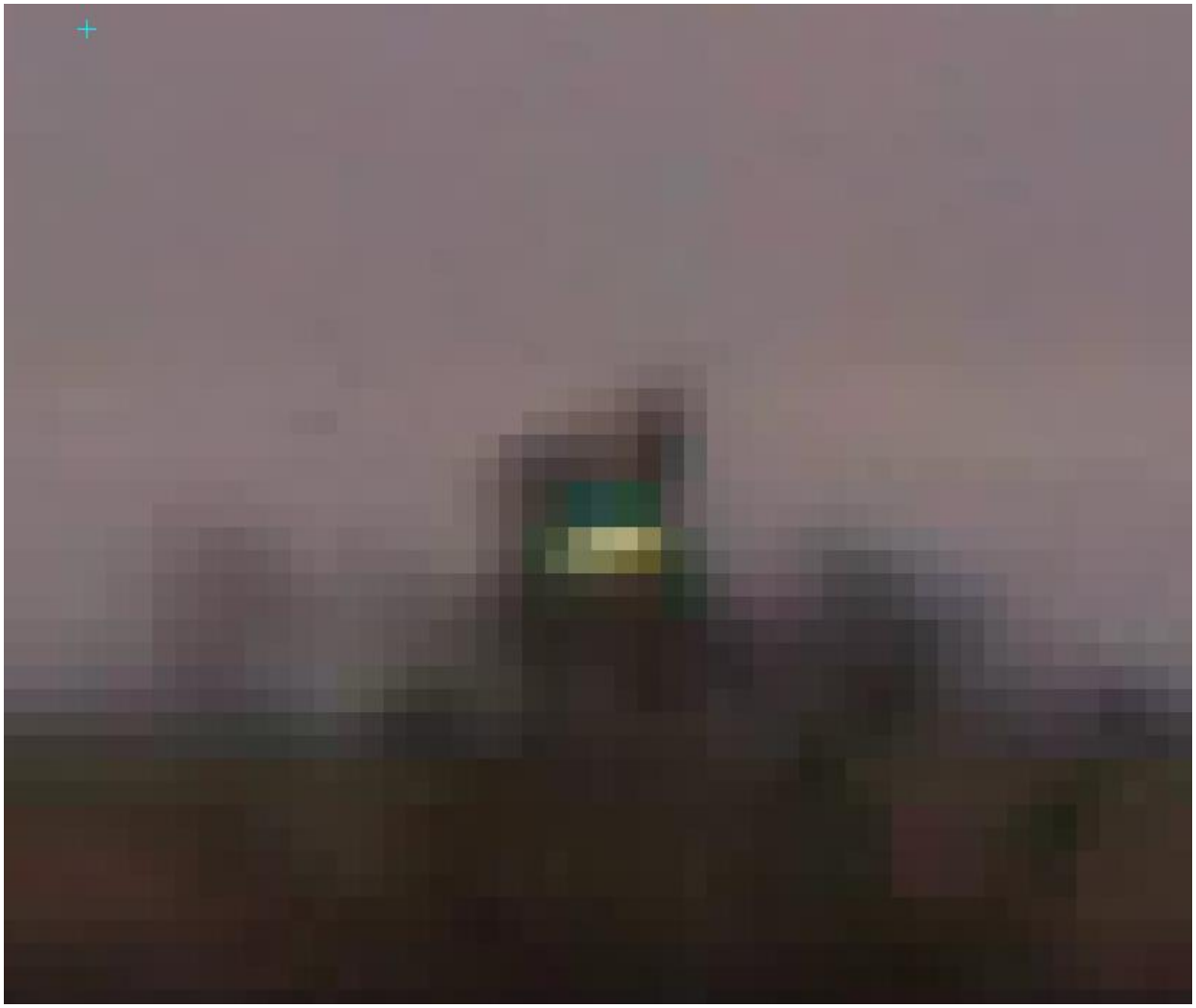
When the contrast is slightly stretched in the frame, it becomes apparent that the window refractions subtend an arc consistent with what would be expected from a bright object at a high incident angle as shown below.



The next frame is also suggestive of a non-CGI origin. In this frame, the object is no longer in the field of view, yet, contrast stretching shows that the refractive properties of the glass are still operating as if there is a source of illumination above the glass.

Again, while this can be done through a CGI approach, the modeling required to generate the image now includes a separate model to generate refractive properties of the glass overlaid onto the image of the glass. While not impossible, this becomes an extraordinary achievement only available to high-end CGI software modeling and expert CGI studios. There are multiple refractive and reflective events during the video sequence consistent with a bright object passing over the vehicle which would be extremely difficult to render without expert CGI capabilities.

One other image warrants demonstration which tends to discount the image sequence as CGI. In the next image, we are looking at the object after it has passed to the other side of the vehicle. The "flash" is still occurring albeit in a different geometry than before. In the final few frames, the "flash" appears to descend and at one point actually appears to dip behind a tree in the scene where the flash is visible through the tree. In this frame, the flash is partially obscured, but there are significant pixels surrounding the flash that show a bright green consistent with the coloration of the tree in the foreground. Below we see two consecutive frames prior to and during the flash, and a third frame which is an expanded view of the pixels around the final flash.



Again, while it is possible to replicate this imagery using CGI, it requires extraordinary attention to detail and talent to replicate this type of imagery.

Thus, the conclusion is that while it is possible to replicate the video using CGI modeling, the time and cost of performing such a rendering would be extremely high. It is therefore reasonable to proceed with the analysis as if the video reflects a real physical event.

Physical characteristics of the UAP & Flash

While the main UAP is visible in the majority of the frames, and the flash appears in over 50 frames, there is no detail that can be derived from any image processing of either object. Essentially, both objects saturate the pixels of the imaging device within the primary focus, and surrounding "halo" artifacts on the CCD (CPD) are consistent with pixel bleed through from adjacent saturated pixels. Thus, no physical structure detail can be derived beyond an assertion that the objects are bright enough to saturate the camera imaging elements.

The flash element has two interesting characteristics. The first is that the flash appears to have a time domain for behavior. No flash is apparent in two consecutive frames which implies that the flash duration is less than $1/27^{th}$ of a second. The fact that no flash occurs between frames in over 50 flashes suggests that the flash duration is significantly less than .7 milliseconds in duration otherwise some persistence between two adjacent frames might statistically be visible.

The second characteristic is that the flash appears to flash in pattern sequences. A sequence is defined as an interval during which flashes occur, followed by an interval during which no flashes occur. Intervals are roughly within 1 to 2 frame times suggesting that the typical sequence of flashes is usually on the order of $1/15^{th}$ second followed by pauses of longer duration. No sequence is less than 2, nor greater than 15 in the recording. No obvious meaning has been derived from the sequences, but this warrants further investigation.

One of the more interesting characteristics of the video is that the means by which it was taken permits a 3-d reconstruction of the event which permits physical size analysis of the UAP. Traditional 3-d photography consists of the simultaneous capture of two frames typically separated by several inches which thereby permits scene reconstruction when each frame is presented independently to each eye. In the case where a video is captured while moving at a tangent to the subject, as is this case in the moving vehicle, a 3-d reconstruction can be performed by using frames offset in time. Essentially, the vehicle motion (assumed to be 60 mph) provides the physical separation (assumed to be 3.26 feet) required to do 3-d reconstruction provided the scene characteristics do not change dramatically from frame to frame. Cross-eyed stereograms are used below to display the 3-d reconstruction generated by software designed specifically to do such reconstructions. Person's unfamiliar with how to view these images should look here: http://www.easystereogrambuilder.com/howTheyWork.aspx

Examples of 3-d reconstruction

This permits an approximation of the physical size of the UAP. The assumptions in this estimate are as follows:

1. The imaging is tangent to the window
2. The imaging is done from the midpoint of the traffic lane
3. The lane width is standard and the separation from the center of the lane to reference road signage is 100 feet.
4. The reference road sign (suggested by imaging) is a two post informational sign at the standard size for an E1-4 or E1-1a which is typically 4.5 feet tall.

If these assumptions are correct, at the time the UAP crosses the location of the road equidistant to the sign seen in other frames, then the object diameter is approximately ¼ the sign size which places the UAP size at something between 1 and 1 ½ feet in diameter.

From this estimate, using a comparable cell phone camera, this permits us to estimate that the UAP position at closest approach was less than 10 feet from the lens.

Possible physical causes

Ball Lightening

Dimensionally, the only comparable known phenomenon that comes close to this behavior is ball lightening. The dimensions of the object and brightness are consistent with the extremely rare photographs of ball lightening.

This is, however, problematic in several ways.

1. There is no record of ball lightening associated with a "secondary" ball which is proximate to the primary that flashes at intervals.

2. As an electromagnetic phenomenon, ball lightening would tend to ground and discharge. While ball lightening has durations in excess of the time of this video, there are no records of ball lightening approaching a vehicle. In cases where ball lightening has been seen to approach an object, i.e. a fence, it does so in a manner which results in grounding, discharge and ending of the event. Approaching the vehicle would make sense if the vehicle were of opposite polarity, but not grounding and proceeding past the vehicle after a close approach is not consistent with prior observed behavior of ball lightening.

Laser Induced Breakdown

Laser induced air breakdown could produce an event equivalent to that imaged here inclusive of the "secondary" discharges. However, no civilian or declassified military system has the capacity to perform a continuous discharge lasting 22 seconds inducing a plasma size of 12 or more inches. Use of a classified military CW laser with many megawatts of CW power adjacent to a public freeway system, while possible, would be an extremely unwise and dangerous event. Sweeping such a discharge towards a moving vehicle would run the risk of seriously injuring the passengers which is not consistent with military test protocols.

Further analysis

This video sequence provides a very rich sequence of data for analysis. There is sufficient detail and content to compose a complete geometry of the event inclusive of location and size of all aspects of the UAP.

Given the overcast nature of the sky conditions at the time, a weather reconstruction needs to be performed to determine the location of any electrical storms that may possibly have induced a ball-lightening event.

Final geolocation needs to be performed to examine proximity to any military, or electrical power stations which may have contributed to the event.

Supporting Data

Available author derived data includes:

1. Extract of all frames as uncompressed jpeg files
2. 3-d stereo pair video reconstructed from the original video
3. Image stabilized video