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| Artifact ID:  CD-006 | Artifact Title:  Predictive Tracking Concept Defintion | |  |
| Revision:  1.1 | Revision Date:  15 NOV 2019 | |
| Prepared by:  Nick Merriman | | Checked by:  Checker |
| Purpose:  The purpose of this artifact is to clearly communicate the concept for the predictive tracking system. | | |

# Revision History

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| --- | --- | --- | --- |
| Revision: | Revised by: | Checked by: | Date: |
| 1.0 | Autumn Twitchell | Nick Merriman | 7 NOV 2019 |
| 1.1 | Nick Merriman | XXX | 15 NOV 2019 |

# References

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| Artifact ID: | Revision: | Title: |
| CD-004 | 1.0 | Reactive Tracking Concept Definition |

# Concept Definition

The tracking controls system refers to the coding method that we desire to use in order to properly track the in-flight vehicle. This does not include the computer hardware or the mechanical device we are using to track the vehicle. This concept involves the method of receiving data and determining what needs to happen with that data in order to find the in-flight vehicle. When the aircraft is in the antenna’s field of view and a communication link is established, we will receive the aircraft’s GPS coordinates. Using that information, we will update the gimbal position to keep the antenna on our system pointing within 8 degrees of the center of the plane at all times.

The predictive system will use the aircraft’s previous locations to calculate its velocity vector. This will be used to preemptively determine where the aircraft is heading. The GPS coordinates are only received at a rate of 2 Hz, but by predicting where the aircraft is moving, we can update the antenna’s position at a faster rate. This will allow for smoother tracking of the aircraft. This would also be beneficial in the case of a power outage where the communication link is lost. By knowing the velocity of the aircraft, we can predict where it should be when power is restored. This would allow for faster reacquisition upon power being restored.

# Decision Justification

We have decided not to pursue predictive tracking at this time. Our testing showed that the reactionary control method (see CD-004) would be sufficient for keeping the aircraft in the field of view and maintaining a communication link. We feel that pursuing the predictive method would be overly complicated and would not be the best use of our time. The biggest advantage of this method is in the case of a mid-flight power outage. After talking more with IMSAR this is not a likely scenario and is not a major concern. If we have extra time towards the end of the project predictive tracking could potentially be explored further.