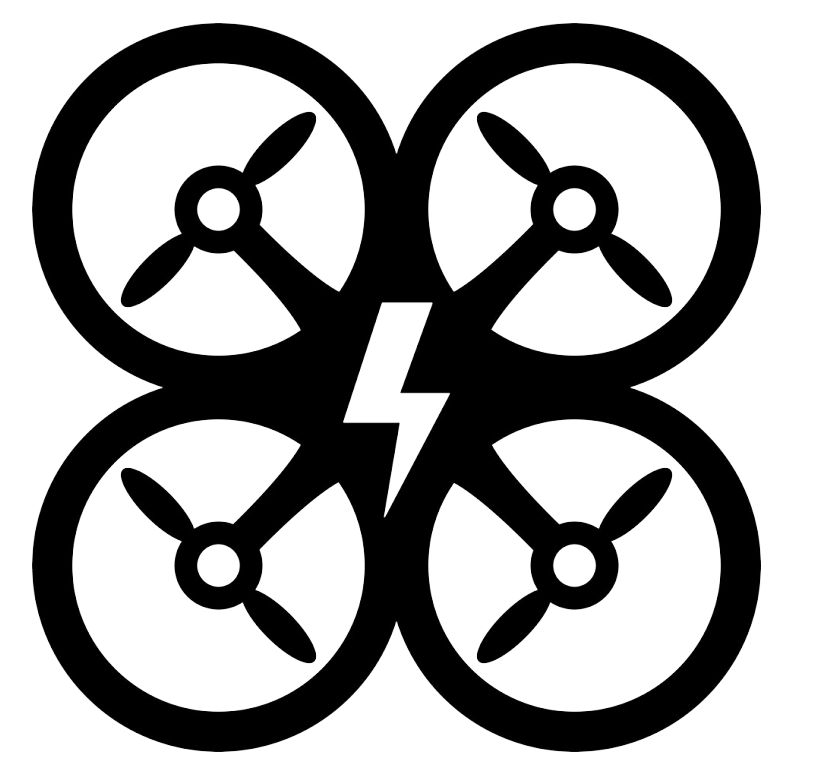


# Drone Energy Delivery DEC1705

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## Goals

- Autonomous flight to node
- Locate destination with image processing
- Autonomous landing on node
- Functional charging unit

## Functional Requirements

- Application must be able to take command and fly to node
- Drone must land autonomously on node
- Drone must be able to charge node by landing on it
- Drone must be able to return to base

## Non-functional Requirements

- Ability to request and update GPS position data
- Predetermined symbol on node for image processing
- Must be able to process images quickly enough to update commands
- Requires a robust tracking method for final guidance

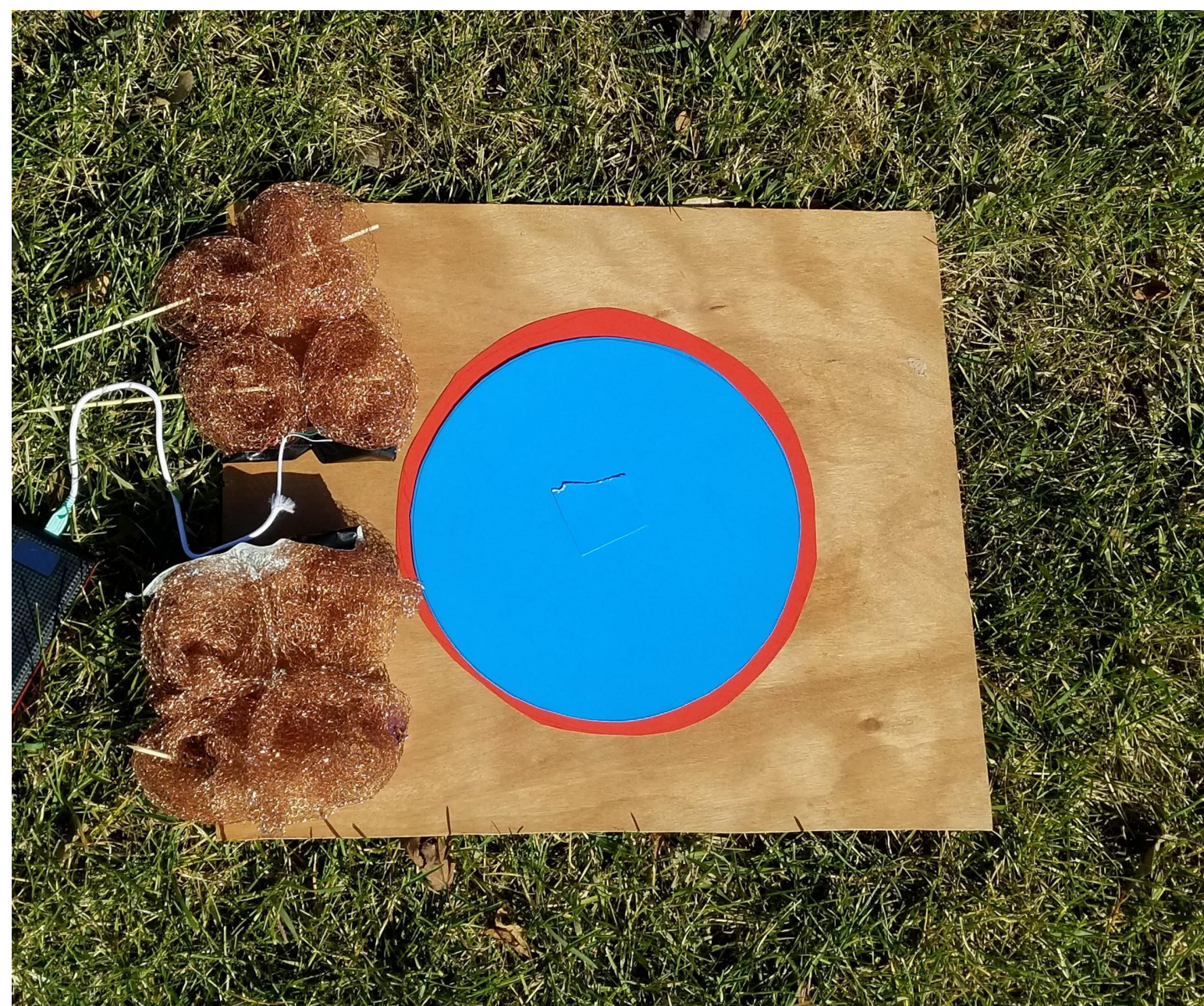


## About

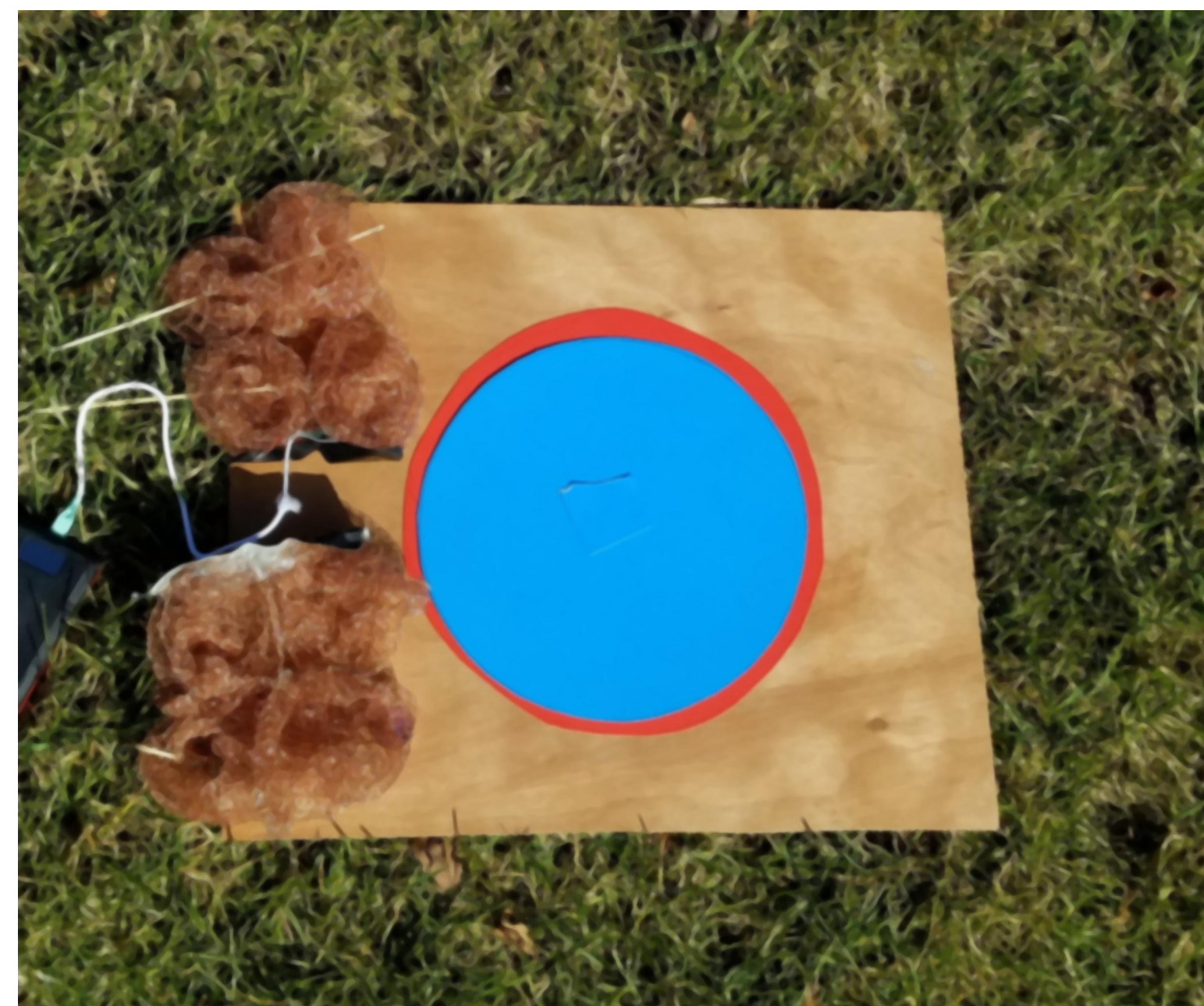
- DJI Phantom 3 Standard
- Interfaced with SDK
- High resolution camera
- Android Device communication via ad-hoc wifi network

## Navigation

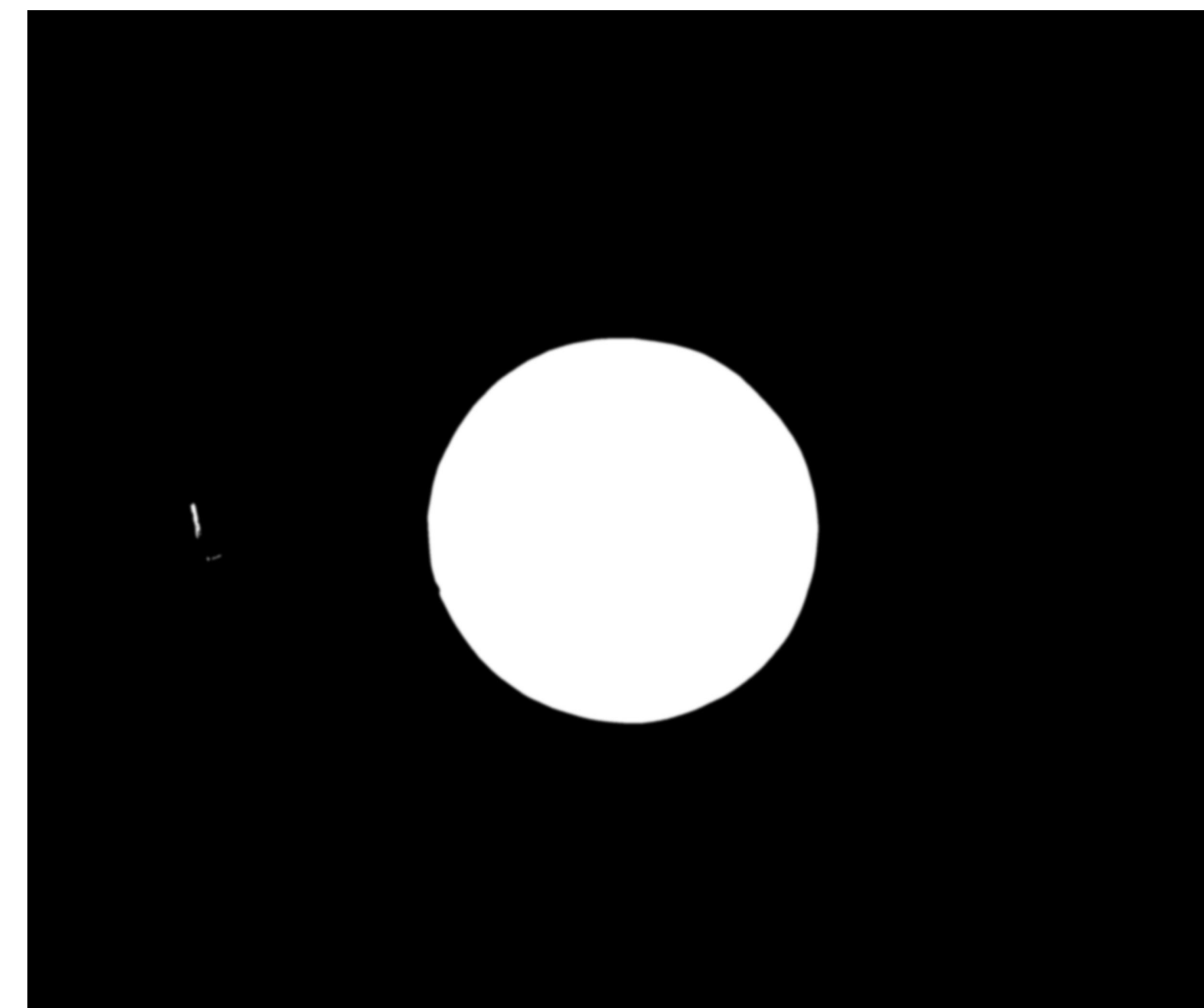
- Uses GPS for general flight guidance
- Flight altitudes modifiable based on information stored about node



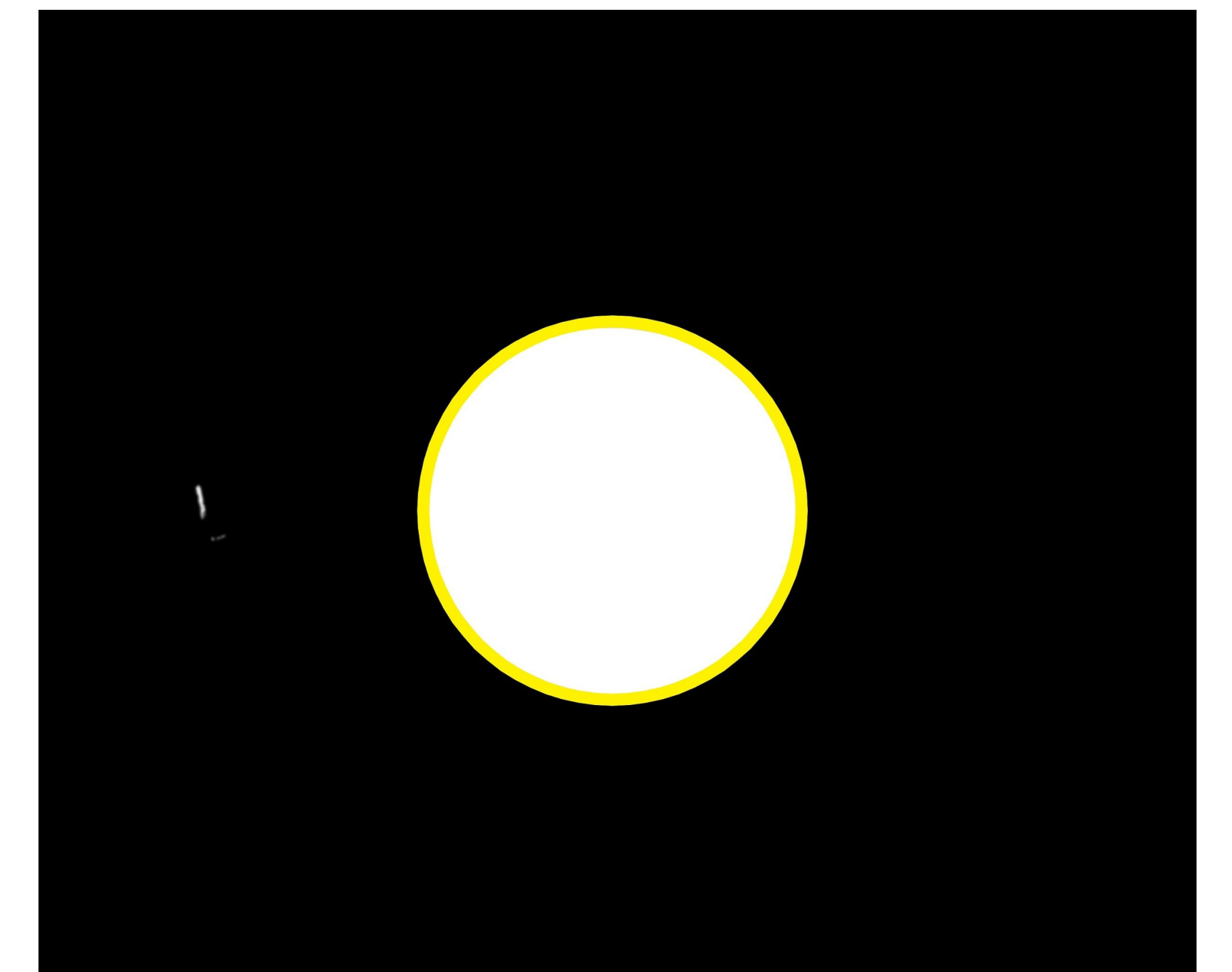
- Original retrieved image



- Image blurred using Gaussian and median filters



- Threshold for hue applied
- Image is dilated to produce smoother edges



- Circle Hough transform algorithm applied
- Tracked object is marked

## Landing

- Video stream images analyzed to find target
- Position error from images fed to PID controller
- PID output transmitted to drone
- Altitude calculated by target size
- PID values scale with altitude
- Drone is locked facing north
- Copper wool used for electrical contact surfaces



## Group Accomplishments

- Autonomous flight between GPS coordinates
- Image tracking of marked nodes
- Use of PID controllers to center and land drone on node
- Charging remote node using autonomous drone