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From: K2S3


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**Summary**
Throughout this week, several details of the topic of this project were revised.

Although the topic was chosen last week, there was a lack of papers that are related to this project. Hence, by having a meeting with the Ph.D. student, Mia, several discussions are done to specify the topic.

Based on the feedback of the Ph.D. student, various preceding papers were researched and summarized by all members to find specific motivations for the topic.

In the following week, data for this project will be collected at Prof. Smith's farm and the first draft of "Abstract" will be confirmed by the Ph.D. student, Mia.


**What K2S3 completed this week:**

- Having a meeting with the Ph.D. student, Mia
    - The presentation was presented with slides and images
    - Feedback from the Ph.D. student
        - Equipment
            - Microphones: MacBook is used in her research. No other devices are needed such as connecting devices or software.
            - Noise reduction: No extra work was needed as the data is collected at places near uncrowded Lafayette. The filter algorithm for the noise processing was enough.
            - Sound: The sounds are collected using Raspberry Pi connecting to a MacBook to save sound files and divided by 10 seconds each.
            - GPU server: No GPU server was used. Only MacBook Air is used.
            - Spec of laptops: When training, it is preferred to use laptops or computers that have the same spec. If the types are different, using only one that has the best spec is required.

        - Related Papers
            - At least 10-12 papers should be reviewed.

        - It is important to summarize each paper and to know the main algorithms that are used for training.
        - Research papers that are about the altitude of UAVs are needed. However, the research papers that are done using video and audio-based features are also helpful for this research.
        - More motivations are needed to research and publish the paper as the research should be valuable and reasonable.

    - Further meetings
        - The meetings are planned for every Wednesday.
        - Before the next meeting, more papers with related topics need to be researched and summarized. Furthermore, the motivations for the altitude estimation of UAVs should be clarified.

- Reviewing papers related to this project
    - Papers were assigned to all members.
    - All papers are reviewed and presented by the members.
    - Two main types of papers are reviewed: papers that used audio and visual-based feature and papers that are about drone collision, altitude, and traffic control.

- Working on the first draft of "Abstract"
    - About 10 papers are referred to write "Abstract" of this paper.

- Revising the details and motivations of the topic
    - Few preceding research papers with the estimation of UAV's altitude are searched. However, since the estimation of the altitude is believed valuable, more other papers are researched to find motivations.
        - Recently, as the demand for drones increases, drone traffic management and drone delivery system issues are drawn. Hence, estimating the position of the drone may help the drone traffic management such as drone delivery or drone transportation.
        - The goal of this project is to estimate the position (estimating the altitude and width with fixed distance) using two drones in the air to collect data.
    - The main keywords of this project were discussed and drawn, which are "UAV", "Altitude", "Detection", "Distance", "Position", "Drone traffic management", "Sense and Avoid", "Acoustic", "Visual", and "Video".

- Building the basic structure of this experiment

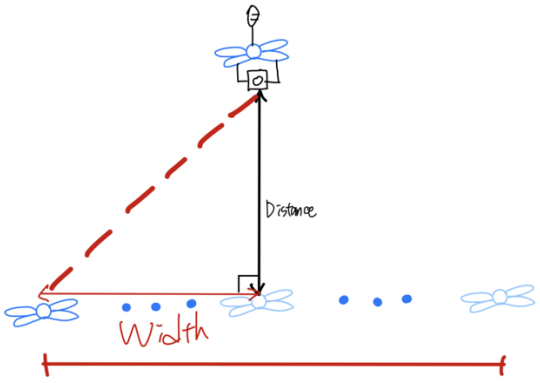


**Figure 1 Main Structure of Top Angle**

This structure in Figure1 is when collecting the data to the top. Orthodromic distance is fixed, and the position of the UAV moves to the horizontal axis (y-axis) to collect the data.

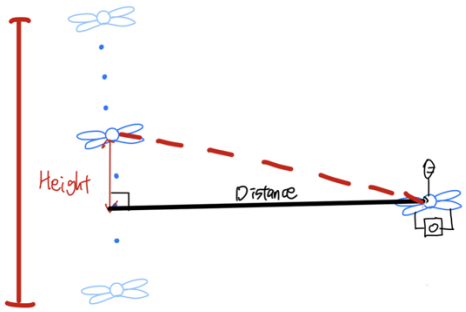


**Figure 2 Main Structure of Front Angle**

Another structure in Figure 2 is when collecting the data to the front. Orthodromic distance is fixed, and the position of the UAV moves to the vertical axis (x-axis) to collect the data.

- Data Collection Pre-setting
  - The distance between two UAVs is set to be the minimum distance to avoid the target UAV. (The distance is fixed when training)
  - The position of the target UAV indicates as the $X \in width, Y \in Height$ value, after initiating the coordinate of 2-dimension space in the fixed distance.

**Things to do by next week**

- Collecting data in Prof. Smith's farm.

  An appointment was made with Dr. Matson on next Monday, so data collection is supposed to proceed.

- Setting up the experiment environment.
    - Papers will be written to choose certain conditions below
        - Weather condition
        - Minimum distance between two drones
        - Environment (e.g., indoor, grass, etc.)
        - The type of noise
        - The range of given area
        - etc.
    - Methods of saving both video and sound will be discussed.

- Meeting with Ph.D. student, Mia
    - On May 11th, the meeting will be proceeded.
    - The new presentation will be prepared, as the change of the project topic.
    - First draft of Abstract will be sent by this Sunday and will be checked.

- Writing Introduction draft 1.
    - Introduction will be drawn including new keywords above.
    - Collecting and comparing more than 5 papers related to the project are needed.

**Problems or challenges:**

- Motivation to the topic of the project was not founded.

  There was little paper related to the topic "The Altitude Estimation of the UAV using Acoustic and Visual Methodology", so it was hard to search the motivation of the project. Hence, new topic was drawn, which is "Estimating Position of the UAV using Acoustic and Visual Methodology". Based on new topic, new keywords were also set up.

  (The reason to change the topic of the project is written above.)

- Determining equipment.
    - Multiple microphones, one camera, and more than one drones are needed to the project. Certain device models of those, however, has rarely listed the papers related to the project, so which device will be chosen was considered.
    - Equipment that are necessary to the project is affordable to what Dr. Matson have, so the type of devices will be checked next week.

**References**

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