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From: Beer per Day

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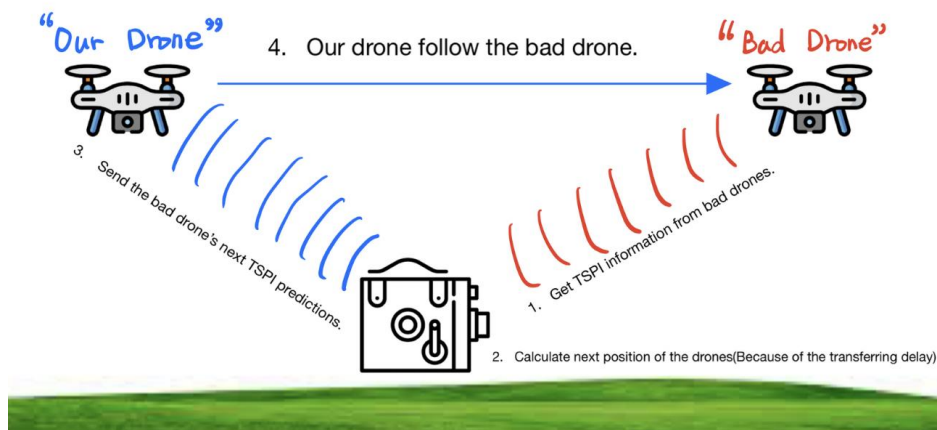
Summary

All the team members make an individual today's plan related to the project.

- Research-related works about predicting the trajectory of objects.
- Verify Machine Learning Architectures about the related works.
- Write a draft of the INTRODUCTION in the paper.

What Beer per Day was completed this week:

- **Narrowing the research's subject**
 1. Decide to predict the next position of the UAV because of the communication's latency.
- **Find Related references**
 1. Trajectory prediction of UAV Based on LSTM [1]
 - a. LSTM: Long Short-Term Memory(Deep Learning)
 2. UCAV maneuvering trajectory prediction based on PSO-CNN [2]
 - a. UCAV: Unmanned Combat Aerial Vehicle
 3. Vehicle trajectory prediction based on the LSTM network [3]
 4. A Deep Learning Approach for Aircraft Trajectory Prediction in Pre-Tactical Stage [4]
- **Design project architecture**
 1. Make steps for the research goal. (Temporary image)



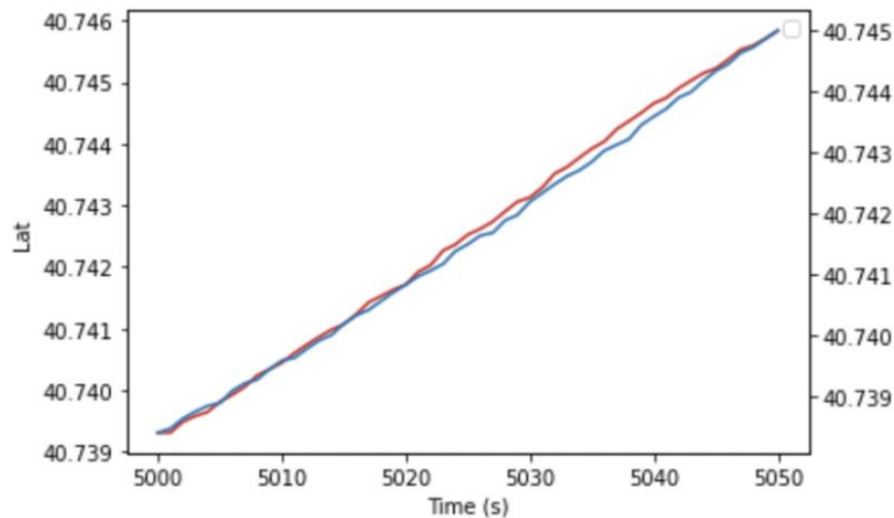
2. Devise about Machine Learning Algorithm for trajectory prediction.

A. Make LSTM Algorithm for trajectory prediction.

```
[125] x_input = array([latX.loc[i:i+2] for i in range(401, 5000)])  
# print(x_input)  
y = array([latX.loc[i] for i in range(404, 5003)])  
  
yhat = model.predict(x_input)  
# print(x_input)  
print(np.std(yhat - y))  
  
144/144 [=====] - 0s 1ms/step  
0.07970260233427993
```

i. Error: 0.0797 (using the RMSE). It is not appropriate for comparison.

B. Make Linear Regression Algorithm for trajectory prediction.



```
[ ] np.std(sub_data)  
  
Lat    0.061668  
dtype: float64
```

i. Error: 0.0616 (using the RMSE). It is not appropriate for comparison.

Things to do by next week

- Make error equation for Machine Learning Algorithms.
- Configure which model to predict the next position of a bad drone.
- Configure data format from the aerospace.

Problems or challenges

- How to make the error equation? (What is the appropriate equation?)
- How to find the data-set about drones or other flying objects?

References

- [1] Peng Shu, Chengbin Chen, Baihe Chen, et al. Trajectory prediction of UAV Based on LSTM, 2021 2nd Int. Conf. on Big Data & Artificial Intelligence & Software. Engineering (ICBASE).
- [2] Xie Lei, Ding Dali, Zhang Hongpeng, et al. UCAV maneuvering trajectory prediction based on PSO-CNN, 2021 Int. Conf. on Computer Engineering. and Application(ICCEA).
- [3] Zhifang Yang, Dun Liu, Li Ma, et al. Vehicle trajectory prediction based on LSTM network, 2022 Int. Conf. on Artificial Intelligence and Computer Information Technology (AICIT).
- [4] Ziyu Zhao, Lidong Zhang, Jizhi Mao, et al. A Deep Learning Approach for Aircraft Trajectory Prediction in Pre-Tactical Stage, 2022 5th Int. Symp. on Autonomous Systems(ISAS).