Human Perceptual Models

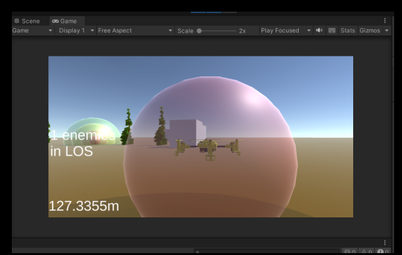
Department of Computer Science, California State University of Los
By Jesus, Peter, Bruck, Jean Paul, Raymond, George, Hugo, Lloyd,
Faculty Advisors: Dr. David M. Krum PHD. • Liasons: Dr. Eric Holder PHD, Dr. Paul

Objectives

The objective of our project is to develop a program that models human audio and visual perception for soldiers to use for reconnaissance.

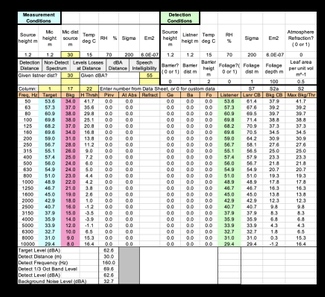
- Takes in various factors such as environmental noise
- Use 3D Unity simulations to pinpoint a good distance from target

Unity



The Unity program uses an instantiated model from WebODM and the provided physics model to visualize the results. By using the simulated environment, the drone can be moved through it by way of WebODM, and by utilizing a linked list of all humans that can potentially detect the drone, can calculate their distance and detect any potential obstacles using Raycasting.

Results



- Past data is meaningful but was lost in old past of functional programming.

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det_cons = {
    'source_height_det': 1.2,
    'listener_height_det': 1.2,
    'celsius_degrees_det': 15,
    'relative_humid_percent_det': 70,
    'sigma_det': 200,
    'em2_det' : 0.0000006,
    'wind_speed': 0,
    'wind_flag': False,
    'wind_direction': 'UP',
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    'barrier_dist': 1,
    'barrier_height': 2,
    'foliage_on': False,
    'foliage_dist': 1,
    'foliage_depth': 100,
    'leaf_areapervol': 0.5,
    'leaf_width': 3.2,
}
```

- Same meaningful data but in modern day object oriented programming

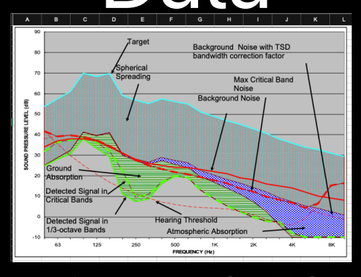
Unity®

- Highly scalable, flexible, intuitive to other developer envi-

BackGround

The ARL is focused on scientific discovery and technological innovation to advance the US Army's chances of surviving and winning future conflicts. The human perception model is an overview of the human senses, used to create pathways for drones to pass through undetected.

Data



ARL provided the SUDO team with various research documents pertaining to auditory and visual human perception.

- Both 3D mapping and the algorithm outputs are fed into a Unity visualization
- Creating probability detection bubble, making a stealthier drone

Future Applications

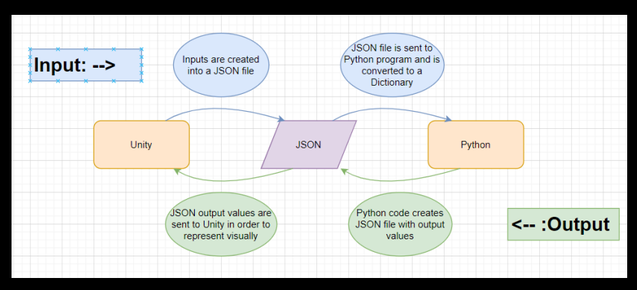
Our team's various tools will help the next team to take on implementing a rigorous model using other human senses, even potentially using psychological factors with the updated data model. Future access to a unity program will be useful to test out said, more complex, model-

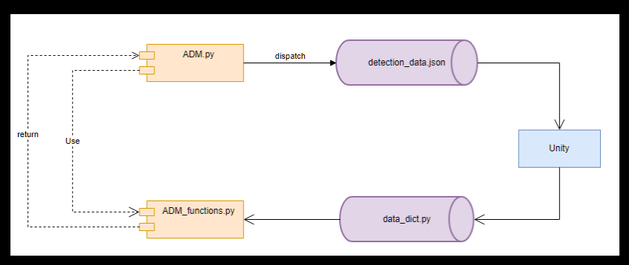
Modeling



The models created via WebODM will allow us to send Unity a realistic environment. These models will serve as a sandbox area for testing drone flight navigation and for general location exploration. The amount of detail that can be represented based on a small set of images is optimal for rapid deployment, minimizing any redundancy in environmental re-

Scripts





Conclusion

Our team's research and the development of this software could not only potentially lower the risk of our troops losing their lives due to lack of reconnaissance solutions on the squad-level, but also potentially save countless civilian lives and billions of dollars in unnecessary collateral damage.
There is nothing more powerful to the military than good intelligence, and SUDO