

## **sdmay19-10: Distributed Wild Bird Surveillance and Recognition System**

Week 3 Report

September 23 - September 29

### **Team Members**

Claudia Athens — *Systems Integration Lead*

Ben Simon — *User Interaction Lead*

Francisco Arreola — *Infrastructure Lead*

Pierce Adajar — *Machine Learning Lead*

### **Client**

Dr. Joseph Zambreno

### **Faculty Advisor**

Craig Rupp

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### **Summary of Progress this Report**

This week was dedicated to completing project plan version one. This required a lot of discussions as a team and with our client and advisor to determine the appropriate requirements and deliverables of this project. We also had to decide as a team the higher-level architectural decisions of the project and have broken the project into four main areas: hardware, detection and classification, data streaming and storage, and user notifications and frontend. This has allowed us to better break down the project in requirements and planning. We have completed the plan and have submitted it to the project web page.

We have completed additional research on camera systems and hardware platforms. We are currently sourcing a camera from ETG and using an Nvidia Jetson TX1 from Dr. Zambreno's lab. Per our discussion with the client, we also conducted research into some higher cost/quality options with respect to the board and camera.

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### **Past Week's Accomplishments**

The pending issues that were fixed from last week were reviewing the project's requirements with the client and finalizing our camera decision. We also finalized the first version of the project plan and have given it to our client to review for concerns and errors. Individual accomplishments for the past week are detailed under individual contributions.

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### **Pending Issues**

ETG requires that we only buy equipment from certain approved suppliers. The camera we have decided on may not be able to be sourced from their suppliers. We will consult with ETG when Lee Harker comes back to the office on 10/1/18. At this point in time, we are also unable to get our GitLab activity to generate from the autogenerated status reports. We will have to consult with the TAs for the next status report.

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### **Plans for Upcoming Reporting Period**

Under the assumption that we can buy the e-CAM131\_CUTX2 from E-Con Systems, we plan on purchasing the camera this week. This week we will begin to conduct the base setup of this project's components. We will begin the setup of a Nvidia Jetson TX1 that Dr. Zambreno has allowed us to use in his lab. We will also get a prototype website setup.

**Individual Plans:**

Ben:

- Install basic components to start a website on the Iowa State virtual machine
- Create a test website to weight pros and cons using AWS and the Iowa State virtual machine
- Research bootstrap and css for web development
- Research methods to stream video from a web server or using amazon Lambda streaming service.
- Create a prototype front end page

Claudia:

- Coordinate with ETG to get camera ordered.
- Begin setup of Jetson TX1.
- Assess Nvidia Xavier board and its possible camera options.
- Continue to conduct market research on case solutions with respect to size, design, weatherproofing, dustproofing, stability, and material.

Francisco:

- Evaluating functionality of YOLO implementation.
- Researching additional networks we could use for object detection.
- Provide a write up the various cloud providers along with a recommendation.
- Begin work on cloud service to back to the web frontend.
- Look into communication between the board and a cloud service.

Pierce:

- Evaluate test CNN model for hardware requirements and preliminary accuracy.
- Implement a smoothing function for image input, in order to shrink the network size.
- Implement a colorspace change (RGB -> HSV) and analyze whether it affects low-lighting conditions and overall accuracy.
- Continue to research and implement network architecture changes as needed.

**Individual Contributions**

Team Member	Contribution	Weekly Hours	Total Hours
Claudia Athens	Claudia finished camera her evaluation and recommended a camera to the client. Began research on NVIDIA's new Xavier Board and the cameras others have used on the board. Started market research on consumer cases available and what standards our case and project should adhere to.	11	31
Ben Simon	Ben has researched methods of hosting the frontend web page on AWS and Iowa State web servers. He has submitted a request for a virtual machine from ETG in order to create a prototype web page. Additionally, has created a developer account with AWS to test their services.	10.5	29.5
Francisco Arreola	Francisco has continued working with training YOLO as well as testing other object detection	9.5	28.5

	networks. Additionally, he has contributed to completing the project plan last Friday. Additionally he conducted research on various cloud providers, and the services they provide.		
Pierce Adajar	Pierce has contributed time to researching neural network training models and how to apply them to our project, along with finishing up driver installation to resolve the previous issues. Additionally, he has helped contribute to the project plan.	5	26.5

### Meeting Notes With Client

This week friday we meet with our client. The meeting was to discuss general progress, hardware options, and potential hardware challenges. After discussing our general progress, we consulted with our client on several options of cameras and Nvidia Processing boards. He stated that our choices of cameras were fine and should be a good fit for the Nvidia boards. Next we discussed buying either a Nvidia TX1 or Xavier processing board. The client stated that the Xavier board while more expensive may be a worthwhile purchase for the project, and we can expand budget to accommodate for it. Additionally, he granted us access to his lab's TX1 boards for developing our project.

Next, we discussed potential challenges of integrating the camera with the jetson and creating a weather proof case. We learned about potential issues and solutions of interfacing the camera using L4V2. Secondly, we discussed our concerns about creating a weather proof case that could house the camera. We brainstormed several different options such as creating a weather proof seal for the camera or purchasing a clear case to house the whole system. We will dedicate further research to ensuring the case will be weatherproof.

### Gitlab Activity Summary

Not currently working.