Smart Animal Tag

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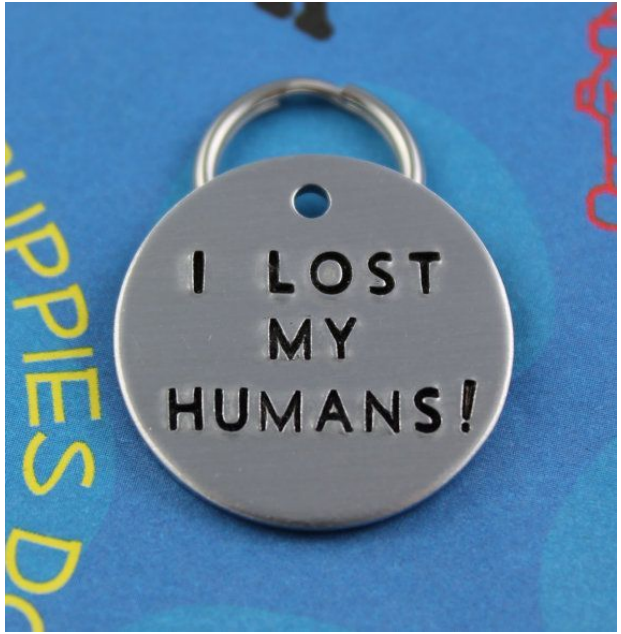
What is a Smart Animal Tag (SAT) ?

Smart animal tag (SAT) is a small electronic device that is used to monitor animals remotely through a web interface.

SAT offers

- Compact and Sleek Design
- Real-time GPS tracking
- GeoFencing
- Heartbeat monitoring
- Animal Behaviour monitoring and prediction
- Check surroundings through attached Camera
- Poaching alert through bluetooth
- Wildfire detection

SAT for your pets



- Long battery life
- Tracks your pet's location and predicted mood in real time so they never get or feel lost
- Tracks your pet's heartbeat on the SAT Web Application and build a stronger connection
- Get notified when your pet enters an area that is off-limits to them
- Check your pets routine through the built in camera

SAT for Preservation

- Small and Waterproof design
- Wearable on animals of any size
- Track movements and predict activity
- Get notified when animal enters a restricted zone
- Get notified when their heartbeat spikes
- Identify unauthorised personnel based on video captured from tag cam
- Detect nearby Bluetooth devices, capturing human presence in restricted areas to prevent poaching/hunting

Requirements

1. Robust service that works in an environment without WiFi
2. Portable and long-lasting battery supply to minimize the replacement of batteries, hence the interruption of animal activity
3. Real-time data processing and alert system to notify users about potential risks promptly
4. Real-time location monitoring service with geofencing capabilities that support both short and long-range tracking
5. Responsive application interface that supports different screen sizes, eg. desktop, laptop, tablet, mobile
6. Waterproof casing to ensure the product is resilient to different weather conditions

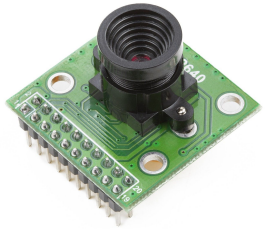
High Level Design - Hardware

1. De1-Soc with Arm Processor
   - ➢ Matrix multiplication Hardware Accelerator
   - ➢ Activity prediction through Machine Learning

2. Terasic RFS daughter board
   - ➢ Bluetooth and Wifi Capabilities
   - ➢ Temperature and Humidity Sensor
   - ➢ Accelerometer

3. ArduCam

- Video/Image Capturing

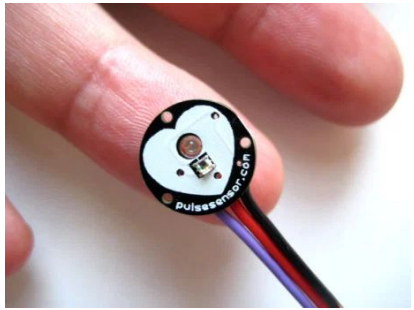


4. Neo 6M GPS

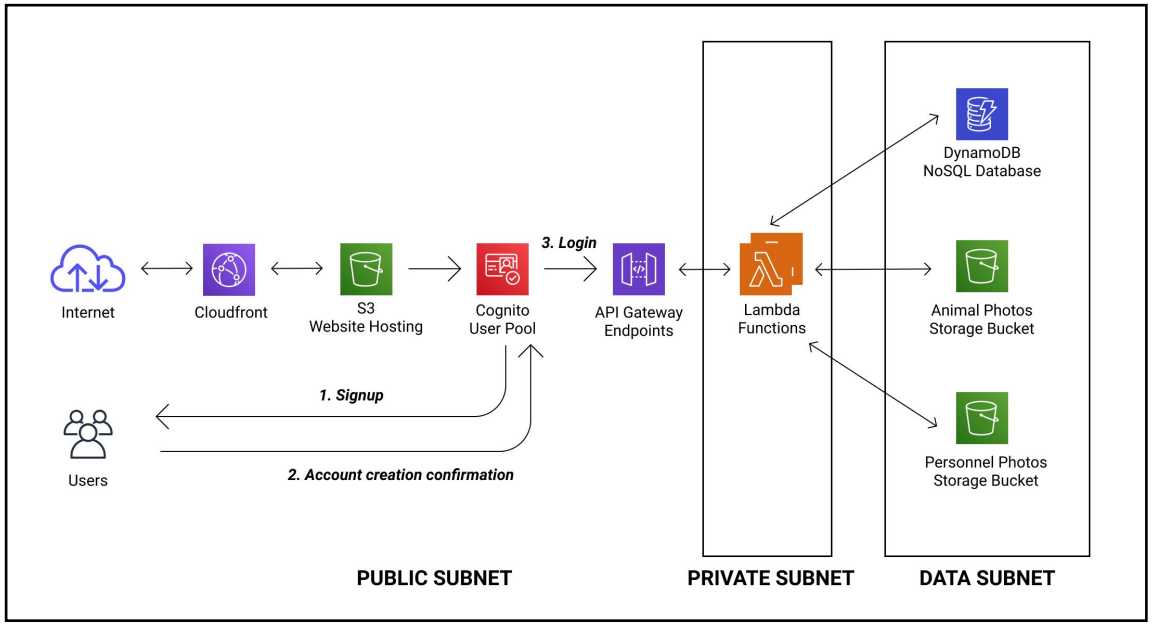
- Location Tracking & GeoFencing

5. Arduino Pulse and Heart Rate Sensor

- Heart Rate Monitoring



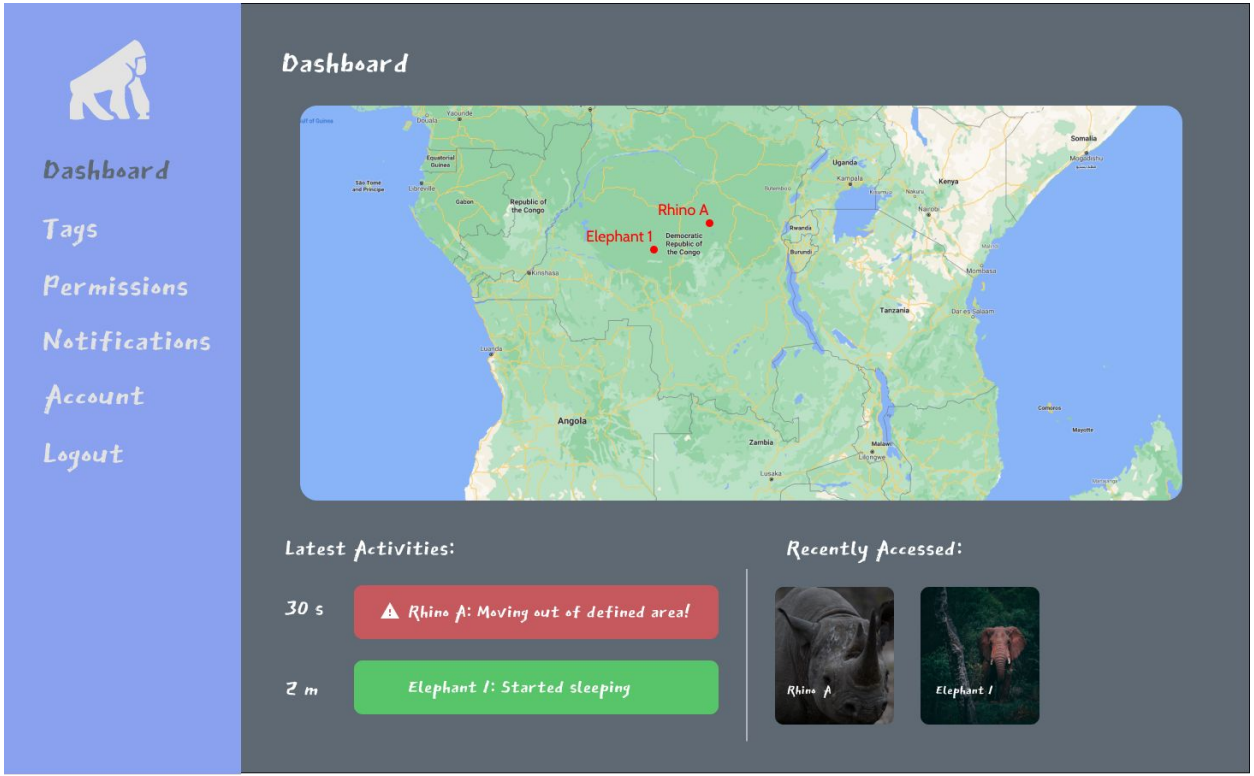
High Level Design - Software



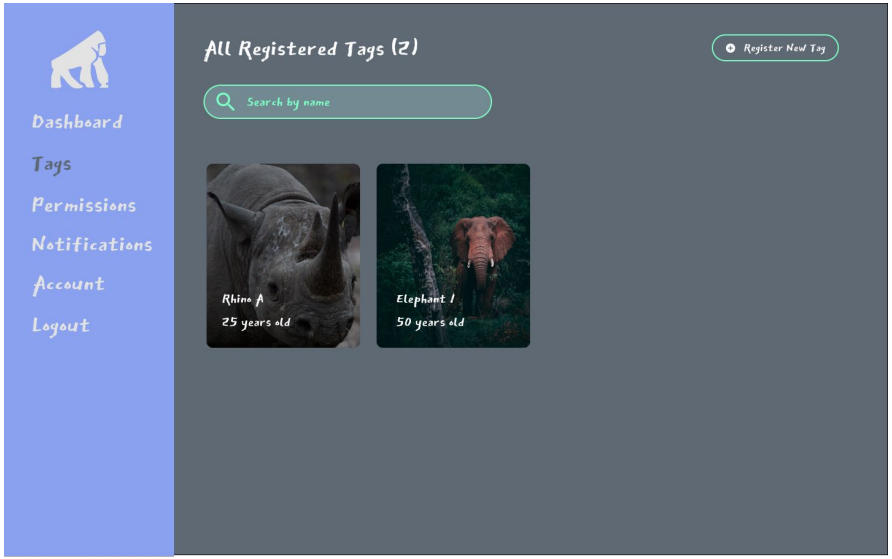
Overview of how the Serverless architecture works:

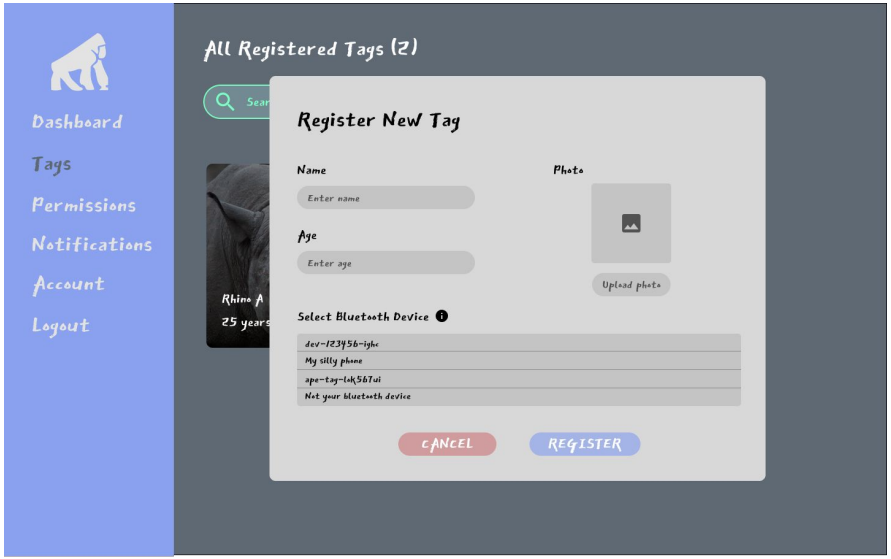
1. Website hosting through Cloudfront to provide high transfer speed and low latency
2. Cognito User Pool is used for user authentication and management
3. API gateway helps in HTTP connections and endpoint routes, also triggers lambda functions.
4. DynamoDB provides low latency access to data.

GUI - Main Dashboard

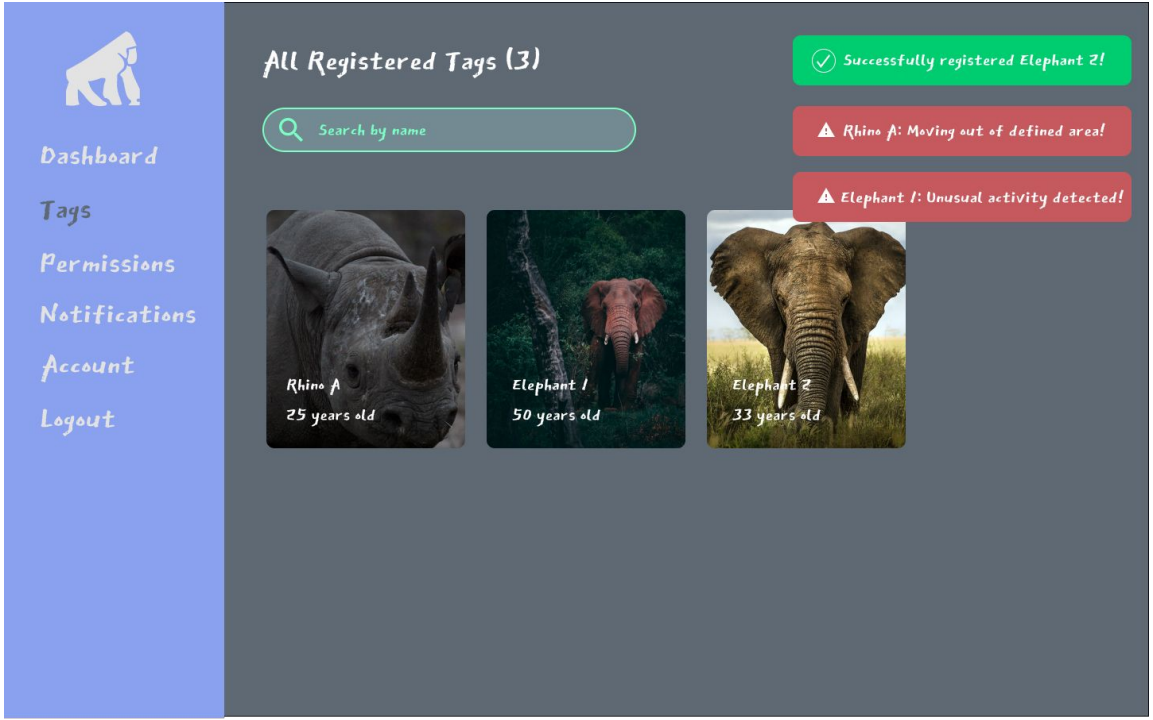


GUI - Registering Tags

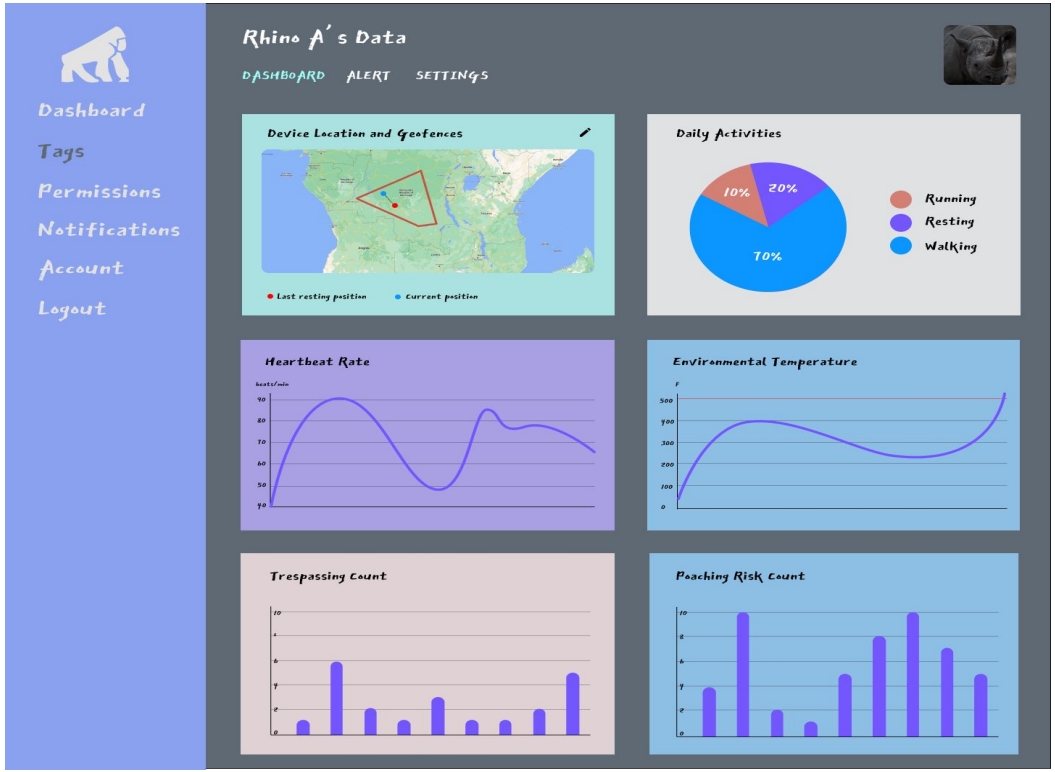




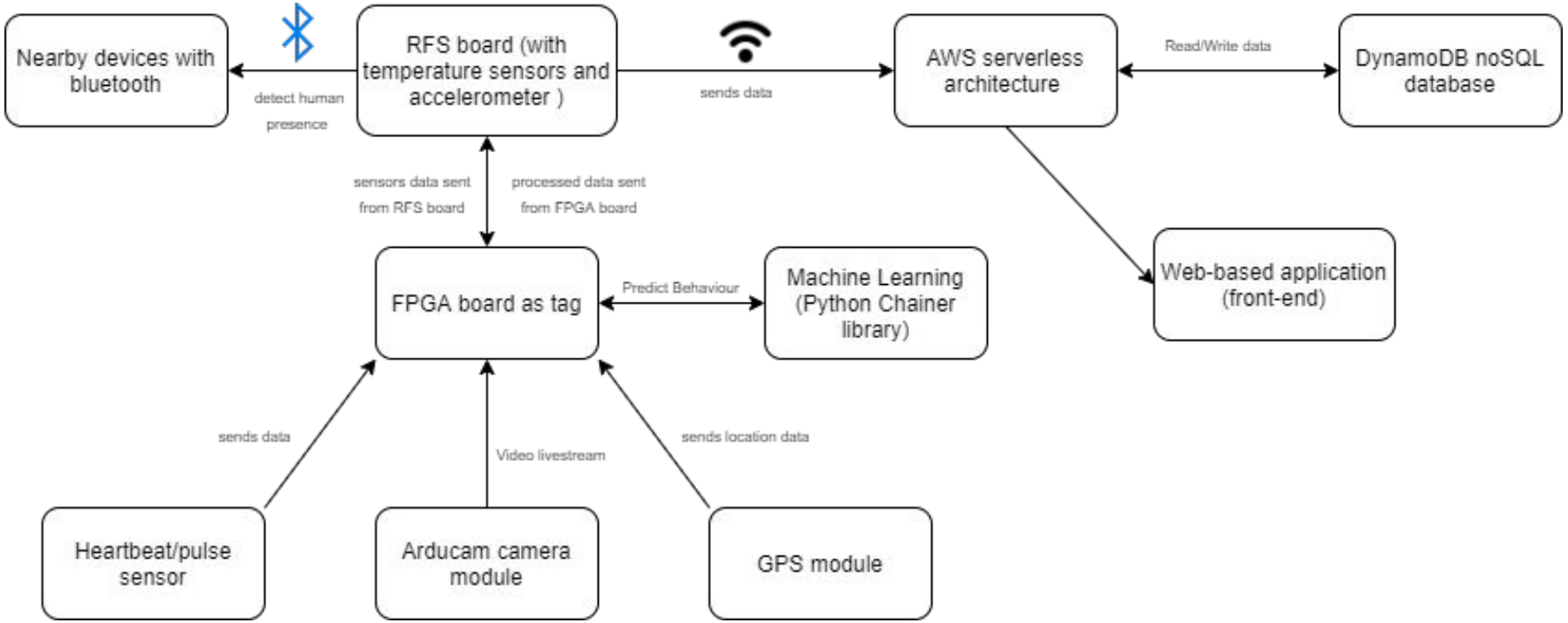
GUI - Notifications



GUI - Individual data



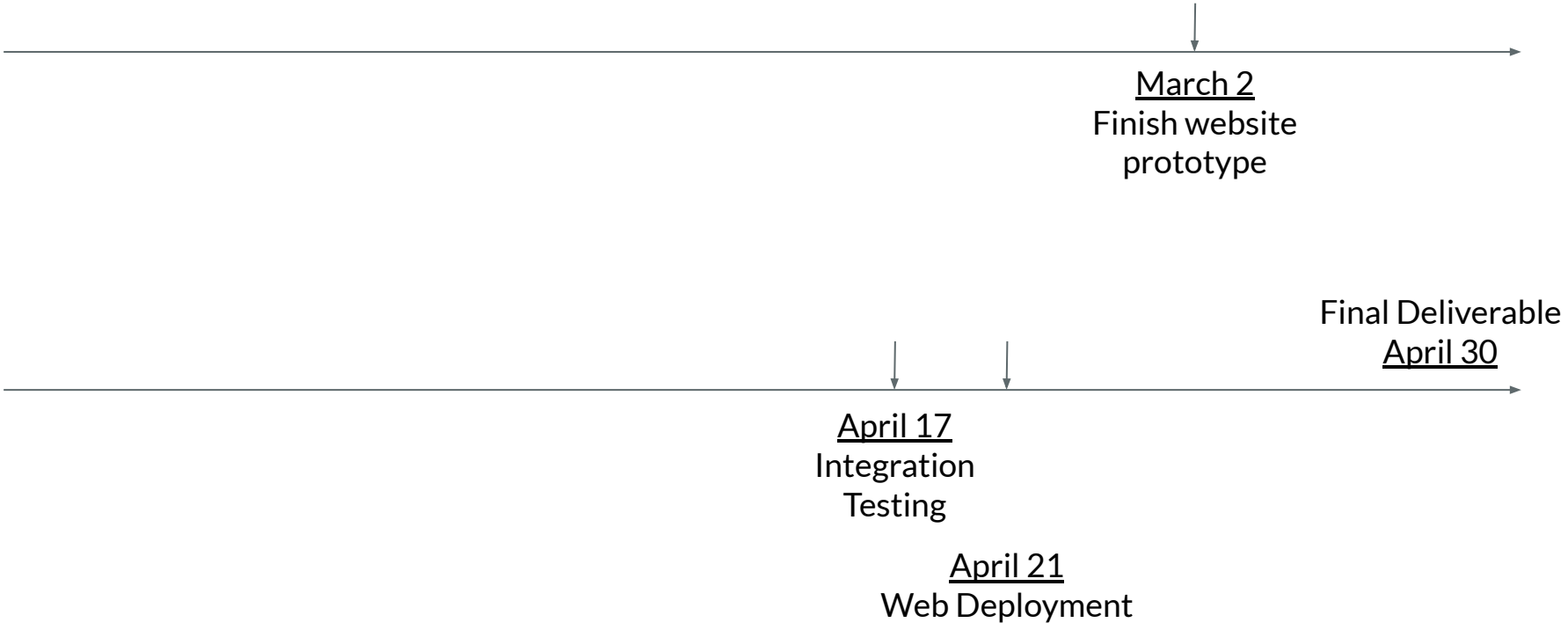
Overview of the whole system



Task Distribution

Vincent	React.js Front-end Setup AWS Cloudfront CDN
Shade	Create FPGA synthesis for deep learning neural network
Andrew	Lambda function for data upload Cognito User Pool
Elbert	Setup python.py training scripts
Aayush	Sensors and circuit integration

Deadlines


March 2
Finish website prototype
Final Deliverable
April 30
April 17
Integration Testing
April 21
Web Deployment