UNITED STATES MILITARY ACADEMY

FINAL PROJECT OUTLINE

SE370: COMPUTER AIDED SYSTEMS ENG

SECTION G1

LTC STEPHEN GILLESPIE

BY

CDT WILLIAM MONAHAN '27, CO E3
CDT CHARLES PERRUZZI '27, CO B1

WEST POINT, NEW YORK

1 APRIL 2025

WM CP I CERTIFY THAT I HAVE COMPLETELY DOCUMENTED ALL SOURCES THAT I USED TO COMPLETE THIS ASSIGNMENT AND THAT I ACKNOWLEDGED ALL ASSISTANCE I RECEIVED IN THE COMPLETION OF THIS ASSIGNMENT.

_____ I CERTIFY THAT I DID NOT USE ANY SOURCES OR RECEIVE ANY ASSISTANCE REQUIRING DOCUMENTATION WHILE COMPLETING THIS ASSIGNMENT.

SIGNATURE: MONAHAN.WILLIAM.ELLIS.1623692520 Digitally signed by MONAHAN.WILLIAM.ELLIS.1623692520 Date: 2025.04.01 23:59:45 -04'00' DATE: 01APR2025

SIGNATURE: _____ DATE: _____

Final Project Outline – Preventing Houthi Attacks in the Red Sea

Problem Definition

One of the greatest national security issues facing the United States right now are the threats posed by the Houthi movement. The Iran-backed military organization began during the Yemen Civil War and is dedicated to fighting the United States and Israel. The group now controls nearly a third of Yemen and are now attempting to control the Bab el-Mandeb Strait at the South End of the Red Sea. This poses a threat to all maritime traffic through the Red Sea. Much of the World's trading ships travel through this area and the United States Navy has deployed the Fifth Fleet to safeguard the Area. The Fifth Fleet has successfully shot down numerous rockets and drones launched by the Houthi rebels; however, the hijacking of multiple cargo ships has deterred shipping companies form sailing through the region. They are now taking the long way, around Africa, adding a month to their trip and roughly $1 million more in fuel. This can negatively affect the economy worldwide.

In order to prevent further attacks on civilian and naval ships in the region, we will create an optimal route path through the Red Sea and Bab el-Mandeb Strait.

Data

In order to create the optimal route path, we will use data from locations of previous attacks, locations of known Houthi missile and drone launch sites, and ranges of Houthi weapons to determine the path with the least amount of risk for an attack. So far, we have compiled sources that will supply us with this data "Red Sea Attacks Dashboard" from acledata.com will be our primary source of data for previous locations of Houthi attacks in the region. "The Houthi Front" from inss.org is another source that shows known Houthi bases and launch sites. Lastly,

“Houthi Arsenal” from wilsoncenter.org will supply us with data regarding Houthi weapons and their ranges. We will use these data sources in order to create our path and solve our designated problem.

Methodology

It seems that the problem of Houthi raiding shipping vessels and terrorist attacks in the region are concentrated by the natural geography. All the shipping must be narrowed through the Bab el-Mandeb Strait at the end of the Red Sea, as it becomes the Gulf of Aden. The Houthis understand this and take full advantage of this vulnerability to attack commercial and naval ships. If we are to solve this, we need to analyze how attacks are linked to the route and then brainstorm ways that we can mitigate them while referring to our data.

In order to visualize our data, we will either make a heat map or a choropleth. We will visually be able to see which parts of the gulf are most dangerous. Using this visual, we will attempt to solve the problem and create and optimal route. Visually seeing the concentration and location of attacks, we can learn where the Houthis operate and will be able to avoid them. Our solution will be in the form of the optimal route to avoid attacks and minimize the risk of traveling through the Red Sea and Gulf of Aden. This solution will be presented in the form of a graphic on a map with a line representing the optimal route.

Rough Timeline

We will divide our project into 5 different phases. This will include the analysis of our data, the creation of the products, the completion of the writing aspects of our project, the final project completion with all revisions, and the creation of the final submission. By April 3, we need to have gone over the data, and review if the creation of a choropleth is feasible with what's available. We should also understand it and be able to mark certain trends and patterns. On April

7, all of our products should be done, which entails the choropleth. Using these products, we will begin the writing portions as listed in the final project submission by April 12. All revisions should be complete by April 14 and the coversheet, and all works cited should be finished right after. The final project will be submitted on April 15.

Roles and Responsibilities

CDT Charles Perruzzi will code the portion of the code that relates to the previous locations of attacks. This is to see if there is a correlation between certain locations and a higher probability of being attacked. CDT Liam Monahan will code the portion that has to do with threats of future attacks based on weapon ranges and locations of known Houthi launch sites. Together we will work to map our solution: the optimal route through the area.

Works Cited

https://acleddata.com/yemen-conflict-observatory/red-sea-attacks-dashboard/

https://www.inss.org.il/publication/yemen-map/#map

https://www.wilsoncenter.org/article/houthi-arsenal

https://en.wikipedia.org/wiki/Houthis

https://www.navalnews.com/naval-news/2025/03/u-s-navy-begins-sustained-combat-operations-against-houthi-forces/