2025 Virginia Datathon Solutions

MANTA RAYS: VIEW PRESENTATION HERE

Team Manta Rays developed a smart routing tool to empower hesitant cyclists by prioritizing safety over speed. Using open data and the OSMNX library, their tool incorporates historical crash data and traffic volume to generate safer biking routes in Richmond. Each road segment is assigned a "danger coefficient" based on crash severity, with bike-related and fatal crashes weighted heavily. The algorithm favors quieter, safer routes—even if slightly longer—offering a real-time view of traffic conditions through live 511.org camera feeds enhanced by AI. Looking forward, the team envisions integrating a social aspect, connecting bikers commuting along similar routes to increase group visibility and confidence on the road.

CODE BLOODED: VIEW PRESENTATION HERE

Team Code Blooded developed Where's My Ride, a smart transit assistant that helps Virginians catch their buses on time and find the fastest public transportation routes. The tool uses real-time data and machine learning—specifically Random Forest models trained on over 200,000 rows of transit data—to predict whether a user will miss their bus. If the bus is missed, it recommends alternatives like walking, biking, or scooters, complete with estimated travel times. Built as a mobile-first web tool, it integrates open GTFS data and offers fast, customized route planning without the need for an app. With this tool, the team aims to make public transportation in Virginia more reliable, efficient, and rider friendly.

NEURAL NEXUS: VIEW PRESENTATION HERE

Team Neural Nexus developed a solution focused on reducing road fatalities and improving transit access in underserved areas across Virginia. They created a heat map to identify zones with both high crash rates and poor public transit access, then built a predictive model using crash severity scores, speeding trends, and infrastructure funding patterns. Their tool enables forecasting of future high-risk areas, supports infrastructure investment planning, and offers real-time safety insights that could be integrated into platforms like Google Maps. This data-driven approach helps state agencies prioritize safety interventions and optimize public spending to better protect vulnerable road users.

SMARTY PANTS: VIEW PRESENTATION HERE

Team Smarty Pants developed a Corridor Analysis Tool to help city planners make data-informed decisions regarding pedestrian and bicycle safety. The tool allows users to define specific corridors and generates detailed metrics such as crash trends by year and month. It includes mapping and visualization features, downloadable PDF reports, and even a chat assistant powered by Retrieval-Augmented Generation (RAG) that lets users query the Virginia Open Data Portal directly. This solution streamlines access to safety-related data and enhances planning efforts across Virginia's urban infrastructure projects.

BACKSEAT ANALYSTS: VIEW PRESENTATION HERE

Team Backseat Analysts focused on using crash data to identify Virginia's most dangerous roads and conditions contributing to fatal accidents. With over 1.2 million crash records from 2016 to 2025, they mapped high-fatality zones across the state, including interstates and urban areas like Richmond and Virginia Beach. They incorporated pedestrian data to highlight risky intersections and created an interactive dashboard to visualize crash data and trends. Their team also developed a deep learning model to predict crash severity, helping prioritize emergency response and infrastructure planning. Despite challenges with data imbalances, their model demonstrated potential for improving road safety and supporting real-time alerts for risky areas.

RUSH HOUR ANALYSTS: VIEW PRESENTATION HERE

Team Rush Hour Analysts focused on improving road safety in Virginia by addressing the rising number of traffic crashes. With over 100,000 crashes in 2024, the team zeroed in on the Hampton Roads District, where the majority of crashes occurred,

especially along Interstate 64. They discovered that congestion and roadway conditions were significant factors contributing to these incidents. The team developed an interactive web application that offers crash insights across Virginia. By inputting a specific county, users can view detailed data on traffic accidents, contributing factors like speeding and distracted driving, and tailored safety recommendations. Their solution aims to help transportation planners identify high-risk areas early, prioritize safety measures, and reduce crash risks before they happen, shifting Virginia's traffic management system from reactive to proactive.

THE A-TEAM: VIEW PRESENTATION HERE

The A-Team aimed to address the urgent need for accessible public transportation in Richmond by focusing on improving bus stop infrastructure for individuals with mobility challenges. Currently, many bus stops are situated at elevations that exceed the recommended slope for wheelchair accessibility. Additionally, very few bus stops provide shelter and seating – essential amenities for the estimated 13,000 residents with disabilities or mobility issues. The team proposed a solution for the Virginia Department of Motor Vehicles to allocate a portion of its funding toward accessibility upgrades, aiming to promote inclusivity and improve the quality of life for underserved populations.

DATA DRAGONS: VIEW PRESENTATION HERE

Team Data Dragons tackled one of Richmond's most problematic intersections—Belmont, Franklin, and Monument Avenue—identified through community feedback as poorly designed and unsafe. Key issues include high-speed traffic, limited visibility, and inefficient traffic flow. Their solution? A data-driven, AI-powered redesign centered around a turbo roundabout. Using cloud-based simulation, hyperparameter optimization, and precise geospatial data from OpenStreetMap and OSMX, their platform rapidly tests hundreds of design variations to find the most effective configuration. The result is safer, faster, and more efficient intersections with reduced pedestrian risk, lower idle times, and minimal maintenance. Their long-term vision includes seamless integration with Google Maps to streamline inputs and further optimize urban mobility. Early simulations show significant reductions in travel time and notable safety gains.

BYTE-BY-BYTE: VIEW PRESENTATION HERE

Team Byte-By-Byte set out to tackle the growing issue of distracted driving, a leading cause of preventable accidents, injuries, and fatalities across Virginia. Using crash data and trends, especially along high-speed corridors like I-64, the team identified driver drowsiness and inattention as major contributors to roadway incidents. In response, they developed a proof-of-concept solution that combines artificial intelligence with serverless cloud technology to detect inattentive driving in real time. Their system uses in-vehicle cameras to capture images of the driver, which are analyzed via AWS's Amazon Rekognition to identify signs of distraction or drowsiness—like closed eyes or looking away from the road. When detected, an automatic alert is triggered and sent via SMS, email, or push notification to concerned parties.

SOPHON: VIEW PRESENTATION HERE

Team Sophon explored how flooding contributes to traffic congestion in Virginia, particularly on local and back roads. By analyzing traffic speed data alongside storm and flooding records, they found that seasonal slowdowns strongly correlate with flood-prone areas near interstates. Their solution emphasizes improving drainage infrastructure around highways, exits, and merging lanes, where congestion spikes during flooding. They also propose staggered release times—similar to practices used in some Virginia school districts—to better manage traffic surges during rainy seasons. These interventions aim to reduce accidents, lower carbon emissions, and enhance the flow of goods and services, ultimately making roads safer and more efficient.

FEATURE, NOT A BUG: VIEW PRESENTATION HERE

The team Feature, Not a Bug, addressed the challenge of fixing potholes with a focus on safety for Virginians. Their innovative solution proposed collaborating with local artists and schools to create mosaic-like artwork over potholes. This creative approach not only offers a unique and visually appealing fix but could also provide job opportunities, utilize recycled materials for a positive environmental impact, and potentially enhance the structural integrity of roads across the Commonwealth.

DATA CRUSHERS: VIEW PRESENTATION HERE

The Data Crushers examined the daily transportation methods of students in Richmond, Virginia, uncovering several gaps in the area's transportation options. They highlighted the urgency of addressing this issue, emphasizing concerns around public safety, equity, the risk of students missing school due to inadequate transportation, and the need to foster better traffic safety habits. The team called for prioritizing transit upgrades in underserved school zones, piloting micro-transit options, enhancing bike and pedestrian infrastructure near schools, and more, to ensure that all students have reliable and safe access to education.

DATA MAGES: VIEW PRESENTATION HERE

The Data Mages team tackled the ongoing pothole problem in the Commonwealth, leveraging VDOT resources to highlight the severity of the issue in Richmond and how potholes progressively weaken road surfaces. They pointed out that the longer a pothole remains untreated, the more expensive it becomes to repair, ultimately shifting the financial burden to taxpayers. The team emphasized the importance of moving from a reactive to a proactive approach in pothole management. They proposed using AI-based technology to detect road deterioration early and underscored the critical role of community involvement in reporting potholes promptly, which could help reduce both repair time and costs.

WE MIGHT MAYBE SUCK AT BASIC ALGORITHMS: VIEW PRESENTATION HERE

This Datathon team focused on improving the safety of school bus transportation for Virginia students. By analyzing data from the Virginia Department of Education, they examined school bus crashes, preventable incidents, injuries, fatalities, and whether the injuries occurred while students were getting on or off the bus. The team identified specific localities in Virginia with the highest rates of bus-related injuries and preventable crashes. They also investigated bus driver qualifications in relation to these incidents. Ultimately, they recommended further data analysis on key factors such as public school bus budgeting, driver qualifications, and other safety measures to enhance overall student protection.