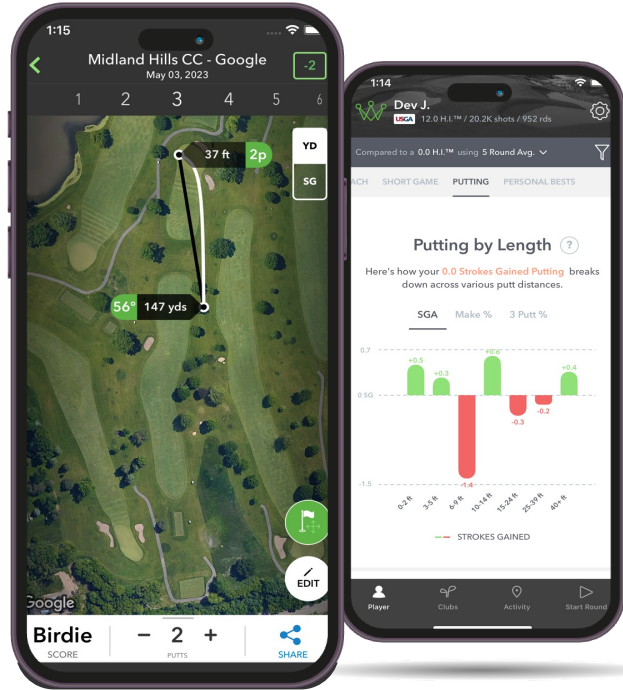# Transforming Sports Using **Artificial Intelligence**

tenx.

Arccos Golf is a pioneer in automated golf performance tracking, using grip-embedded sensors for real-time shot monitoring. Arccos has been ranked the 3rd most innovative sports company globally by Fast Company and has been featured in Bloomberg, Golf Digest, Forbes, WSJ, and others.

ARCCOS

Challenge

Arccos Golf developed a fully automated golf performance tracking system to help golfers monitor their game, gather data, and identify improvement opportunities. They were aiming to develop new products by leveraging the vast dataset collected from thousands of golfers over several years.

Project

- Designed and implemented Arccos Caddie, the world's first AI Golf Caddie, that offers golfers live recommendations as well as post-game analytics insights to refine their game.

- Built and orchestrated 60+ machine learning models to devise the best strategy based on a golfer's profile, history, and course conditions.

- Used unsupervised machine learning for user segmentation based on demographics and usage.

- Integrated 1.1T data points of shot history, location, wind and weather conditions, elevation changes, hole geometry, hazard locations and more.

- Developed image and sound recognition algorithms to improve shot detection accuracy and refine the Arccos product experience.
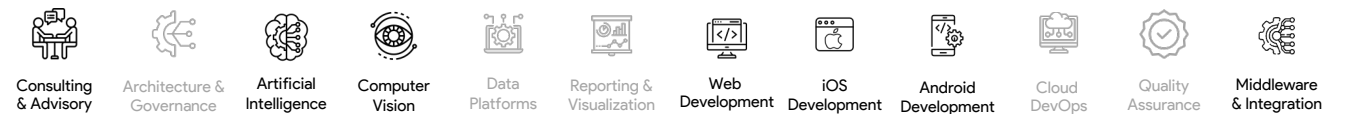
Value Delivered

- AI Caddie has helped 86% of users decrease their handicap by an average of 3.8.

- Automated the recognition of geographical features on 51K+ golf courses worldwide, significantly reducing manual labeling efforts.

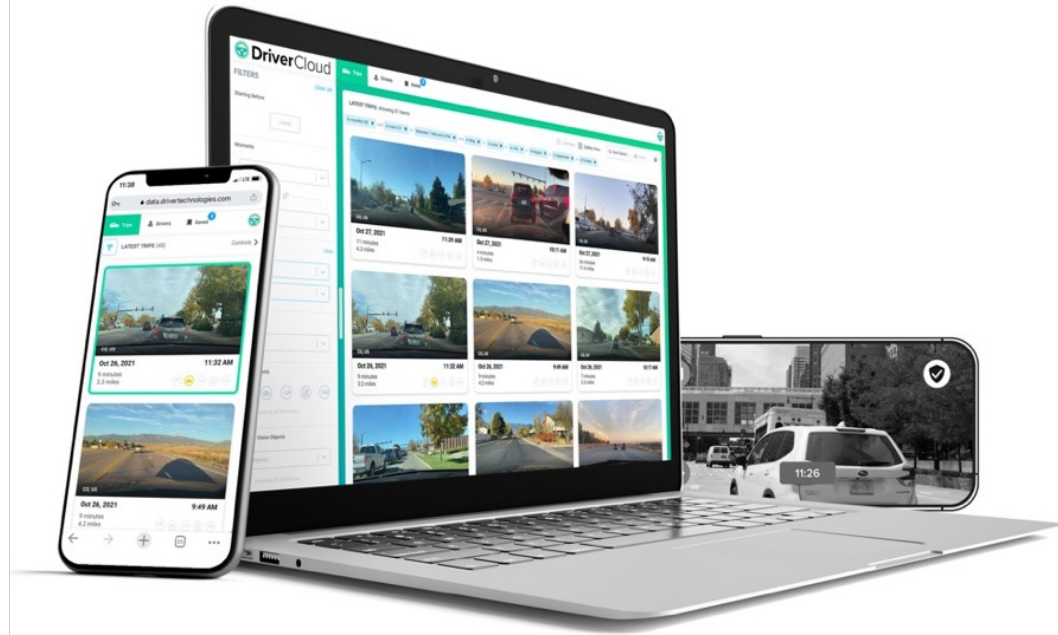- Arccos members have engaged in 15 million rounds taking 743 million shots.

Technologies

Azure SQL Data Warehouse, Snowflake, Mongo DB (NoSQL), Hadoop, Microsoft Power BI, Tableau, Azure ML Studio, Python, Keras

Services

Consulting & Advisory | Architecture & Governance | Artificial Intelligence | Computer Vision | Data Platforms | Reporting & Visualization | Web Development | iOS Development | Android Development | Cloud DevOps | Quality Assurance | Middleware & Integration

Improving Road Safety using Cutting-Edge AI

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Driver Technologies specializes in AI-based automotive solutions to enhance road safety. Their mobile app enables users to video record trips, detecting risks of collisions as well as detecting drowsiness or distractions while driving.

Driver

Challenge

Driver Technologies aimed to enhance road safety by offering affordable access to advanced technology. They developed a smartphone app that transforms any phone into a dashcam and were looking for a partner to help them build AI-based features into their cloud and edge platforms.

Project

- Developed optimized deep learning model for real-time detection (~0.01 sec) of 10+ objects. Generated synthetic training sets in the absence of open source or labeling solutions.

- Optimized model for edge devices, minimizing battery usage and over-heating while maintaining target inference times.

- Designed and developed queuing mechanism using Google Pub/Sub for processing image uploads from edge devices.

- Integrated visual insights with vehicle telematics stream to create behavior profiles for lane changes, hard braking/acceleration, accidents, near misses, tailgating, and braking reaction time, and others.

- Developed driver risk score by analyzing data from 9+ models including forward collision warning, red light violation detection, drowsiness detection, speed limit compliance, tailgating, and more.
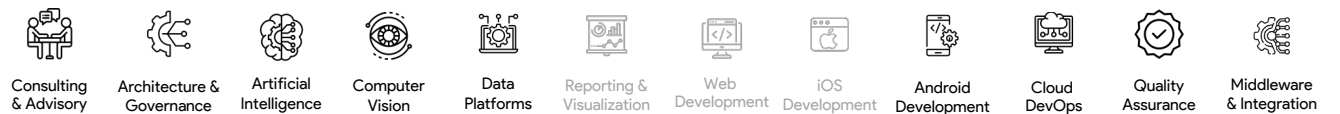
Value Delivered

- Saved thousands of dollars in operating costs by implementing an auto-scaling infrastructure and optimize the usage of cloud resources.

- Helped secure significant client wins by iterating quickly on prioritized product features and delivering on timeline commitments as one team.

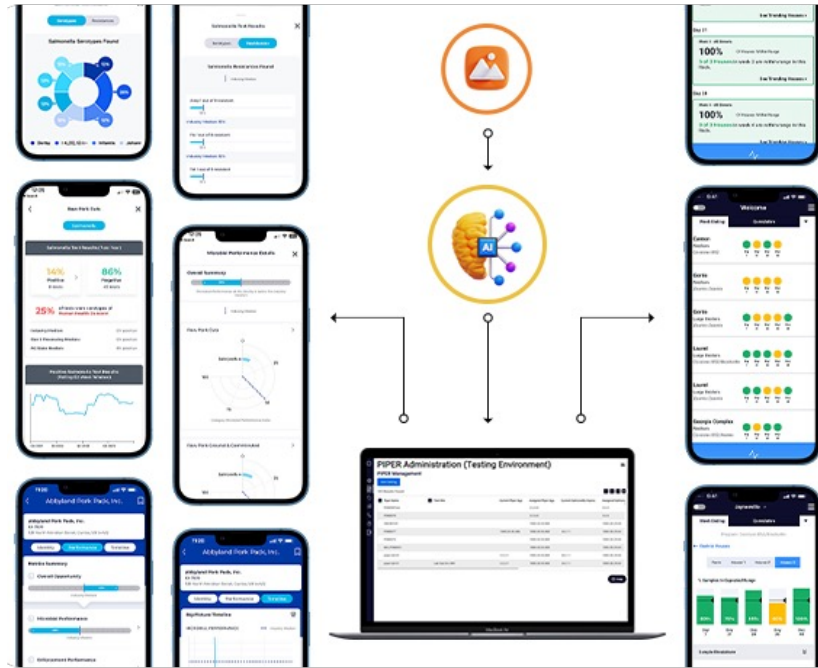## Technologies

Python, Google Cloud Platform (GCP), GCP Pub/Sub, Firebase, AWS S3, Docker, Kubernetes, GitHub, CI/CD Pipelines

Services

Consulting & Advisory | Architecture & Governance | Artificial Intelligence | Computer Vision | Data Platforms | Reporting & Visualization | Web Development | iOS Development | Android Development | Cloud DevOps | Quality Assurance | Middleware & Integration

Reduced Risks, Greater Market Share

Ancera has replaced traditional microscopy methods with intelligent systems, enabling veterinarians to make data-driven decisions through a digital command center, generating greater profits.

Challenge

Ancera was searching for methods to establish a food value chain that could deliver quicker and more efficient outcomes by enabling early detection of microbial contamination in poultry farming.

Project

- Developed a platform to manage the lifecycle of poultry farms.

- Designed a data aggregation platform with 2 deep learning lane image solutions detecting microbial data at an early stage, enabling targeted control measures to prevent bacteria spread in poultry farms.

- Web and mobile intelligence engines were developed to provide veterinarian's with on-the-move insights processed within hours, instead of days.

- Developed assays based on custom semantic segmentation models to detect different types of bacteria and parasites in a lane image.

Value Delivered

- Our intelligence engine empowers poultry farm veterinarians with valuable insights identify patterns and trend. This enhances feed conversion, reduces costs, and prevents pathogen spread.

- Our deep learning models have identified millions of Coccidia and Salmonella cells by analyzing thousands of images. This assists veterinarians in mitigating losses at poultry farms.

Technologies

Flutter, Angular, .NET, SQL, Azure SQL Database, Microbial Image Analysis and Reporting, TensorFlow, OpenCV, Python/C++, Bilinear CNN, Custom U-Net, Docker, Kubernetes, Bitbucket, CI/CD pipelines, MLOps

Services

| Consulting & Advisory | Architecture & Governance | Artificial Intelligence | Computer Vision | Data Platforms | Reporting & Visualization | Web Development | iOS Development | Android Development | Cloud DevOps | Quality Assurance | Middleware & Integration |

Real-time Bio Security Analytics for Threat Protection

tenx.

Ancera products combine software and hard science to provide integrated solutions, offering unprecedented visibility to food producers and enabling them to generate additional profits.

ancera

Challenge

Ancera was looking to aggregate poultry data and analytics from multiple public and private sources. The platform would be used to provide insights to multiple stakeholders in the value chain including farms, processors, and service providers.

Project

- Aggregated data from 10+ source systems, including internally generated testing results, performance data from partners, and US government sources such as OSHA, FDA, USDA, EPA, and others.
- Created a customized data model for the poultry value chain which can adapt to evolving business requirements and support scalability and performance requirements.
- Designed and built 500+ data pipelines to extract data from multiple technology platforms, websites, and file formats including PDF, CSV, XLS, and JSON.
- Used robotic process automation (RPA) techniques to cleanse and aggregate historic datasets which were previously deemed unusable for analysis
- Developed mobile applications (iOS, Android) for users to access insights, search for specific entities, and build customized views.

Value Delivered

- Provide poultry stakeholders with on-demand analytics, trends, and insights on news, events, outbreaks etc.
- Enable downstream applications to access essential performance metrics, baseline facilities using peer groups, and track performance changes over time.

Technologies

Azure DevOps, Azure Data Factory, Data Lake, Azure SQL Database, Azure Logic Apps, Automation Anywhere, Queue Messaging Service

Services

Consulting & Advisory | Architecture & Governance | Artificial Intelligence | Computer Vision | Data Platforms | Reporting & Visualization | Web Development | iOS Development | Android Development | Cloud DevOps | Quality Assurance | Middleware & Integration