WILSON PYM MAY LIMITED

RouteShoot

Visualising Infrastructure for Asset Management

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Abstract

RouteShoot is an award winning, proven software technology solution which allows users to capture video and routes using just a Smartphone or tablet. It is a video fully integrated with a route which creates a version of events very similar to Google Street View. The software allows the user to conduct video capture with position, bearing, altitude and speed attributes recorded within the device with an easy to use Smartphone or tablet application. This allows users to map either using the device as a hand-held or vehicle-mounted video camera. A product useful not only for providing evidence but also for planned and adhoc surveys asset management, traffic management and site inspections.

Introduction

It is essential to be able to demonstrate compliance with laws and guidelines that regulate the safe movement of traffic and pedestrians on the highway network. Highway Authorities are faced with budget cuts on one hand and ever rising claims, from more informed claimants, on the other.The cost of compliance failures can often be very high and can even lead to loss of life.

RouteShoot was created in response to customer needs. On a regular basis clients wanted to survey many miles of road in order to be able to assess condition, clarify defects or ensure contractors had delivered maintenance work, additionally those carrying out maintenance work on new commissions needed to understand latent defects and responsibilities.

The existing practices for collecting this data utilising Video and GPS were either; costly, cumbersome or difficult to manage the outputs. Coupled with the need to book specialist surveys ahead of time, often on an annual basis, meant the client could not react to assessing more immediate asset issues. Specifically, the product was developed to address these operational constraints and to provide a means by which the client could address risk management through auditing maintenance practices, thus providing corporate governance; collaborative use of the product by client and contractor gives a transparency that activities being paid for are actually being carried out. In addition, it gives the client the ability to record and document issues that may occur during severe weather events, such as flooding, which are not apparent during normal annually commissioned asset surveys.

In early 2012, developments in technology - which saw full 1080p HD video recording and accurate GPS incorporated into a smartphone - meant that it was possible to replace existing, expensive and technology-intense solutions available only through 3rd party specialists with ubiquitous technology that most people owned already and were proficient in operating. By May 2012 it was clear that we could achieve equivalent geo-referenced video standards by using smartphones and the name "RouteShoot" was given to the product.

RouteShoot is an easy to use application that is affordable for, and accessible to, everybody across the world. Video and GPS location data is collected simultaneously and continuously by our app. After shooting a video, files are uploaded to the RouteShoot cloud directly from the phone. By delivering our output over the internet, videos and routes can easily be shared across organisations using dedicated websites or email. This makes RouteShoot a powerful collaboration tool for businesses.

There is nothing currently available like RouteShoot, it is simple, affordable and, with no client side installation of software, there are no barriers to IT implementation. As experts in asset management, we know that businesses already use route-referenced video data and we know that there is growing demand. The technologies we employ combined with low entry level costs open this solution up to a wider range of business sectors and make this affordable for emerging markets.

RouteShoot has been proven in multiple infrastructure industries worldwide in both the public and private sectors. It is an essential tool for managing risk in industries that have to look after assets over a distributed network. This includes **Oil** companies in Africa, Major **Utilities** companies in the USA, **The World Bank** in the Philippines and highways authorities in the UK such as **Dorset County Council (DCC), East Sussex Highways** and **Transport Scotland**.

Architecture

The RouteShoot Video Content Management Library is based upon DotNetNuke(DNN). The DNN Platform (formerly "DotNetNuke Community Edition" content management system) is open source software that is intended to allow management of websites without much technical knowledge, and to be extensible through a large number of third-party apps to provide functionality not included in the DNN core modules. Skins can be used to change the look of a website using DNN.

RouteShoot extends the DNN platform by making use of Modules. All the modules developed by RouteShoot are not open source and as such must be licensed through RouteShoot. The modules are distributed as binary files that can be used by the end user to configure and install RouteShoot as required.

Smartphones

In order to make the process of actually collecting video as simple as possible and available to as many users as possible we have written a suite of RouteShoot smartphone applications.

There are smartphone applications written for iOS, Windows and Android. All smart phone applications can be downloaded free of charge from the relevant application stores. This encourages users to distribute the app on both work and personal devices as needed.

Using these applications you can upload videos directly from your smart phone to the web platform from site using 3G/4G or from a WiFihotsport making use of faster WiFi connections.

Critically, you can also collect video regardless of having a SIM card or a phone signal. This is essential when you consider the geography of some of our road networks and how poor mobile coverage can be. Most new phones will now support HD video recording as standard. GPS accuracy is extremely good with positional location often within +/-5 metres.

With most high end smartphones, you able to store up to 64GB of data so you can store several hours of video without a problem. As an example, a 32 GB phone can store up to 21 hrs of video in Standard Definition or up to 8 hrs in High Definition.

Whilst the smartphone applications are written to be as simple to use as possible they are also very sophisticated. To optimise storage and upload times the settings support varying recording resolutions, bit rates and frame rates. Focus and exposure can also be manually overridden to fine tune image quality to different use cases.

Interoperability

The true value of data can often be realised when it is shared with other systems. RouteShoot supports the Open Geospatial Consortium (OGC) standards as a default. By making use of the Web Map Service (WMS) and Web Feature Service (WFS) protocols, RouteShoot data can be exposed and linked directly to 3rd party.

Many GIS applications from suppliers such as ESRI and MapInfo support WMS and WFS protocols natively. This means that geographic data can be shared from and with RouteShoot in real-time with no additional software to install and configure.

RouteShoot can also work with many bespoke asset management systems that support these interfaces. The Confirm Infrastructure Asset Management solution by Pitney Bowes already supports RouteShoot via the WMS and WFS protocols so that videos and routes can be shared with and analysed within the core Confirm product set.

3rd Party hardware

It shouldn't matter how GPS tagged video is captured so RouteShoot deals with all the complexities of converting video data into a single unified format that can be easily

streamed by web clients. So regardless of how the video is collected we provide a common user experience to play and analyze videos.

Support is provided for native file formats where ever possible. We have recently added native support for Contour cameras so that all you have do is copy the video off the device and load it into RouteShoot. Once loaded we then decode the video and extract the GPS coordinates and map it automatically into the RouteShoot GIS.

Generic support is provided by using an open GPS exchange format. Many devices are capable of outputting GPS data to this XML based format commonly referred to as a GPX format. Many Garmin devices such as the Virb XE are able to export location data in a GPX file.

Mapping
All geographic data stored in RouteShoot is held in SQL databases and managed using GeoServer. GeoServer is an open source server for sharing geospatial data and is designed for interoperability by publishing data using open standards.

RouteShoot is able to use any background maps that are available using OGC standards. As standard RouteShoot supports Open Street Map as well as several publicly available map layers from ESRI.

RouteShoot can also display asset data stored in external systems using OGC protocols, examples could be, public enquiries, asset information as well as asset defects.

Deployment models
Deployment of RouteShoot very much depends on what the anticipated business needs are, approach to risk management of the platform and security. There are essentially three deployment models for RouteShoot.
1. **Self hosted**. The core application and all storage is placed on local "on premise servers". This deployment is often suited to large organisations that have the resource available to manage and support the application on a day to day basis. If security is critical the application can be entirely operated by a corporate firewall.
2. **Cloud hosted**. A dedicated virtual machine is hosted in a local data centre and used to run the core application and host all storage. All data can be secured via SSL and access controlled by password and limited to specific IP addresses. This model is fully scalable and can grow to support ever increasing demand.
3. **Shared hosting**. This deployment model is similar to cloud hosting but only one virtual machine is used to host up to ten active sites. This model is great for organisations that anticipate light usage and fewer than 20 users.

Case study examples

Premier Utilities – USA

Premier Utility Services are located in Hauppauge, New York with over 800 employees operating in 22 states across the United States. Premier provide various services to utility partners across the country, including Damage Prevention (Underground Utility Locating) and GIS Services (GIS Mapping & Management Programs, Asset Inventories).

1. **Problem**. As part of a Premier's daily workload technicians were deployed with a laptop, digital camcorder and other devices to capture field video footage. It was soon clear that some major issues had developed not least of which was the growth of file storage requirements - over 30 terabytes in 17 months - and this brought additional problems in searching for the relevant videofiles on local laptops, network servers and camcorder devices.

2. **Solution**. Choosing RouteShoot as the video content management system has helped Premier to not only lower their capital expenditures per technician it also increased productivity per technician. RouteShoot has also allowed Premier to scale this deployment very quickly to over 480 remote technicians.

   Now, when a request comes in from a client or supervisor, a member of the claims department can easily search the system and retrieve the video in seconds. Moving the video management system to the cloud has also freed up valuable IT staff resources to do other things, instead of managing on premise hardware. Currently approaching 2 Million video files are managed by the successful implementation of RouteShoot.

3. **Key Benefits**. RouteShoot's ease of use, with accurate and effective search functionality has been extremely beneficial Premier and its clients. The ability to email a link tothe videos to anyone with an internet connection has provided an irrefutable audit trail that is transparent to the client. RouteShoot's low cost andscaleable technology has streamlined the workflow and improved resource management within the business.

East Sussex Highways

East Sussex Highways is a partnership between CH2M, Costain and East Sussex County Council. They maintain over 2,000 miles of highway in East Sussex and have the remit to look after roads, pavements, street lights, grass and winter maintenance.

1. **Problem**. East Sussex Highways have adopted the use of computer tablets throughout their Construction and Maintenance division and wished to make the information collected more accessible to inform other stakeholders within the business of site conditions and remedies.

2. **Solution**. Routeshoot was deployed to document all the schemes within the rolling East Sussex Roads Programme (ESRP). The client tablets are mounted within dampened cradles in the vehicle and high definition video is recorded for each road section the engineer has identified for repair or improvement.

   With the Routeshoot portal, access to the video data is made quick and easy via a fully customisable map based front end. Large file sizes are conveniently stored securely in the cloud and are always available to the user, removing the need for local storage of video data. This innovation has been integrated within the detailed design process for carriageway improvement schemes and has reduced the need for further site visits by the DesignTeam.

3. **Key benefits**. The Design Team have benefited from being able to use Routeshoot to add operational intelligence and demonstrate the buildability value whilst working collaboratively with engineering and environmental team colleagues from across the service during Early Team Involvement value engineering meetings.

The Philippines has a population of a hundred million inhabiting an archipelago of over seven thousand islands with more than two hundred thousand kilometres of roads, most of which are neither mapped nor represented within the core national road asset management system.

1. **Problem.** The national government currently finances thousands of local road projects across the Philippines, supported by technical and financial assistance from The World Bank. With such large sums of money involved in enhancing tourism and routes to market, The World Bank required a solution that could support their investment of almost $1 billion a year and help to ensure that road schemes are actually delivered on the ground.

2. **Solution**. Selecting RouteShoot as a low cost technology ideal for use in the predominately rural areas of developing countries, The World Bank has provided amechanism that means the number of 'Ghost Projects' have been practically eliminated by linking staged payments to direct evidence of road construction progress through route-referenced video.

   Through the Open Roads portal developed by the RouteShoot team, project transparency provides the confidence that value for money is being obtained - enhancing the corporate governance expected for such high value investment.

   The World Bank have now established a benchmark for monitoring the progress of road building projects at all stages and are promoting this method for other infrastructure projects across the globe, including Vietnam and Tanzania.

3. **Key Benefits**. RouteShoot is scaleable and cost effective providing a real solution in shorter timeframes, consequently the PhilippinesGovernment have now mandated its use for their new roads financing program - Kalsada.

Key Benefits

There are many benefits to using RouteShoot:

1. It is quick to set up and easy to use. You can be up and running in less than 48hours. We can deliver a corporately branded portal and video content management system typically within two working days so you can start collecting and using video as soon as possible.

2. By effectively crowd sourcing your own video collection using your mobile workforce you are in complete control and will not be waiting around to fit in with any 3rd party's survey programme.

3. It is cheaper than the alternatives. Making use of existing smartphone deployments means there are no additional hardware costs. Our cloud hosting solution secures your data and also minimises start-up costs.

4. Cloud hosting reduces impact on local IT networks and there is no need to grant unsecured devices access to your network.

5. Save time. You can find your videos by searching maps or using 'keyword" searches – an end to spending hours locating content in files or DVDs.

6. RouteShoot video integrates with your existing GIS data.

7. Quickly share important business information. Videos and maps can be uploaded directly from site and shared with nothing more than a web browser.

8. Protect reputations, budgets and staff. Defend claims, ensure contracts are complete and reduce the need for multiple site visits.