XeroScout

(Universal Scouting System)

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# Introduction

XeroScout is an FRC scouting system designed to be reused year after year with no code changes. The idea is to focus on what needs to be scouted and the strategy derived from the scouting data, and not focus on the actual scouting process and software. This software should make the scouting process simple and seamless. The system includes the following features:

* Supports both match scouting and pit scouting
* Once the event has been created, no internet access is required. A local scouting data model is created, and all data is stored in this local data model. This local data model is stored in a single file that can be copied to a flash drive for safe backup during the event.
* Local scouting data model can be augmented with match scoring data and zebra robot position data from the blue alliance with internet access. Again this data is stored in the local data model so that once downloaded internet access is not required to access this data.
* Provides visual tracking of what scouting data has been imported and what is missing.
* Provides simple query capability to look at the data while local at the event
* Supports scouting forms that are defined via simple JSON data files
* Uses a USB to USB transfer cable to transfer data between scouting tablets and a central scouting machine. No complicated network or Bluetooth connections required while sitting in the stands at an event.
* Frequent backups of the data model both on the scouting tablet and the central machine. Disasters can occur while scouting and there are always recent copies of the data available for recovery.

# Overview

## Devices

The scouting system uses four types of machines. There is a single central machine that collects all the scouting data and data downloaded from the blue alliance. There are team scouting tablets that are used to collect data about the individual teams and their robots. There are match scouting tablets that are used to collect data about each of the six participants in each match. Finally, there is a coach’s machine that contains a copy of all the data that is present on the central machine. The coach’s machine is nearly identical to the central machine but cannot create new events nor synchronize with tablets. The coach’s machine provides a portable way for the coach to have all the data gathered to date at his or her fingertips.

## Event Flow

The flow of an event is as follows:

1. A couple of days before the event, create a new event. This brings in the team list for the event, sets the scouting forms, and initializes the pool of tablets for the event. The tablets assigned to team scouting are assigned specific teams. At this point the ***Import/Key Performance Indicators*** menu item can be used to pull in historical data about the teams in the event. This historical data is only for the current year.
2. After the match schedule for an event is published in the blue alliance, the **Import/Match Schedule** menu item can be used to import the match schedule. Performing this step, not only imports the match schedule, but assign tablets to the matches.
3. Synchronize the one or more pit scouting tablets and the six or more match scouting tablets with the central machine to push the match or team assignments to each tablet.
4. Scout teams or events on the tablets. The data is stored on the tablet.
5. Synchronize periodically the tablets with the central machine to move a copy of the scouting data to the central machine.
6. Periodically, if a network connection is possible, download blue alliance match data and blue alliance zebra data to the central machine.
7. Use the match data, match graphs, single team summaries, and alliance graphs to propose strategy for each upcoming match.
8. Use the single team summaries, alliance graphs, and picklist picker to generate alliance selections.

# Installing the software

The XeroScouting requires the following external prerequisites in order for the software to function.

* Open SSL for Windows (<https://slproweb.com/products/Win32OpenSSL.html>)

Provides SSL support for the applications when accessing sites like the Blue Alliance site.

* libUSBK (<https://sourceforge.net/projects/libusbk/>)

Provides low level USB access to support the USB to USB cable synchronization.

* zdiag (<https://zadig.akeo.ie/>)

Utility to assign the libUSBK driver to the USB to USB transfer cable.

The latest xeroscout software can be downloaded from http://www.mewserver.com/scouting/xeroscout.exe

# Software Overview

There are four different programs available the software in installed. These are XeroCentral, XeroScout, XeroCoach, and XeroView.

XeroCentral is the central program that synchronizes with the tablets and creates the centralized database.

PCScoutApp is the tablet based scouting application.

XeroCoach is the coache’s applications that provides access to all of the data but cannot synchronize with tablets.

PCFormViewer is used to develop the JSON based scouting forms.

# Using The Software

## Creating A New Event

A new event is created in the XeroScouter program using the File/New menu item. This command walks through a series of steps using a New Event Wizard.

* Select an event as provided by the blue alliance online database.
* Select team and match scouting forms
* Create and assign the tablet scouting pool

After answering these questions, the event data is downloaded from the blue alliance and the event is generated. You will be immediately prompted to save the event. After the event is created, no additional access to the internet is required except to download blue alliance data and zebra data.

The team and match scouting forms are JSON files with a specific format. This file format is described in Appendix A.

# Command Line Arguments

The XeroScouter program has a set of command line arguments that can be used to simulate various conditions. These arguments are useful for testing and debugging the program. These arguments are also useful for training the scouting team to use the program.

|  |  |  |
| --- | --- | --- |
| Argument | Type | Purpose |
| year | Integer | Sets the competition season for the program. By default, the current year is used. |
| bamaxmatch | Integer | Sets the maximum match number for data from the blue alliance match data. This is used to simulate partial data in the blue alliance for an event. |
| nomatch | Boolean | If this value is true, no match schedule data is downloaded from the blue alliance when an event is created. This is used to simulate creating an event well before the event date and downloading the match schedule when it becomes available |
| redrandmaxmatch | Integer | Sets the maximum number of matches for the red alliance to get random data. This is used to simulate partial match scouting data sets during the event. |
| bluerandmaxmatch | Integer | Sets the maximum number of matches for the blue alliance to get random data. This is used to simulate partial match scouting data sets during the event. |
| Randmaxteam | Integer | Sets the maximum number of teams to get random team scouting data. This is used to simulate partial team scouting data sets during the event. |