Department of Computer Science & Engineering
University of Nevada, Reno

ARIA: Administration, Registration, and Information Assistant

K.R.E.W.
Renee Iinuma
Wesley Kepke
Ernest Landrito
Kyle Lee

Instructor: Dr. Sergiu Dascalu
Advisor: Dr. Frederick Harris (CSE)
External Advisor: Cindy Harris (NNMTA)
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Abstract

The goal of ARIA is to create a WordPress plugin that will assist the Northern Nevada Music Teachers Association (NNMTA) with the registration, scheduling, and organization of their music competitions. This project is important because it will significantly reduce the amount of overhead that NNMTA personnel spend in regards to the preparation of their music competitions. Moreover, this plugin will automate tasks that would otherwise take NNMTA members hours to complete. Once implemented, the NNMTA will have a robust and systematic manner of hosting music competition for years to come. Furthermore, ARIA will be constructed in a generalizable format such that the plugin can be used in situations other than music competitions.

Project Description

The NNMTA is an organization comprised of students and teachers who share a common interest in music. The NNMTA provides opportunities for aspiring musicians and music aficionados by holding competitions, festivals, networking events, and other music-related functions. Despite the diverse array of events held by the NNMTA, music competitions are their most prominent affair with enrollment and participation growing.

While the board of NNMTA is excited that an expanding number of students are electing to participate in their competitions, the music organization has been experiencing difficulty in accommodating the already abundant body of competitors. To elaborate, every component of their competition format is facilitated through the use of paper, a method prone to several mistakes which can be difficult to alleviate. Unfortunately, the current state of the NNMTA's website provides little support for mitigating the organizational problems associated with their music competitions.

The main goal of ARIA (Administration, Registration, and Information Assistant) is to modify the NNMTA's website such that the registration, management, and operation of their music competitions can operate in a more efficient and streamlined manner. The intended users fall into three main categories: the NNMTA board members, the music students and their parents, and the music teachers . The NNMTA board members, particularly the music festival chairman, will be using ARIA to create competition forms, schedule competition times, and generate all necessary competition documents. The music students and their parents will be using the forms generated by ARIA to register for competitions, and the music teachers will be using other forms to update the competition information. This project is beneficial to them because ARIA will make music competitions easier to access for all parties. By eliminating the need for paper registration, ARIA eliminates waste while also saving the NNMTA board members time and effort. By moving registration online, festival registration will be easier for parents and music teachers to access, and it will eliminate errors in the process by enforcing registration guidelines automatically.

The main functionality and capabilities of ARIA are to allow competitors to register online, make registration payments, and select a time for their competition. Additionally, ARIA will automate scheduling opportunities to reduce conflicts imposed by paper registration, allow the festival chairman to print out all documents associated with competitions, and even calculate statistics information based on each competition.

ARIA is specifically designed to operate on WordPress; therefore, custom plugins are under development using PHP. Data management and storage is handled in conjunction with the Gravity Forms plugin and API on WordPress. Client-side services are handled with Javascript, jQuery, and AJAX.

Significance

This project is worthwhile because it has an immediate and real-world impact since it will be used in music competitions occurring annually, beginning this March. It is interesting because ARIA combines a front-end which must be accessible to users, a back-end which must handle dynamic form creation, and the integration of large amounts of data, from the song database to the information of all music students and teachers. These components must work together in a reliable way so that it may be reused and modified as necessary without continued support by the development team.

The potential for further development beyond CS426 is expanding the functionality of ARIA both specifically for the NNMTA and for the general public. Its potential within NNMTA includes the possibility of adding features and functionality to create and manage music competitions, while the potential for the public includes a generalized system which handles registration and scheduling for any organization or purpose. This addresses the market potential of ARIA, since ARIA can be packaged as an all-purpose registration and scheduling assistant as a WordPress plugin. Since plugins can be developed and sold for use by the public, there is even the potential for ARIA to become a commercial product.

Similar applications include various plugins listed below:
- RegistrationMagic - Custom Registration Forms
  - Allows the users to create a form with just a few clicks (https://wordpress.org/plugins/custom-registration-form-builder-with-submission-manager/).
- Simple User Registration
  - This allows the administrator to input fields in registration form using a drag and drop meta page (https://wordpress.org/plugins/wp-registration/).
- Event Registration
  - It provides registration events, classes, or parties. It is designed to be easy to navigate and allows the user to capture the registering person contact information and any additional information the user request to a database (https://wordpress.org/plugins/event-registration/).

- Gravity Forms
  - Gravity Forms enables the user to quickly build and design a WordPress form using the form editor (http://www.gravityforms.com/). The user can select fields, configure options and easily embed forms on WordPress powered sites. ARIA will be building off of Gravity Forms.

The innovative characteristic of the project is the fact that forms are created dynamically for the festival chairman. Upon activation of ARIA, a configuration form is created and published for the user. The festival chairman of NNMTA can then fill out this form (which includes competition name, dates, volunteer times, and other configuration information). When the chairman submits this form, additional (music student and music teacher) forms are automatically generated with all necessary fields, such as name, email, and student level. The chairman does not need to configure each form individually. This process makes the process much easier for the festival chairman. It also sets ARIA apart from other similar plugins because it allows for the possibility of dynamic field creation and population catered to meet the goals of the NNMTA.

This project will help the team's professional growth by giving developers an opportunity to work with a project that will be put into use immediately. Team members will learn to work with clients who come from diverse background and will gain experience working with the non-technical.

Estimation of Time Worked on Project Concept

Team Member	Total Work Time	Activities
Renee Iinuma	60 Hours	- Worked on the competition registration component with the entire team. - Worked on developing registration form structure - Worked on dynamic field population on forms. - Began researching dynamic RTF file creation
Wesley Kepke	60 Hours	- Worked on the music uploading/exporting functionality with Kyle. - Worked on the competition registration component with the entire team. - Began preliminary design of scheduling component.
Ernest Landrito	60 Hours	- Worked on the competition registration component with the entire team. - Worked on dynamic form creation. - Worked on managing and storing data.
Kyle Lee	60 Hours	- Worked on the music uploading/exporting functionality with Wesley. - Worked on integrating the music uploading module into the main plugin - Worked on the competition registration component with the entire team.
All members	10 Hours	- Meeting with Dr. Dascalu - Meetings with Dr. Harris and Cindy Harris - Learning WordPress/PHP Plugin structure - Team meetings

Changes and Progress Since October 2015

Changes:
- Focus on competition creation
  - Rather than being in charge of reworking the entire NNMTA website, the team was given the task to focus on the competition registration aspect of the website. While this limits the original scope of the project, the added requirements and depth make the project more comprehensive than its previous version.

- Shift from front-end and back-end to a more complex back-end
  - One of the key aspects of ARIA was to create a visually appealing front-end for the NNMTA website. However, since the team is no longer able to control the visual aspects of the front-end, the team can now focus on making the extended back-end functionality as reliable and streamlined as possible.
- Need for creation of registration forms
  - A main feature necessary for ARIA's new goals is the ability to dynamically create registration forms for the NNMTA. ARIA will now be responsible for generating music student and music teacher registration forms with various constraints on its behavior and management.
- Need for dynamic population of fields
  - In order to create the forms desired by the NNMTA, ARIA must be able to populate certain fields in forms automatically. Additionally, it is also necessary to populate some of these fields from a database of song information.
- Need for automated scheduling and document generation
  - In order to completely automate the competition management process, it is now necessary to automate scheduling of competition times with restrictions and conditions for this scheduling. Additionally, ARIA must now be able to generate various documents required by the NNMTA, such as judging forms and award certificates.

Major developments:
- Dynamic form creation
  - ARIA is now successfully generating forms for music student and music teacher competition registration, which are automatically created and published when a competition is created by the festival chairman.
- Data entry management
  - In order to effectively store and manipulate the data, ARIA is using the Gravity Forms database to store information about the students and teachers in a master database.
- Form prepopulation
  - The forms generated by ARIA can now be prepopulated with the necessary values which come from data stored in the Gravity Forms database.
- Dynamic field population
  - Certain fields regarding song information are now populated on the client-side from a database on the server and are displayed with necessary constraints.

Expected major developments:
- Automated scheduling
  - Once the registration forms are created and published, the team's next task is to create an algorithm which will schedule students into time blocks and rooms by constraints such as their age and level. This scheduling algorithm must be reliable and flexible to be used by the festival chairman.

- Document generation and distribution
  - ARIA must also generate forms which will be printed for the judges to fill out, certificates for the students, and various schedules and signs which will be posted during the competition.
- Statistics
  - After each competition, it is necessary to collect information about that competition, such as the number of students and their respective scores. These statistics must be generated automatically by ARIA.

Project Management

At a fundamental level, ARIA can be broken down into the following components:
- Music Uploading/Exporting
  - The NNMTA maintains an Excel file that the festival chairman uses to add, delete, and update music pieces that are used in competition. ARIA's music component is responsible for reading this data (imported as a CSV file) and adding all of the entries into a centralized database. Moreover, this component is also responsible for creating a CSV file that be downloaded in the event where the festival chairman does not have access to the original file.
  - Kyle Lee will be in charge of this component. Wesley Kepke will be assisting him.
- Competition Registration
  - For each competition, registration begins as parents submit information regarding their children. Once student registration has closed, the music teachers of the aforementioned students need to perform additional registration, both for themselves and also for their students. The successful interaction between these two phases of registration is pivotal.
  - Ernest Landrito will be the main developer of the competition registration module, and Renee Iinuma will be assisting with the front-end of this module.
- Competition Scheduling
  - After both phases of registration have closed, ARIA will automatically generate scheduling for all students and teachers that have registered for the competition. This component will take into account a substantial amount of information in order to create a schedule that most appropriately fits what the students and teachers had requested.
  - Wesley Kepke will handle all code associated with this module. He will be assisted by Ernest Landrito.
- Competition Paperwork and Statistics Generation
  - After scheduling is complete, ARIA will provide a mechanism for printing out informational papers, such as which students and teachers are assigned to a competition room at a specific time, that can be used to help NNMTA personnel during competition days. Finally, ARIA will also retain statistics information about a competition, such as the number of students competing and number of teacher-volunteers.

- Renee Iinuma has elected to work on the competition paperwork and statistics generation component. Kyle Lee will be assisting her on this module.

ARIA's developers will be responsible for ensuring that their component can be integrated into the component(s) that precede/succeed the component with which they are directing their focus. While this is not always achievable in practice or occurs without some form of discrepancy, ARIA's developers will strive towards this goal.

A public repository on GitHub (https://github.com/wesleykepke/ARIA) is used to store all ARIA source code. Team members will work on files that pertain only to their specific module. The team is also using Slack for all team communication so that team members are kept up-to-date on project module developments.

A potential risk for development includes developers working on the same file at the same time because it is needed to accomplish their module. This can be alleviated by ensuring unambiguous group communication. Continuing, a second risk involves introducing functionality that breaks the current build. This risk can be dismissed by reverting to a prior build on GitHub that functions as expected. Finally, a third risk involves a non-compliant merging of individual modules. As previously mentioned, this can be resolved by working together and discussing what interactions need to take place among modules in order for them to be integrated without errors.

Team Members

All members of ARIA's development team are seniors studying Computer Science & Engineering at the University of Nevada, Reno and are graduating in May 2016.

- Renee Iinuma
  - After spending two years at UC Davis studying chemical engineering, Renee transferred to Nevada and switched her major to computer science. Renee is now the president of ACM at Nevada and works as a tutor at the Engineering Tutoring Center. Her interests include computer graphics, as well as web applications and front-end development. Renee hopes to work in industry in a field in which she can apply these skills.
- Wesley Kepke
  - At Nevada, Wes enjoyed learning about programming language theory, compiler construction, and computer graphics. While he still maintains an interest in these subjects, Wes would now like to direct his focus towards web and mobile applications and is aiming to land an industry position that pertains to these topics. Wes' beverage of choice while programming is matcha green tea and his favorite programming language is CatfishC, a dialect of C.
- Ernest Landrito
  - Before taking up the keyboard as a Computer Science major, Ernest was a music education major and vocalist. Because of his background, Ernest, is passionate

about his work to help the Northern Nevada Music Teachers Association. Ernest is excited to be starting at Google in Mountain View, CA, this upcoming summer, hoping to work on YouTube.

- Kyle Lee
  - Kyle began his education as a mechanical engineer, but switched over to computer science after taking a his first computer science course. He currently works at Central Services (Networking) at the university. He is interested in human computer interaction and networking, and his goal is to find a job in these fields.

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