

E-Performance Management Process for Athletics in Sri Lanka

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Abstract: Automated systems indeed have become indispensable in our daily lives. More varieties are introduced into Automated systems second by second and existing applications are being enhanced and broadened. Due to the rapid growth it is the right time to Athletic management professionals to tap into the power of web context to provide correct information effectively, efficiently, keeping the Athletes loyalty and faith. Automated system will be contributing in changing the way of existing manual athletic system in Athletic association'. Athletes currently seek for non-complicated services which are faster simultaneously. Through this research paper, we focus on the potential implications of improved efficient Athlete registration procedure, Coach athlete communication, timing detection and storing procedure, Displaying performance evaluation procedure.

Finally, this research paper provides evaluates the performance of all athletes in Sri Lanka by addressing the topic of Sri Lanka Athletic performance and registration web-based system to improve the athletics in the country. Using this system, they can prepare for their future championships like the Olympics.

Keywords: Athletic performance, Athlete registration, database, web development, Timing detection, IOT Module

Introduction

In this new technological era, the world's people have proposed software solutions as a major way of dealing with real people's

problems. Software solutions can be used to accelerate the efficiency, accuracy, cost effectiveness, mobility, reusability, and many more aspects of a manual process. Evolutionary concepts such as the Internet of Things and the progress of networking involve more people in a global village than ever before. Among other software technology programs, databases, web and multimedia software applications are increasingly used to develop solutions for different industries. There are many software engineering technologies, tools and platforms available today for developing software applications for enterprises. This research paper presents a project to develop a software solution for the Athletic Management in Sri Lanka.

A. Problem in brief

In Sri Lanka their athletic management is getting manual system. In Sri Lanka athletes from different schools, universities, clubs at the National level compete annually for a different championship.

Here they must register with each championship. They register using registration forms that they get in the Sri Lanka Athletic Association. Where they must give their details by filling out that form and post it to the Athletic Association.

Athletes in Sri Lanka have done well. However, there is no official website and database for athletes. They are our heroes and their history need to be preserved for generations to come. It is necessary to keep a database of their past performance. The way to go is to come up with athlete performance

and Registration. They are trying to check School athletes to the National level. But Some School Level Athletes stop their sports life because of misunderstanding about their performance because they cannot check their past performance. In Sri Lanka, they cannot watch their past performance because all the performance details (Track and Field that means Timing for Track and Distance for Field) are stored in a file-based system.

In other countries, they have an electronic timing system, the official website for the sports so it is easy to check the performance evaluation of athletes in their country. But in Sri Lanka, they haven't the necessary way to store that data. Because of these issues, it is essential to develop a reliable website. To keep the athletic performances to a database and develop an automated registration system, where it is easy to keep and secure this data.

This paper gives knowledge about the automated registration system and storing all data of athletes in the database.

Literature Review

Need to evaluate performance management in all sports. Currently, sports consultant-manager evaluations are not based on specific criteria, because coaches-managers are involved in performance sports. Do not confirm to counsellors. A performance management system is a performance - centre process that reflects how an organization approaches performance and includes sub-processes such as defining and implementing strategy, also training and performance management system. Several performance levels can be used here as a solution they think will help to develop a performance management system for Sports. From this perspective, the performance management level of sports consultancy managers affects the optimization of all specific activities.

Should be evaluated based on objective and unitary criteria. (Badau et al., 2010)

Here databases are used in sport administration. Some of these areas are provided below together with a discussion of the key elements of good database design. Databases are used to capture, storage, management, analysis, retrieval, interpretation and reporting data. And that data should be effective in performance analysis and decision making. Database is useful as multimedia repositories in sport information. Then databases are used for information access via creative interfaces that provide timely and efficient information that is tailored to each individual's unique requirements (Vincent, Stergiou and Katz, 2009)

In the past athletes would train with a coach under the supervision or direction of the sports federations. In the modern world the first timing system is Hand timing system. In this system everything is done manually. Time keepers get timing from using stopwatches then they write it in the paper and add it to the report book. But the world is combined with technology and they are using electronic systems to measure timing. European countries use this first electronic system; there are no databases that only generate text files now in Sri Lanka using that method. But now European countries use a high-performance system to measure the timing in track and measure the distance in the field. There is a database to store that performance and they have their own website to display that performance. Athletes can get their performance details by using that website. In the future they think to improve with some other techniques for athletics.(Sotiriadou and De Bosscher, 2018)

Athletic performance can be assessed by analysing specific variables that provide information about the physical condition of the athletes. Mainly strength and power related variables are the standard for the

athletic evaluation. The system automatically determines evaluation parameters and integrates them in ready-mode reports. Decreasing the time involved in the evaluation process. The Graphic representation of time evaluation of the variables being measured by the sensors is shown in real time on the screen. Evaluation session is defined by a protocol that can be specifically created by the coach for each athlete. Result of the evaluations is stored in an athlete's database so that the historical performance of the athletes can be easily assessed. In this article they used hardware side for sensor athletic performance there are four areas they sensor by, base station, multipower, jump platform, leg press using these four areas and monitoring athletic performance and timing. The purpose is to use a database to store that data and the coach can look at the history of athlete performance. Another thing is this system showing weaknesses and strengths of the athlete. (Silva, Martins and Palma, 2009)

There are different Athletes in the country like school athletes, university athletes, and national level athletes. There is registration for the athletes in the department. They must submit their details by profiling in the registration form. This wills the tedious work of the department unlike the traditional way of collecting the student athletes' profiles. Then they build up Athlete's Registration management and monitoring system. The result of this system developed is highly favourable to users. This system used to analyse the details about the athletes and can be used for competitions registrations also. There is an individual account for all the users. All can see the details about the athletes in Sri Lanka and their performance also displayed by the web site. Coaches also can register using this system and their details also there. Advantages of this system is we can stand up with new technologies. Another one is some schools where there are

no prizes but there are very talented athletes. They can search for a good coach by using this system and they can contact them. This is a very useful system to develop the sports in the country.(Montellano, 2017)

Most of the countries use the radio frequency identification device (RFID) for detecting athlete's performance in the championships. This device includes a silent gun, photo-finish camera and pressure sensitive start blocks to detect false starts. And another thing is at the race finish it detects the athlete 's upper part. All the detected details are generated by text document. Most of the countries detected these performances and displays by using web sites. And all the details are stored in the database. They can use these details by any time, because those details are stored in the database. This system is used to detect who is the winner of the race. Then it detects his/her timing and checks if it is recorded or not. If this is a good system, all the championship records are generated. Here this system uses many sensors that are photo sensors and the radio frequently detect sensors. This system can check lap timing also that's good for training sessions for the athletes because they can check their timing improvement .(Woellik, Mueller and Herriger, 2014)

Methodology

A combination of qualitative and quantitative methodologies was used, considering the nature of the project to provide adequate process subjects to provide the functionality needed for software success. The quality part generates the theory, which is then verified by a quantitative part of the research. The main advantage of combining these two systems is the ability to develop a comprehensive software solution Cover all the conditions of the Athletic management process.

In the requirement analysis phase data gathering techniques such as questionnaires,

interviews and surveys were used to gather qualitative and quantitative data required for create the requirement specification for the E-performance athletic management system.

Architectural design defines the relationship between the overall structure and the components of the solution before it goes to the detailed design or the lower level design, which includes the design of specific component details. The architectural design is provided in a layer-by-layer architecture, and the overall design spans three layers: client layer, application layer, and data layer. The overall system architecture for the proposed system is as follows.

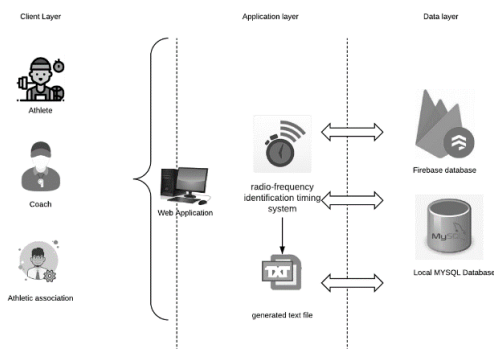


Figure 5: System Architecture

Identifying athletes' real performance for establishing their performance evaluation and giving timing results for resource management and store the timing in the sport management is the main three parts of this research. Functional requirements of this project monitor electronic timings, timing stored in the database, preview data about coaches using AI chat bot, displaying upcoming championship details and all the results of the championship generate year reports and performance evaluation reports.

A. IOT Module

In data gathering we identify parameters that can be able to easily measure in order to detect Athlete timings. Those main parameters are:

1. distance of the race track

2. Speed timing of the athlete

3. detect 8 lanes

4. assign athlete numbers to each lane.

Therefore, these parameters should be collected in analysing proper manner to detect Athlete timing accurately. To achieve this there should be collected in analysing proper ways to monitor the parameters and collect values for athletic performance evaluation. Use of IOT technology will be a great solution for this requirement. Main reason which greatly influences this monitoring purpose is the capability of sensing the speed and distance of IOT technology. IOT is proven to be fundamentally capable enough to provide more significant scalable, portable and energy efficient solutions to various problems in the athletic management system. Specially for the timing detection purposes. Therefore, for the solution, here sensors are used, 1.4bit line hunting sensor module-for detect starting point values and finish line values. This sensor is able to detect each lane's single values separately. And the sensor and the object by measuring how much time passed between start and finish the lane. We use other IOT parts. Hats are, 1. Mega Arduino 2. Ethernet shield 3. 128*64 Dots Graphic Blue Backlight LCD Display ,5.4*4 16 key membrane switch keypad module. Then the values which are gathered from the sensors will be passed to the main system using an Ethernet shield and then the main system will store them and do the analysing and displaying part. All these details will be stored in the databases for other purposes.

B. AI Module

A chatbot gives them an easy way to get the right coach information fast. Entrants may still have questions that a website itself does not answer or does not answer quickly enough. Entrants often find it easier to ask than to search a website. In that case, the

chatbot acts as a super navigation assistant to the current information.

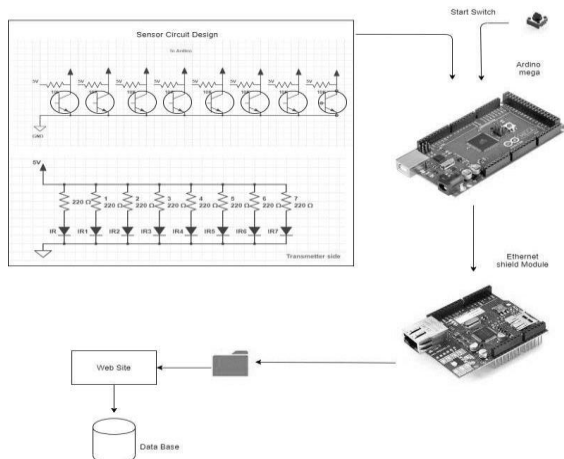


Figure 6: IOT Module Architecture

C. Main Web Module

All the isolated details and information of each sub module will come to this main module and store them for the integrated process. This module is responsible for every process. That is, Gather the sensor details from the Arduino module and process them. This main web module admin is Sri Lanka Athletic Association. In here admin adds the competition registration link to the web site. Then they can get all the registration details about who participates in the competition. Then they can easily create competitor's chest numbers using this system. And also, they can publish competition results using this system. Another section is the users are competitors and coaches. Users can register the competition by using that registration link. Users have their own account. School registration is more difficult than other registrations because they should upload the confirmation letter and they should register in their age sequence like (Under 20, Under 18, Under 16 etc.). National Athletes can register individually; all the coaches can register with their details individually then the system suggests to the competitors for good coaches by checking their performance. And anyone can check the results of the competitions. And also; they can check performance of the Athletes in Sri Lanka by

events. Example like who is the Sri Lankan Fastest man. They can check their performance year base. This system's main purpose is creating a database for the Athletics in Sri Lanka and performance improvements of the athletes. Athletes can know when their performance is a failure. This system gives a message to competitors how much their performance is lost at the Olympics.

Non-functional requirements are security, Availability, Reliability, Recoverability, Maintainability, serviceability. Security is very high because the competition registration fee is the main requirement of the competition and user details must be protected with this system. In this system you have available services any time that is a good effect of this system and its mean also serviceability.

Technology

A. Google Firebase

Firebase Database is a real-time database that stores data in JSON format. It provides an API that allows developers to store and sync data. The admin login module connects with Firebase to authenticate users to the application. By default, only authenticated users have access to read/ write, but this can only be published via configuration. Each user has distinct privileges and access to each specified module after they are logged in.

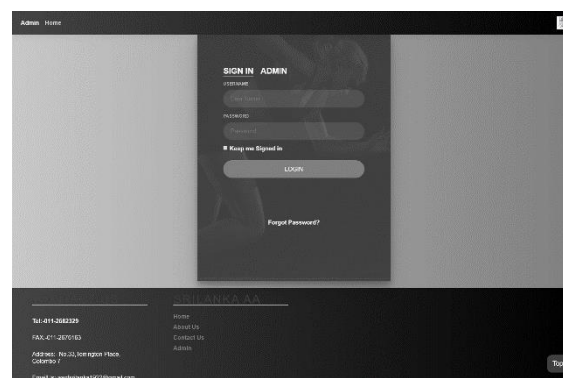


Figure 7: Login Interface

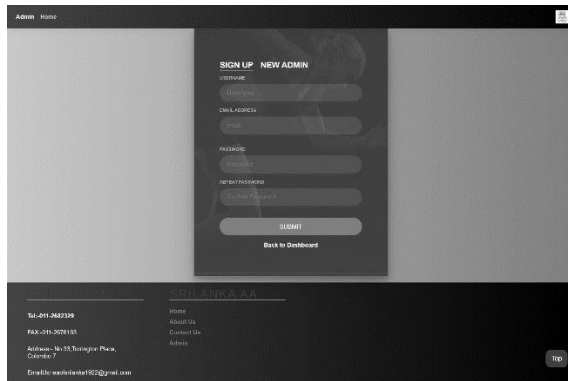


Figure 8:Registration Interface

B. MYSQL Local Database

MySQL is the most popular language for adding, accessing and managing database content. It stands out for its quickness, proven reliability, ease of use and flexibility. Entire web application connected with MYSQL local database.

C. IOT Technology

The Internet of Things, or IoT, is a set of interconnected computer devices, mechanical and digital machines, objects or individuals that provide identifiers and transmit data over a network that people do not need. Human or human-computer interactions. In the IOT module there is a timing detection device for each athlete in the one race. Using IR sensor beam for detect timing in each athlete who participate the event. Use Arduino tools for build timing detection device. And Finally get the text file for each event. And pass that data to web application.

D. ASP.Net

ASP.NET is a client-side web application framework designed for web development to produce dynamic web pages. It is purpose is to improve the android development and help to build the highest quality optimized applications. Whole web application developed by using ASP.NET.

Evaluation & Discussion

The main purpose of an evaluation is to ensure that the system meets the needs of

real users. This section describes in detail the planned evaluation process. Evaluation is a study of research procedures.

The systematic use of judging the quality or value of a service or intervention provides evidence that can be used to improve it. "Is the software developing in the right direction?" Such a question must be met. Or "Does the software meet user requirements?" Conducted through the software evaluation phase. System evaluation can be divided into summary evaluation and model evaluation. Formal evaluation improves the system while it is being evaluated. It helps to maintain quality standards. Summary evaluation is the evaluation of a completed project. It is used to assess the success of the final product. Assists in assessing the system's replicable operational needs and executes user requirements in the software development lifecycle.

First, we do a survey and get results of 95.8% athletes and 100% coaches have problems in the existing system.

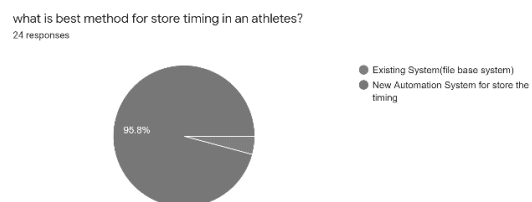


Figure 9: Athletes' idea for the new system

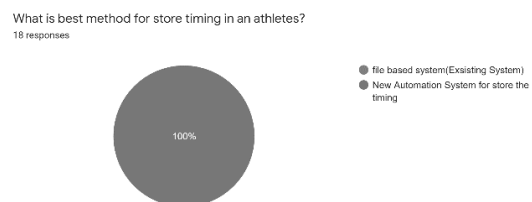


Figure 10: Coaches' idea for the new system

As a solution we decide to build an E-Performance Management Process for athletics in Sri Lanka, making use of the recent

advances in technology, we create a new solution for the existing registration system. Introduce a new online registration system and, also give a solution with a database for athlete performance storing safely. Also using this system and rural athletes can improve their performance with good coaches. They also can achieve with other Urban athletes.

IoT provides us with seamless interconnection between heterogeneous devices. Analyse and integrate data on various IoT devices used for timing detection.

Once the e-performance athletic management system is developed, the entire system is tested by unit tests, integration tests and acceptance tests. Athletes of all stages are given to the athletes and their prototypes are improved and tested accordingly. This solution reduces traditional systems in Sri Lanka and gives a new step to Athletic evolution of Sri Lanka.

Conclusion

Athletic management brings together all the knowledge related to the management of an athletic organization, whether local, national or international. The athletic management system is not only rewarding but it also helps the programmer to quickly organize the athletic events and lists in a short interval of time. I personally see this as a great way to find even more information about my topic. It will be able to check anything related to athletic at any time. Paperwork and manual work are reduced through this system. The system is user friendly and easy to use. I hope that the user would not only enjoy this system but also get satisfaction from finding how each and every feature of athletic management is implemented.

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