



# Sant Gadge Baba Amravati University Senate Elections Management System Based on “AngularJS” & “.NET”

<sup>1</sup>Ms. Shweta A. Solanke, <sup>2</sup>Prof. Dr. R. R. Keole, <sup>3</sup>Prof. Dr. A. P. Jadhao

<sup>1</sup>M.E. Student, <sup>2</sup>Professor, <sup>3</sup>H.O.D

<sup>1</sup>Dr. Rajendra Gode Institute of Engineering and Technology, Amravati, Maharashtra, India1,

<sup>2</sup>Professor, H. V. P. M. College of Engineering & Technology, Amravati, Maharashtra, India2

H.O.D., Department of Computer Science & Engineering

Dr. Rajendra Gode Institute of Engineering and Technology, Amravati, Maharashtra, India3

**Abstract:** This Research article presents the development of a Senate Elections Management System using .NET and AngularJS. The system aims to provide an efficient and reliable platform for managing and conducting senate elections. It includes features such as candidate registration, voter registration, ballot creation, voting process, result calculation, and reporting. The report discusses the design, implementation, testing, and evaluation of the system, highlighting the key challenges faced and the solutions employed. The project demonstrates the effective utilization of .NET and AngularJS technologies for building a comprehensive election management system.

**IndexTerms** - Online voting System, Web Base Election system, .NET frame work, Application Designing, Web Page Designing.

## I. INTRODUCTION

Voting is a fundamental process in a democratic system. It is a chance for the citizens of a country to have a say in the people who represent them or an issue that impacts them. Informed voting and participating in elections are one of the responsibilities of citizens of any Country. The voting process of different countries are fairly straightforward. First, an eligible citizen registers to vote, studies the candidates and issues, looks up their polling location, then casts their ballot during the election. An electoral system or voting system is a set of rules that determine how elections and referendums are conducted and how their results are determined. Electoral systems are used in politics to elect governments, while non-political elections may take place in business, non-profit organizations and informal organizations. These rules govern all aspects of the voting process: when elections occur, who is allowed to vote, who can stand as a candidate, how ballots are marked and cast, how the ballots are counted, how votes translate into the election outcome, limits on campaign spending, and other factors that can affect the result. Political electoral systems are defined by constitutions and electoral laws, are typically conducted by election commissions, and can use multiple types of elections for different offices.

## HISTORY OF ELECTION SYSTEM

Elections were used as early in history as ancient Greece and ancient Rome, and throughout the Medieval period to select rulers such as the Holy Roman Emperor and the pope. As we know India earned its independence in 1947, before independence our government is ruled by England. They have started the election system in India and from that time India is following same manual voter registration and ballot paper base voting system. Where Indian government have introduced EVM technology for Indian election in 1977. But as we know the population of India is very high and because of this we can't change whole process into a paperless system. Same like India numbers of countries are following same manual systems because of security concern. Numbers of countries use manual system because they think that online system or web base systems are not trust full, any cyber-attack can manipulate or destroy the result of online system. Hackers can manipulate the data online and our security systems still don't have that much potential to provide high security.

## NEW AGE TECHNOLOGIES

As per discussed in earlier section we have concern about the safety of online voting system but still numbers of researchers are doing research to increase the security of online or web base election management systems. As we know manual process of election management have different stages. In first stage we have to register new voters in voting list. This process is very hectic and time consuming some researchers dose a nicest work in this domain to reduce the overall timing of data collection. They have designed a web base portal to collect voter's data. By simply using this type of portals we can register our self as new voter on internet and our data is going to get feed into voting management system database. Some of researchers have created an online voting system to conduct small scale election of different organizations like: corporate election, society elections, university elections and many more.

Same like voter registration, Manual vote counting also have different problems. In manual vote counting we first have to collect the ballot papers, after that we have to relocate all the ballot boxes at single vote counting station. Which required transportation and it increases the cost of process. In next stage we have to count all the ballot papers as per voter voting and this process consume more time. To replace this system some of the countries have adopted the new electronic counting systems but still improvement is needed in this domain.



**Figure 1. New Age Technology Base Voting System**

### **INDIAN ELECTION MANAGEMENT SYSTEM**

India earned its independence in 1947, before independence our government is ruled by England. They have started the election system in India and from that time India is following same manual voter registration and ballot paper base voting system, Where Indian government have introduced EVM technology for Indian election in 1977 but EVM were first used in the 1997 election and became the only method of voting in 2004. The EVMs save time in reporting results. A voter-verified paper audit trail. VVPAT was introduced on 14 August 2014 in Nagaland. In the 2014 general election, VVPAT was operational in 8 constituencies i.e. In Lucknow, Gandhinagar, Bangalore South, Chennai Central, Jadavpur, Raipur, Patna Sahib and Mizoram as a pilot project A slip generated by the VVPAT tells a voter to which party or candidate their vote has been given, their name, their constituency and their polling booth. Opposition parties demanded that VVPAT be made mandatory all over India due to allegations against the government of hacking the EVM.

### **ELECTROL PROCEDURE**

Candidates are required to file their nomination papers with the Electoral Commission. Then, a list of candidates is published. No party is allowed to use government resources for campaigning. No party is allowed to bribe the candidates before elections. The government cannot start a project during the election period. Campaigning ends by 6:00 pm two days before the polling day. The polling is held between 7:00 am and 6:00 pm. The Collector of each district is in charge of polling. Government employees are employed as poll officers at the polling stations. Electronic Voting Machines (EVM) are being used instead of ballot boxes to prevent election fraud. After the citizen votes, his or her left index finger is marked with indelible ink. This practice was instituted in 1962.

### **ELECTION COMMISSION**

Election Commission is the federal body of India which is enacted under the provisions of the Constitution, responsible for monitoring and administering all the electoral processes of India. This body is responsible for ensuring elections are free and fair, without any bias. Election ensures the conduct of members pre-elections, during elections, and post-elections are as per the statutory legislation. All election-related disputes are handled by the Election Commission. The Supreme Court of India has held that where the enacted laws are silent or make insufficient provisions to deal with a given situation in the conduct of elections, the Election Commission has the residuary powers under the Constitution to act as appropriate.

### **NOTA**

On 27 September 2013, the Supreme Court of India judged that citizens have the right to cast a negative vote by exercising the "None of the above" (NOTA) option. This was the result of petitioning by the Electoral Commission and the People's Union for Civil Liberties in 2009. In November 2013, NOTA was introduced in five state elections. If the majority votes are for NOTA, the region comes under presidential jurisdiction and is treated with laws similar to a national territory.

### **PROBLEMS WITH EXISTING VOTING MANAGEMENT SYSTEM**

As per discussed in earlier section Indian election commission is improving old existing system with new technological inventions like EVM, VVPAT and more other. But still this process is time consuming and require large amount of money. Before each election voter registration camps are get organized all over India and Indian youth only can register their self during this time period. From 2019 they have introduced an online voter registration process but its not user-friendly.

### **NEED OF WEB BASE ELECTION SYSTEM**

During corona pandemic period software developers and researchers plays very important role to convert number of manual processes into online version. They have created applications, websites and web portals to help various fields like, medical field,

education system, Food and beverage, online shopping system and much more. During this period number of industries and corporate offices moved their work profile into a new culture i.e., “Work from Home”.

As we know every constitutional body is useless without election, this corporate bodies have introduced online voting system and web base election system first. By using this technology, they have created a revolution in Election management system. This web base Election management system can do multiple things from voter registration to voter counting and result displaying. Web base election management system and online voting system is very effective to save time and money.

Voter can register their self by using this web base system with it they also can watch their name in voter list. The person who wants take a Participation election as candidate can also fill his nomination by using same online process. People can vote online just by providing login information. The result declaration and vote counting process using web base system is very fast as compared to other techniques.

Each time, when new voter registers their self-using web base election management system, his name gets stored automatically into online database. Once we create this database for any election, we can use same database for more different election going to get held in future.

## OUR APPROACHE

As per discussed in earlier section, we know the benefits of online and web base election management system bust still this process is not practically proven in India because of its high population. We can't manage all data of voters on this much bigger scale. Second important thing is that in India poverty rate is very high and nearly 40% to 25% of Indian population is illiterate. They can't use this type of online processes.

To prove that our research has potential to overcome all the problems we have find out a solution. We have decided to design web base election management system using “Angular JS” and “.NET framework”. But without getting practice results of system, we can't prove our potential Infront of world. For getting real time result of our designed system, we have decided to work with any organization.

In the state of Maharashtra numbers of universities conducts a Senate election, this is going to be a best platform to try our system. For this purpose, we approached a Sant Gadge Baba Amravati University located in Vidarbha region of Maharashtra state. We have tried this system in their senate election held in 2022 and we have gotten an appreciation from Chancellor and Vice-Chancellor of Sant Gadge Baba Amravati University. For creating this web base Election management system, we dose a survey of some existing online and web base technologies. In this research article we are going to present technical specification and result of our system. In next section we are going to do a survey of some existing systems which is going to serve our focuses on online and web base election management systems.

## OBJECTIVES

The main objectives of the Senate Elections Management System are as follows:

- Automate the process of managing senate elections.
- Provide an efficient and transparent platform for candidate nominations, voter registration, and voting.
- Ensure data accuracy and integrity.
- Generate real-time election results.
- Enhance security measures to prevent fraud and unauthorized access.
- Improve accessibility for voters and candidates.

## II. LITRATURE REVIEW

To make the voting process very easy and efficient wireless and web technologies are used. The online- voting system has the possibility of secure, easy and safe way to capture and count the votes in the election.

The author in [1]” online voting system based on Adhaar id” uses Adhaar id as key of authentication, system is efficient in terms of time and provides security the system is great improvement over traditional system but the main problem resides in this system is that of authentication, the authentication technique used is not that efficient as biometric is not used.

The paper [2]” Secure Authentication for Online Voting System” presents non traceability and integrity of the votes, smart card has been used to avoid multiple votes casted by users, biometric is being used for authenticating voters. The author has introduced smart card for biometric identification and voter id card to be used at the time of casting vote. They are using smart card and voter id card at the time of election which is not feasible as anything can happen to those cards thus relying completely upon cards in not a good idea. And the use of various cards makes the system costly now each and every voter need to have these additional cards. Also, it may take reasonable amount of time to generate so many cards. All voting system generated priory though have met various features, which a voting system may consists but the main problem one could find in this system is that little “online” word, despite all techniques they have used to make system robust there is always a chance of malpractice when your system is online.

In [3]” online voting system powered by biometric security” the author has used personal identification number, thumb impression and secret key altogether for authentication of the voter. Techniques such as cover image creation, secret key expansion have been used for securely sending data to server and then further authenticating voters. This system is quite robust; it takes care of authentication as well as security of voter's data stored in server. The main problem with such systems is that despite using various security techniques they won't be able to manage such a huge amount of data that they may encounter during election periods their system is online and they may face congestion during casting votes.

## EXISTING SYSTEM AND THEIR ANALYSIS

The Existing System of Election is running manually. The Voter has to Visit to Booths to Vote a Candidate so there is wastage of Time. The Voter has to manually register into the Voter List. Also, Vote counting has to be done manually. All the Information of the Voter or Candidate is to be filling in manually. Voter must be present in his/her Constituency to give his/her Vote. There are Electronic Voting Machines used which Takes More Cost. The voting system previously being used by the Government is a paper-based system, in which the voter simply picks up ballots sheets from electoral officials, tick off who they would like to vote for, and then cast their votes by merely handing over the ballot sheet back to electoral official.

Some of the existing systems are:

- I. Paper-based voting
- II. Direct recording electronic voting machine
- III. Punch card

Michael A. Specter and J. Alex Halderman, Security Analysis of the Democracy Live, Online Voting System

Democracy Live's Omni Ballot platform is a web-based system for blank ballot delivery, ballot marking, and (optionally) online voting. Three states Delaware, West Virginia, and New Jersey recently announced that they will allow certain voters to cast votes online using Omni Ballot, but, despite the well-established risks of Internet voting, the

system has never been the subject of a public, independent security review. We reverse engineered the client-side portion of Omni Ballot, as used in Delaware, in order to detail the system's operation and analyze its security. We find that Omni Ballot uses a simplistic approach to Internet voting that is vulnerable to vote manipulation by malware on the voter's device and by insiders or other attackers who can compromise Democracy Live, Amazon, Google, or Cloud flare. In addition, Democracy Live, which appears to have no privacy policy, receives sensitive personally identifiable information including the voter's identity, ballot selections, and browser fingerprint that could be used to target political ads or disinformation campaigns. Even when Omni Ballot is used to mark ballots that will be printed and returned in the mail, the software sends the voter's identity and ballot choices to Democracy Live, an unnecessary security risk that jeopardizes the secret ballot. We recommend changes to make the platform safer for ballot delivery and marking. However, we conclude that using Omni Ballot for electronic ballot return represents a severe risk to election security and could allow attackers to alter election results without detection.

Jagdish B. Chakole, P. R. Pardhi, "Web Based Secure Internet Voting System for Corporate Election

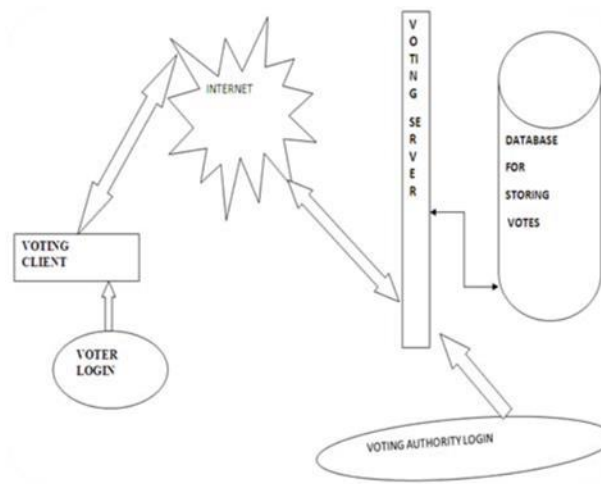
In this paper we propose a secure internet voting system that is suitable for voting over the internet. The proposed voting system is based on digital signatures and cryptography approach and the system will be suitable for corporate company having their offices in different cities. The proposed system encompasses three distinct phases - that of registration phase, authentication phase voting phase and counting phase involving parties, the voter, voting server and voting authority.

### System Architecture

They have designed this system for an organization having their offices in different cities. Our main concern is that to provide security to casted vote, when it is travelling from voter to voting server for storing, we are focusing to provide security from intruders both passive as well as active. The passive intruder can access the casted vote of a voter and create challenge to secrecy and privacy characteristics of voting system. The active intruder may tamper the casted vote and encounter problem for integrity of casted vote. Soto tackle this security concern, we are using the concept of cryptography and taking advantages of digital signature. To provide security from passive intruders, we are encrypting the casted vote on client system, and then will send that to voting server with the help of internet, on server-side decryption of that vote is done before counting. We require two keys for this purpose one for encryption on voter system, which should be publicly known and second key for decryption of encrypted vote before counting on voting server, this key must be private. So, for this purpose we need a pair of asymmetric keys.

To provide security from active intruder who can alter or tamper the casted vote when vote is transferring from voter to voting server, we are using digital signature. When a voter cast his/her vote after that he/she will digitally sign on that by using his/her own private digital signature, and send this to voting server, on voting server side that signature is checked by digital signature verifier of that voter which is publicly known. For this purpose, each voter should have a private digital signature and a public digital signature verifier, for this we are using a pair of asymmetric keys for each registered voter. As figure 2

**"Fingerprint Electronic Voting System based on Android Application" Muhammad Basit Farogh, M. Ghufra Khan, Umair, M. Nabeel Khan, Jawad Ahmed** This paper proposed a new prototype that deals with the design, development and security of a Fingerprint Electronic Voting System based on Android Application. The proposed voting system allows the voter to scan the fingerprint for examining the authentication by matching with the pre-stored fingerprint template in database by using an algorithm. Once the voter completes the verification process, the application automatically allows a voter to cast his vote using friendly graphical user interface design. The vote counting process will be done automatically after the completion of voting time and that makes the voting process efficient, fast, and secure.



**Figure 2. Design of Web based internet voting System Consist of voting sever, voting client, voter and voting authority. A registered voter connects to voting server by using his login identification and password. Voting client and voting server communicate by internet.**

### Definition of Terms:

#### A. E- Voting:

E-Voting also known as Electronic Voting, it is basically a voting procedure that allows a voter to cast their vote electronically through different machines and devices in an easy and secure manner. E-voting can eliminate fake votes, speed up the electoral process, increase accessibility and make voting more appropriate for citizens.

#### B. VVPAT Machines:

VVPAT (Voter Verified Paper Audit Trail) machine also known as VPR (Verified Paper Record) machine used as an electronic voting device. It provides physical evidence of votes that cast in the form of paper receipts. Those receipts are readable by both the voter and machine, and later use for verification and calculation purpose.

#### C. Biometric Verification:

Biometric Verification is an Identification process used to authenticate a person through its fingerprints and other biological traits such as Human Eye, Voice Recognition, Face recognition etc.

#### D. NADRA:

NADRA known as National Database and Registration Authority is a government agency works under the interior ministry of Pakistan. It manages data of all citizens of Pakistan and also responsible for issuing NIC's (National Identity Card) to the national citizens.

### Background of the research:

E-voting is a proactive area of research which is updated year by year by new methodologies, functionalities and new approaches. E-voting can be done through different voting machines like electronic ballot printers, VVPAT machines and internet applications etc. It is first time implemented in 1960's when punch card systems were introduced. Advance E-voting is implemented in many countries like (Belgium, Brazil, America, India etc.). Many countries even Pakistan is also considering and soon introducing Electronic Voting with the focus of improving many aspects of election process.

### “ONLINE VOTING SYSTEM” MANOHARA A.B., NIVEDITA G, NIHAL R, SADHANA D, CHOWDAMMA N

The Online Voting System is a web-based application. The system has a centralized database to keep records of all the Voters and Candidates and Final Results. This Online Voting System is based on SMS sending to voters, to confirmation of Vote. This web-based system is time saving, work load reduced information available at time and it provide security for the data. During the election, the election commission of India has introduced a new method of polling by online voting system (OVS). The election commission will maintain this website. This is a simple, safe and secure method that takes minimum of time.

The word VOTE means to choose from a list, to elect or to determine. The main goal of voting (in a scenario involving the citizens of a given country) is to come up with leaders of the people's choice. Most countries, India not an exception have problems when it comes to voting. Some of the problems involved include ridging votes during election, insecure or inaccessible polling stations, inadequate polling materials and also inexperienced personnel.

The objective of the system is to replace the traditional system that is in existence with new one. This smart system reduces the time for voting and also the system is reliable, and faster. In this system the voter username and password will be sent through SMS. The voter cast their vote enter the confirmation OTP sent their mobile number. Database maintained by this system usually contains the Voters information, Candidate information, The final Result of total votes.

In this paper they have proposed a web application for voting process that is Online Voting System through SMS. The online voting system will manage the voter's details, Candidate details. The main feature of the project includes voters' information and candidate information, voter can login and use his/her voting rights. The system can manage the information data very efficiently. The proposed system is more reliable, faster, accurate and easy to handle compared to existing manual system. It helps to computerize everything and reducing the errors as compare to manual voting system.

## DISCUSSION

It is compulsory to see the errors and benefits of each system, but the most important concern is the correctness of the necessary requirements. In second section we examine the different problems of the different voting system, and few researchers proposed a new idea of voting which is useful to overcome maximum problems and also increase the rate or speed of the election process. Now instantly the discussion is: Why would an offline system is the better solution for the common issues?

Different countries have already converted from paper voting to computerized voting or electronic voting. Different measures, techniques and technology were introduced to increase or raise the voter turnout, and decrease the number of fake and fraud attempts. The use of a Tablet device, thumb scanner, web base application and electronic counters as a voting machine is a solution for many problems like speed of election process, Ballot paper elimination and counting accuracy etc. In the introduction chapter we discussed that democracy needs people to come and show their determination and in India only 55% to 70% people are casted their votes in last few elections. So, the main intension of this research is to overcome on these problems faced by the voter during the elections and find out the best system that would solve these problems.

## III. METHODOLOGY

The methodology is the general research strategy that outlines the way in which research is to be undertaken and among other things, identifies the methods to be used in it. These methods, described in the methodology, define the means or modes of data collection or, sometimes how a specific result is to be calculated. For our project the information about the related work has been collected throughout every source that leads to our project.

Before designing our web base application for Sant Gadge Baba Amravati University Senate Election, we have decided all aspects of requirements. In this phase we have decided about what kind of specification is going to be there with our web base application. We have decided about database creation, front end designing, and portal data management.

We have thinks about the working flow of our system which is described in Figure 3 flowchart. As per described in flow chart our process starts with Establishment of Constituencies and ends with result of election and Resolution of disputes regarding election. Before this we have also made a decision to create portal for voter registration with existing design. This design aspect is need to be in regional language for user-friendliness.

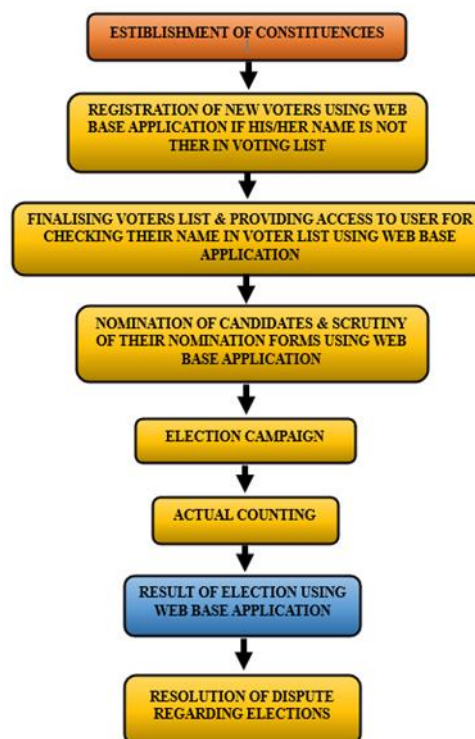


Figure 3. Flow chart of System

## IV. IMPLIMENTATION

As per discussed in earlier section for implementation of the system we dose a literature survey where we have analyze the results of some same online and web base systems. In our approach we have to consider a senate election of Sant Gadge Baba Amravati University. For that we have created a regional language support web base application for election management using “Angular JL and “.NET” Framework.

### FRONT END DEVELOPMENT

**Introduction:** Briefly describe the purpose and scope of the project. Provide an overview of the technologies used (Angular, CSS, HTML, TypeScript). **Project Objectives:** Clearly state the objectives and goals of the project. Mention any specific features or functionalities you aimed to implement.

### TECHNOLOGIES USED:

The following technologies have been used in the development of the Senate Elections Management System:

**AngularJS** is a JavaScript open-source front-end structural framework that is mainly used to develop single-page web applications (SPAs). It is a continuously growing and expanding framework which provides better ways for developing web applications. It changes the static HTML to dynamic HTML. Its features like dynamic binding and dependency injection eliminate the need for code that we have to write otherwise. AngularJS is rapidly growing and because of this reason, we have different versions of AngularJS. It is an open-source project which can be freely used and changed by anyone. It extends HTML attributes with Directives, and data is bound with HTML. We have used this platform to design front end panel/window of web base election management application.

#### **.NET:**

Where for application development we have used a “.NET Framework”. .NET Framework is a software development framework for building and running applications on Windows.

.NET Framework is part of the .NET platform, a collection of technologies for building apps for Linux, macOS, Windows, iOS, Android, and more.

.NET is a developer platform made up of tools, programming languages, and libraries for building many different types of applications.

There are various implementations of .NET. Each implementation allows .NET code to execute in different places—Linux, macOS, Windows, iOS, Android, and many more.

- .NET Framework is the original implementation of .NET. It supports running websites, services, desktop apps, and more on Windows.
- .NET is a cross-platform implementation for running websites, services, and console apps on Windows, Linux, and macOS. .NET is open source on GitHub. .NET was previously called .NET Core.
- Xamarin/Mono is a .NET implementation for running apps on all the major mobile operating systems, including iOS and Android.

.NET Standard is a formal specification of the APIs that are common across .NET implementations. This allows the same code and libraries to run on different implementations.

#### **Architecture of .NET Framework**

The two major components of .NET Framework are the Common Language Runtime and the .NET Framework Class Library.

- The Common Language Runtime (CLR) is the execution engine that handles running applications. It provides services like thread management, garbage collection, type-safety, exception handling, and more.
- The Class Library provides a set of APIs and types for common functionality. It provides types for strings, dates, numbers, etc. The Class Library includes APIs for reading and writing files, connecting to databases, drawing, and more.

.NET applications are written in the C#, F#, or Visual Basic programming language. Code is compiled into a language-agnostic Common Intermediate Language (CIL). Compiled code is stored in assembly's files with a .dll or .exe file extension. When an app runs, the CLR takes the assembly and uses a just-in-time compiler (JIT) to turn it into machine code that can execute on the specific architecture of the computer it is running on.

**C#:** The primary programming language used for the backend development.

**HTML/CSS:** Markup languages for creating the user interface.

**SQL Server:** A relational database management system for storing and managing the application data.

#### **SYSTEM MODULES:**

The Senate Elections Management System consists of the following modules:

**User Management:** Handles user registration, login, and account management.

**Candidate Management:** Allows candidates to submit their nominations and provides administrative tools for managing candidate information.

**Voter Management:** Facilitates the registration process for voters and ensures eligibility verification.

**Ballot Management:** Manages the creation and distribution of electronic ballots for each constituency.

**Voting Process:** Provides a secure and user-friendly interface for voters to cast their votes.

**Result Management:** Generates real-time election results and displays them to the public.

**System Architecture:** The Election Management System follows a client-server architecture. The server-side is implemented using the .NET framework, specifically ASP.NET, which provides robustness, scalability, and security. The client-side is built using AngularJS, a popular JavaScript framework that enables the creation of dynamic and responsive user interfaces.

#### **KEY FEATURES**

- **User Registration:** The system allows administrators, candidates, and voters to register and create their accounts. A multi-level authentication mechanism ensures secure access to the system.
- **Candidate Management:** Candidates can register their profiles, including personal details, party affiliations, and campaign information. The system allows administrators to review and approve candidate registrations.
- **Voter Management:** Voters can register and update their information, including demographic details and voting preferences. The system ensures that each voter has a unique identifier and prevents duplicate registrations.

- **Election Setup:** Administrators can set up elections by defining key parameters such as election dates, polling stations, and candidate eligibility criteria. The system validates candidate nominations and ensures compliance with electoral regulations.
- **Voting Process:** The system provides a user-friendly interface for voters to cast their votes. It ensures ballot secrecy and prevents multiple voting attempts by the same user. Real-time vote counting and result generation enhance transparency and efficiency.
- **Analytics and Reporting:** The system includes comprehensive analytics and reporting capabilities. Administrators can generate reports on voter turnout, candidate performance, and overall election statistics. These insights aid in evaluating the electoral process and making informed decisions for future elections.

By using Angular JS and .NET Framework we finally designed our Web base application to conduct Sant Gadge Baba Amravati university Senate Elections. We have conducted it successfully and our web base application is running without any error. The result and analysis of our Web base application is discussed in next section.

**V. WORKING AND RESULT ANALYSIS**

After designing and testing the web base application we have opened it for users to do a registration for that we have created an instruction manual which is going to guide user about “How to Use it?”.

As we discussed in earlier section, we have created this application in regional Language. The front-end design/ front page appearance of web base application is shown in following figures.



Figure 4. Front panel with three basic options, (A). Search your name in voting list, (B). Click for New Application, (C). Print application & Pay Fees



Figure 5. Options for Voter list name Searching, (A). Choose Department/Branch, (B). Write name for searching, (C). Press for new application





Figure 6. Menu option for application reprint (A). Enter Aadhar number for reprinting of application

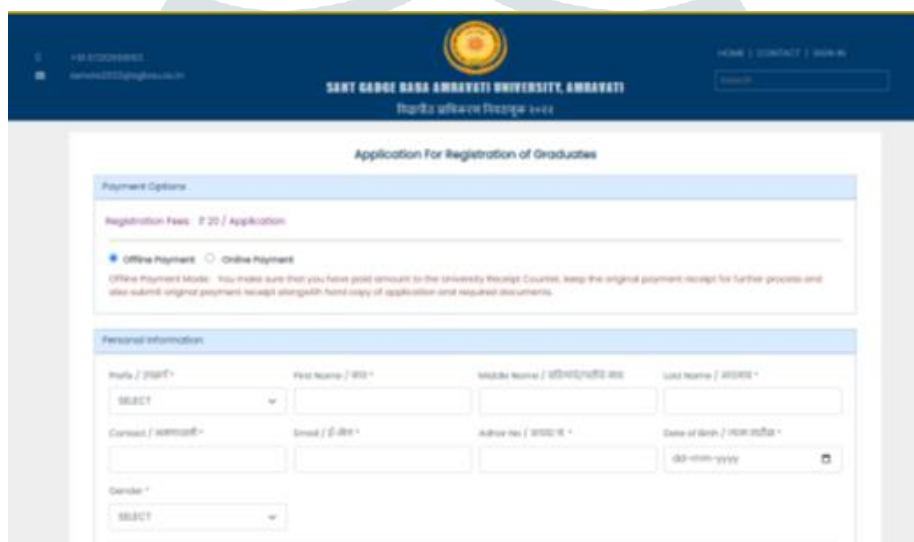


Figure 7: Window for Fees payment (A). Choose Payment Mode, (B). Enter Your information

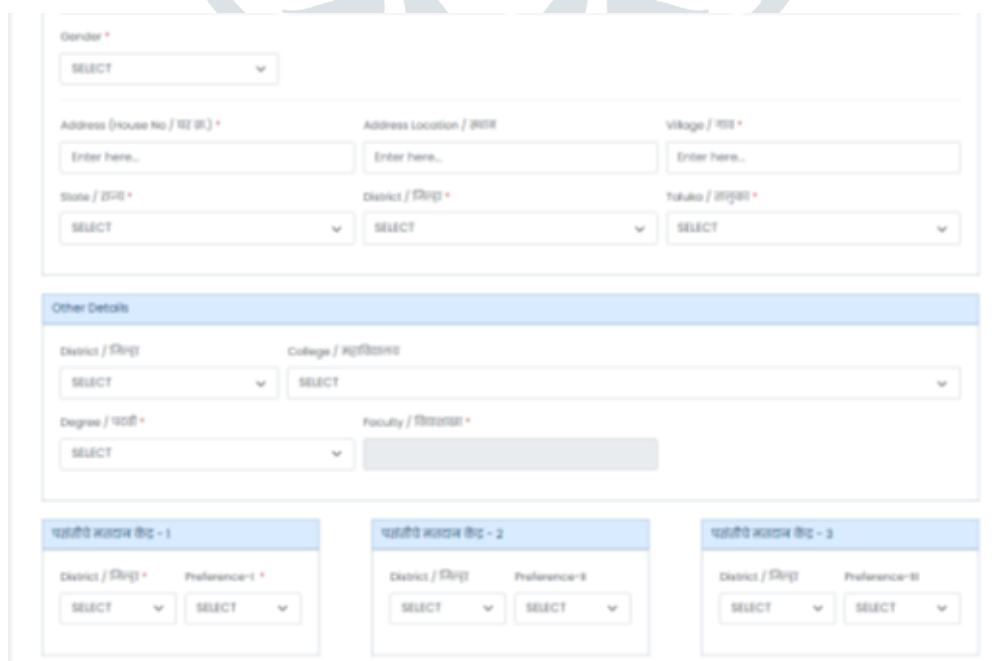


Figure 8. Window for selecting Voting Booth as per Choice

Figure 9. Window for document submission/Upload

Figure 10. Window for Print Application / Print Review/ Submit Application

## VI. FUTURE ENHANCEMENT

**Challenges and Future Enhancements:** During the development of the Election Management System, several challenges were encountered, such as handling a large volume of data, ensuring scalability, and addressing potential security vulnerabilities. Additionally, future enhancements could include:

- Integration with biometric authentication systems for enhanced voter identification
- Integration with external systems for real-time voter registration verification
- Implementation of blockchain technology for improved transparency and tamper-proof record-keeping

Improvements are necessary to be done in order to make a system more efficient and reliable. So, we are planned to move this system to an online Cloud based ERP System. This online system will allow voters to cast their votes by various electronic ways through their mobile phones, home PC' s, Net - cafes and Kiosks machines which helps the voter to vote from any locality, anywhere in the city or even out of the country through his secret ID and password. Every system will be connected through internet to the main server which will allow many people to perform voting at the same time. In online voting all the voting results throughout the country can be calculated in Central Count System at a time and displayed on Election Management Sites.

## VII. APPLICATION:

- We can apply this web base application in multiple small scale election management system like; Corporate Elections, Society body election, Gram panchayat and Municipal Corporation election.
- We can use this approach for voter registration in Indian election system managed by election commission of India.
- Slowly using this approach, we can create an all-India database for voting, like Aadhar.
- By using this approach, we can easily count and display the result of multiple election system currently existed in all over India.

## VIII. ADVANTAGES:

- Overall cost of creating a web base system is very less so we can call it cost effective system.
- It is capable of eliminating costly manual system from market.

- It is user-friendly and easy to operate/use.
- It supports regional language interface so anyone can process and use this application easily.
- We also can check the name in voter list with voter registration.
- We also can watch the result of multiple constituencies faster and easily by using only single page.

## IX. CONCLUSIONS

Research presented in this article is a new approach to eliminate old manual Election management process. By doing this research we can conclude that we have successfully created a new option for conducting election using Web base Application. This Senate Elections Management System is a comprehensive web-based application developed using .NET and AngularJS. It automates the process of managing senate elections, providing an efficient and transparent platform for candidates and voters. The system offers various features such as user registration, candidate nomination, voter registration, ballot creation, voting, and result declaration. It aims to enhance the overall election process by ensuring data accuracy, integrity, and security. The system architecture and technologies used ensure scalability, performance, and maintainability.

## REFERENCES

1. Himanshu Agarwal and G.N. Pandey "Online Voting System for India Based on AADHAAR ID" 2013 Eleventh International Conference on ICT and Knowledge Engineering
2. Smita B. Khaimar, P. Sanyasi Naidu, Reena Kharat "Secure Authentication for Online Voting System"
3. Shivendra Katiyar, Kullai Reddy Meka, Ferdous A. Barbhuiya, Sukumar Nandi "Online Voting System Powered by Biometric Security" 2011 Second International Conference on Emerging Applications of Information Technology. M. D. Rodriguez, J. Ahmed, and M. Shah, "Action MACH: A spatiotemporal maximum average correlation height filter for action recognition," in Proc. IEEE Conf. Comput. Vis. Pattern Recog., Jun. 2008, pp. 1–8.
4. Rajesh M. Ghadi, Priyanka S. Shelar, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 04 Issue: 12 | Dec-2017
5. AAAS Center for Scientific Evidence in Public Issues: Letter to governors and secretaries of state on the insecurity of online voting (April 9, 2020), <https://www.aaas.org/programs/epi-center/internet-voting-letter>
6. Adida, B.: Helios: Web-based open-audit voting. In: 17th USENIX Security Symposium. pp. 335{348 (2008)
7. von Ahn, L., Maurer, B., McMillen, C., Abraham, D., Blum, M.: reCAPTCHA: Human-based character recognition via web security measures. Science 321(5895), 1465{1468 (2008)
8. Akhawe, D., Braun, F., Marier, F., Weinberger, J.: Subresource integrity (2016), <https://www.w3.org/TR/SRI/>
9. Amazon Web Services: S3 Object Lock overview, <https://docs.aws.amazon.com/AmazonS3/latest/dev/object-lock-overview.html> Amazon Web Services: Share an object with others, <https://docs.aws.amazon.com/AmazonS3/latest/dev/ShareObjectPreSignedURL.html>
10. Ali Fawzi Najm Al-Shammari, Sergio Tessaris" Vote Verification through Open Standard: A Roadmap", 978 1-4577-0953-1/11IEEE2011.
11. Amir Omid and Mohammad Abdollahi Azgomi, "An Architecture for E-Voting Systems Based on Dependable Web Services" 978-1-4244-5700-7/10 ©2009 IEEE
12. Amir Omid, Saeed Moradi "Modeling and Quantitative Evaluation of an Internet Voting System Based on Dependable Web Services", 978-1-4673-0479-5/12/©2012 IEEE, Haijun Pan, Edwin Hou and Nirwan Ansari" Ensuring Voters and Candidates' Confidentiality in E-voting Systems" 978-1-61284-680-4/11/\$26.00 ©2011 IEEE
13. Seo-II Kang and Im-Yeong Lee "A Study on the Electronic Voting System using blind Signature for Anonymity", IEEE 2006 International Conference on Hybrid Information Technology (ICHIT'06) 0-7695- 2674-8/06 Chun-Ta Li, Min-Shiang Hwang, Yan-Chi Lai "A Verifiable Electronic Vote Scheme, 2009 Sixth International Conference on Information Technology: New Generations.
14. Lazaros Kyrillidis, Sheila Cobourne, Keith Mayes, Song Dongy and Konstantinos Markantonakis" Distributed e-Voting using the Smart Card Web Server" 978-1-4673-3089-3/12@ 2012 IEEE
15. Y ousfi Souheib, Derrode Stephane, "Watermarking in e-voting for large scale election", 978-1-4673-1520-3/12/\$31.00 ©2012 IEEE
16. Bruce, K.B., Cardelli, L., Pierce, B.C.: Comparing Object Encodings. In: Abadi, M., Ito, T. (eds.): Theoretical Aspects of Computer Software. Lecture Notes in Computer Science, Vol. 1281. Springer-Verlag, Berlin Heidelberg New York (1997) 415–438
17. van Leeuwen, J. (ed.): Computer Science Today. Recent Trends and Developments. Lecture Notes in Computer Science, Vol. 1000. Springer-Verlag, Berlin Heidelberg New York (1995)
18. Michalewicz, Z.: Genetic Algorithms + Data Structures = Evolution Programs. 3rd edn. Springer-Verlag, Berlin Heidelberg New York (1996)
- 19.
- 20.