

VoteVista

Software Architecture Design

SAD version 1.0

Team 07

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Introduction

In this document, we will provide a comprehensive overview of the software architecture that will drive the VoteVista machine, an innovative solution to make the voting experience in Oregon State better.

The VoteVista is a state-of-the-art digital security solution. Its core functionality revolves around providing a secure and user-friendly environment for users to vote. This software architecture plays a pivotal role in ensuring the security, functionality, and ease of use of the system.

This document provides a comprehensive overview of the VoteVista software architecture, organized into four sections. Section 2 offers a system design overview, Section 3 covers component specifications, Section 4 details sample use cases and Section 5 provides a glossary of key technical terms.

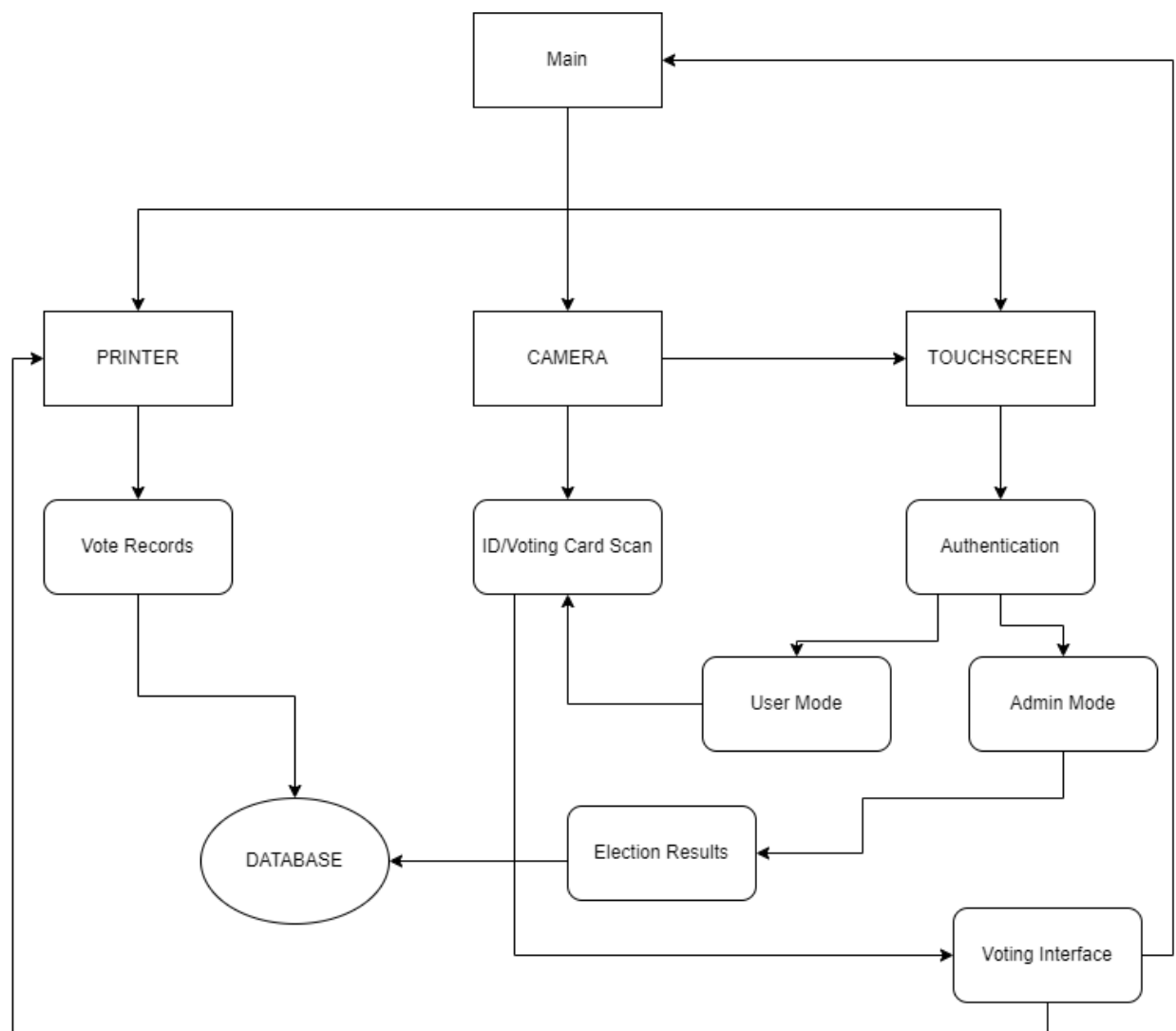
This structured document will facilitate a clear understanding of the software architecture, its

2. Architecture Design Overview

This section comprises a comprehensive overview of the physical elements associated with the system, accompanied by a block diagram illustrating the physical interface and providing a visual representation of the system's physical components and their interconnections.

1) Architecture Design Diagram

The VoteVista's architecture is designed to ensure secure, efficient, and user-friendly operation. The main components and their interactions are described below:



System Overview:

The voting system architecture is organized around a central 'Main' module that interfaces with several key components: a 'Printer', 'Camera', 'Touchscreen', and a 'Database'.

Main:

The 'Main' module acts as the central hub for managing the flow of information and control between the components of the voting system.

Printer:

Connected directly to the 'Main' module, the 'Printer' is responsible for producing 'Vote Records', which are then sent to the 'Database' for storage.

Camera:

The 'Camera' is linked to the 'Main' module and is used for 'ID/Voting Card Scan' operations to verify voter identity. The outcome of the ID scan influences the subsequent flow of control and data within the system.

Touchscreen:

The 'Touchscreen', which also connects to the 'Main' module, serves as the user interface for the voting system. It supports two modes of operation:

'Authentication' process that determines whether the user will access the system in 'User Mode' or 'Admin Mode'.

'User Mode' allows for standard voting operations, while 'Admin Mode' provides access to 'Election Results' and system administration functions.

Database:

The 'Database' is a central repository for the system. It receives Vote Records with voter's name, time of voting, voting records.

The 'Database' also supplies 'Election Results' back to the 'Touchscreen' for display and verification in 'Admin Mode'.

User Mode:

In 'User Mode', the voter is presented with a 'Voting Interface' on the 'Touchscreen', through which they can submit their votes. The submitted votes are presumably stored in the 'Database' (although this is not explicitly depicted in the diagram).

3. Component Specifications

1) Touch Screen

The interface provided by the LCD Touchscreen Display serves as an extensive platform for visual engagement between users and the control software.

Public void updateUIWithInfoAndImage(): *prints the ID card and Voting card infos.*

A) User/Admin mode

The Touch Screen component offers distinct User and Admin modes, enabling a clear differentiation in functionality and access privileges between regular voters and authorized administrators. This mode demarcation is crucial in ensuring secure operations and maintaining system integrity.

Public void performLogin(): *allows the user to authenticate.*

Public void handleQRCodeResult(): *method using algorithms to decode QR Code into text.*

C) Voting Interface

The Voting Interface, facilitated through the Touch Screen, provides a user-friendly platform for voters to cast their ballots securely and accurately. It presents candidate options and facilitates the selection process, ensuring a seamless and intuitive voting experience.

Public void displayVotingInterface(): *allow the user to vote for candidates listed.*

2) Camera

A) Voting card scan

The Camera component incorporates the capability to scan voting cards efficiently. This feature ensures the accurate retrieval of pertinent information from the voter's cards, which is crucial for validation and enables a seamless connection between the physical and digital aspects of the voting process.

Public void setupWebcam(): *setup the Webcam and shows image on screen.*

B) ID scan

Alongside the voting card scan, the Camera system includes an ID scanning feature. This functionality aids in verifying the identity of the voter, ensuring that only eligible individuals participate in the voting process. The integration of ID scanning enhances the overall security and legitimacy of the voting system.

Public void startQRScanning(): *method to scan the QR code representing the user's cards.*

Public promptForIDScan(): *ask the user to scan again if an error occurred.*

3) Printer

The Printer component serves as the final stage of the voting process. Once the voter has made their selections on the Touch Screen, the updated voting card is printed. This critical component ensures that voters receive tangible confirmation of their choices, maintaining transparency and providing a physical record of the cast ballot.

A) Vote records

Under the Printer component, the system manages the critical task of recording votes securely. Once a voter has made their selections on the Touch Screen and the updated voting card is printed, the system ensures that a comprehensive record of the cast ballot is securely stored. This feature is integral in maintaining an accurate and tamper-proof record of the election results.

4) Wi-Fi checking

The machine cannot work without being connected to a Wi-Fi, this is for safety purpose and access to the database.

Public void startNetworkMonitoring(): update UI if network is unavailable.

Public static Boolean isInternetReachable(): ping a server to see if the machine is still connected to Wi-Fi.

4. Sample Use Cases

1) User Mode

A) Authentication successful

Use Case 1: VoteVista User Routine Access.

Actor: User

User Goal: To facilitate the user in the voting process.

Preconditions: The VoteVista is in an idle state.

Trigger: User initiates the voting process.

Scenario:

1. User approaches the VoteVista.
2. Users takes and drop a paper in the printer.
3. User touches the screen to start authentication process.
4. Upon successful verification, the voting interface is displayed.
5. User votes.
6. After voting, user is asked to confirm choices. A ballot paper is printed.

B) Authentication failed

Use Case 2: VoteVista User Error Access.

Actor: User

User Goal: To facilitate the user in the voting process.

Preconditions: The user information are not matching.

Trigger: User initiates the voting process.

Scenario:

1. User approaches the VoteVista.
2. Users takes and drop a paper in the printer.
3. User touches the screen to start authentication process.
4. Verification failed, the user is asked to scan his cards again. (name/last name not matching between Voter Identification card and National Identification Card)

2) Admin Mode

A) Authentication successful

Use Case 3: VoteVista Admin Routine Access.

Actor: Admin

User Goal: To facilitate the admin in getting election records.

Preconditions: The VoteVista is in an idle state.

Trigger: Admin initiates the admin process.

Scenario:

1. Admin approaches the VoteVista.
2. Admin is asked for credentials (name/password)
3. Upon successful authentication, admin has access to the election records with statistics.

B) Authentication failed

Use Case 4: VoteVista Admin Error Access.

Actor: Admin

User Goal: To facilitate the admin in getting election records.

Preconditions: The VoteVista is in an idle state.

Trigger: Admin initiates the admin process.

Scenario:

1. Admin approaches the VoteVista.
2. Admin is asked for credentials (name/password)
3. Authentication failed, admin is asked to try again.

3) Wi-Fi disconnection

Use Case 5: Wi-Fi disconnection.

Actor: User

User Goal: To facilitate the user in the voting process.

Preconditions: The VoteVista is having Wi-Fi issues.

Trigger: User initiates the voting process.

Scenario:

1. User is using VoteVista.
2. VoteVista cannot access Wi-Fi, an error message is displayed.
3. User call admin to notice of the problem.
4. Admin needs to connect machine to Wi-Fi again for it to work properly.

5. Definition of terms

Use Case: A description of a system's behavior as it responds to a request originating from outside of that system.

Wi-Fi Disconnection: Refers to the loss of wireless network connectivity, which could impact the system's functionality.

Vote Records: Digital records of individual votes cast in the system.

Voting Interface: The part of the software through which users interact to cast their votes.

ID/Voting Card Scan: The process of using a camera to read and verify voter identification and voting cards.

Database: A structured set of data held in a computer, especially one that is accessible in various ways, used here for storing voting records and election results.

Printer (in the context of VoteVista): A device used for producing physical records of votes or other relevant documents.

Camera: Used in the context of ID and voting card scanning for identity verification.

Touchscreen: An interactive display that serves as the primary user interface for the voting system.

6. References

OregonState Voting Machine: https://www.youtube.com/watch?v=l-t4_MHxLdU

Voting in Oregon: <https://www.oregonlegislature.gov/lpro/Publications/VotinginOregon.pdf>

Voting process by state: https://ballotpedia.org/Voting_methods_and_equipment_by_state