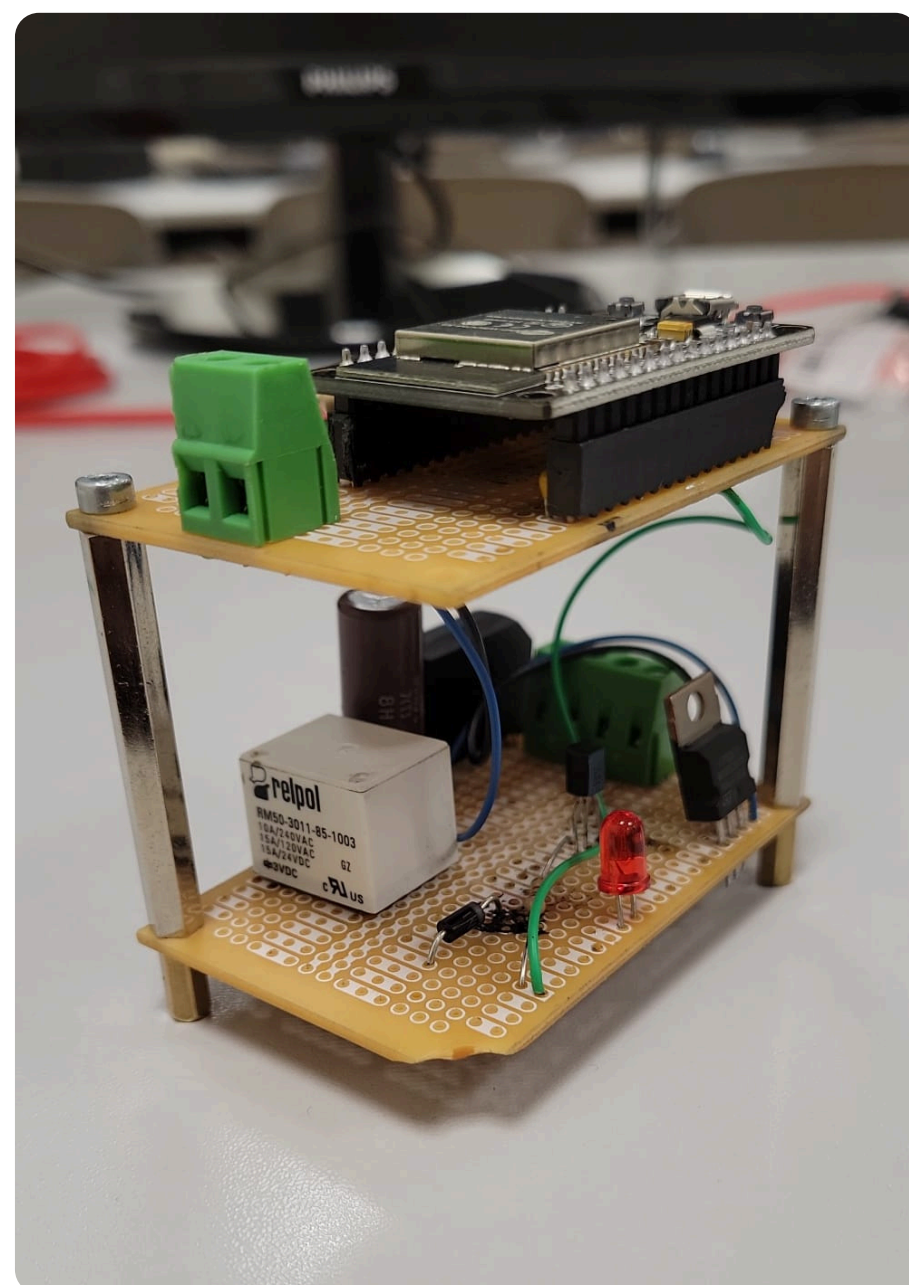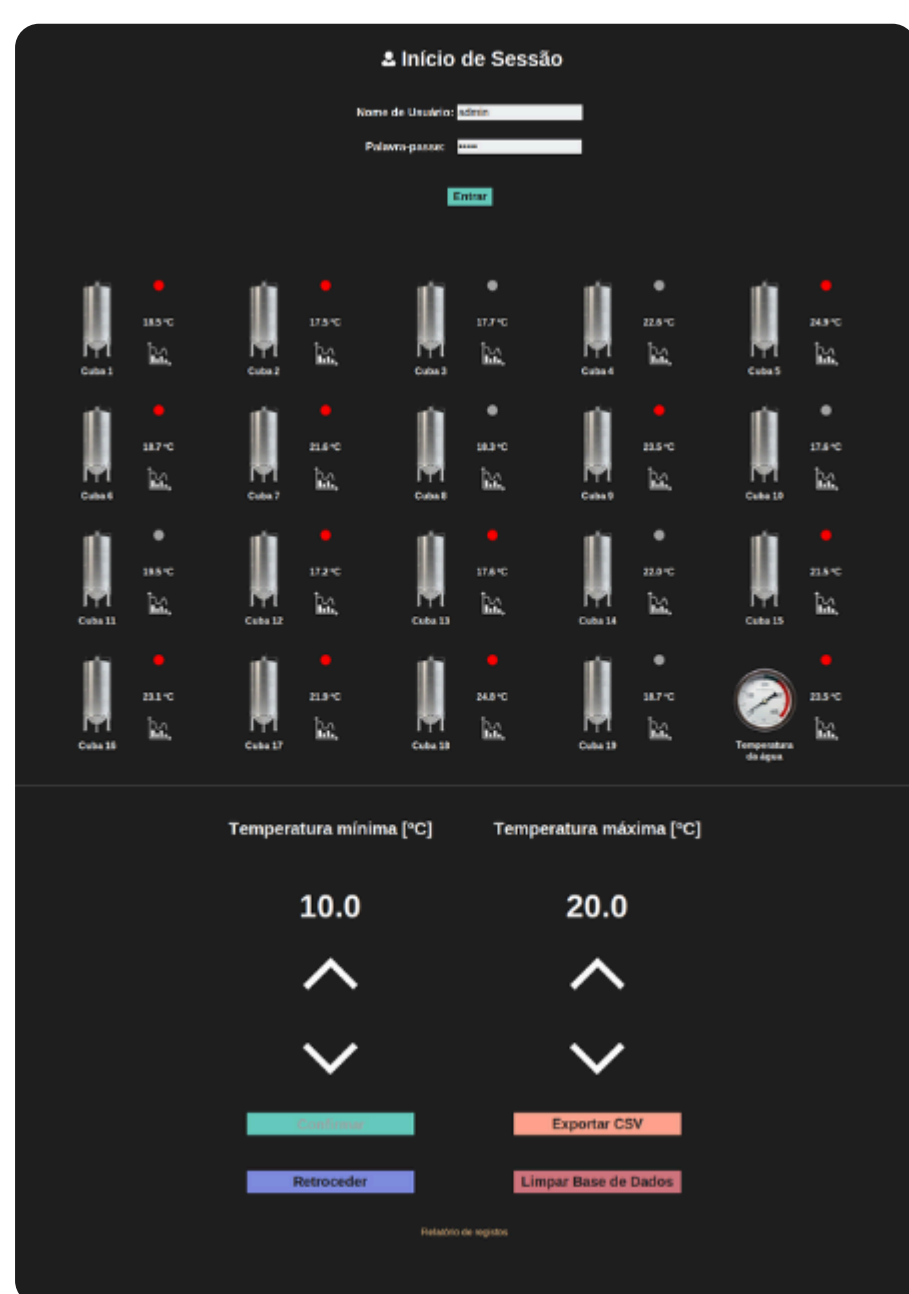# Digital Wine Temperature Control

Problem

Temperature control and monitoring are crucial in wine production. However, only a few wineries rely on localized temperature measurments and controls, established during the initial setup of the winery. When the expansion of the production capacity is needed, it is **usally necessary to install new eletrical systems from scratch**.

About Our Product

Our product effectively monitors and controls wine temperature during fermentation. For **monitoring**, we use a **PT1000** resistance sensor, renowned for its long-term precision, stability and repeatability, to ensure accurate temperature measurements. For **control**, we utilize the robust **ESP32** microcontroller, which offers extensive resources for reliable performance.


Winery App

The implemented app plays a vital role in controlling wine temperatures. It features encrypted **login** for secure access. The app allows users to view the **status** of each electrovalve and monitor the current temperature of each wine vat. Additionally, it provides the capability to independently **set** temperature limits for each vat, export CSV files, manage the database, and check the temperature history graph.

Website

On this **website**, users can **check** the temperatures for each wine vat individually and intuitively acess **graphs** displaying around 100 temperature readings. Users can also set up **email notifications** for when temperatures exceed defined limits. The website **integrates** seamlessly with the app and with the hardware device, providing **efficient** and **real-time** temperature **monitoring.**
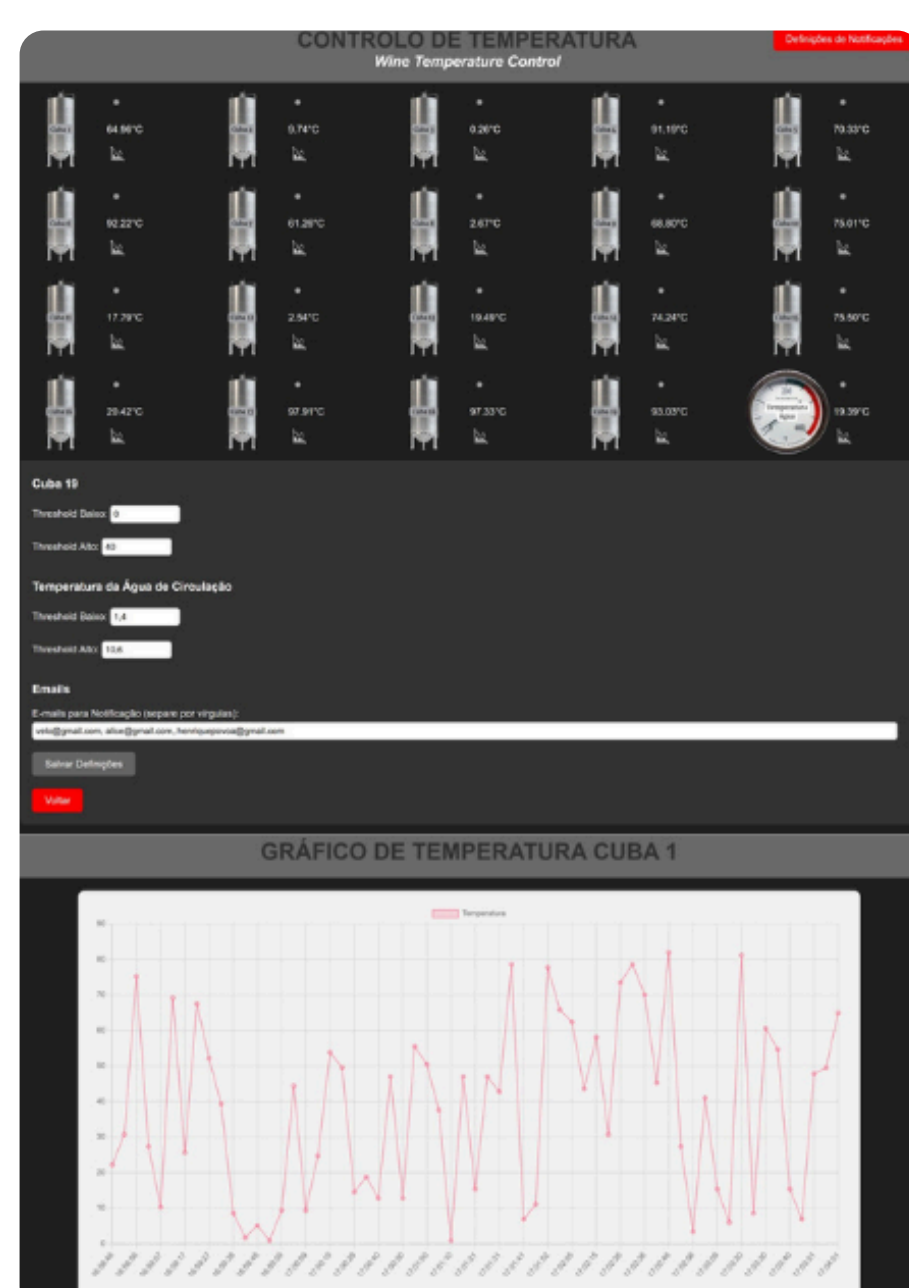

Target Audience

Winery **owners**, **investors**, wine production **engineers, technicians** and **researchers in Oenology** are the primary beneficiaries of our product. They can leverage our monitoring and control system to **enhance** the production **efficiency** and studies, without the need for extensive infrastructure changes and substancial financial investments.

Costs and Benefits

The materials used to produce our product, such as the microcontroller, offer **excellent cost-benefit value**. While the initial investment and installation are the **primary costs**, our product eliminates the need for infrastructure changes during maintenance or expansion.

Key benefits include: **enhanced precision**, **control**, and **efficiency**; a secure and **user-friendly** app and website; effective **data management**; significant **long-time savings**.

How Does It Work
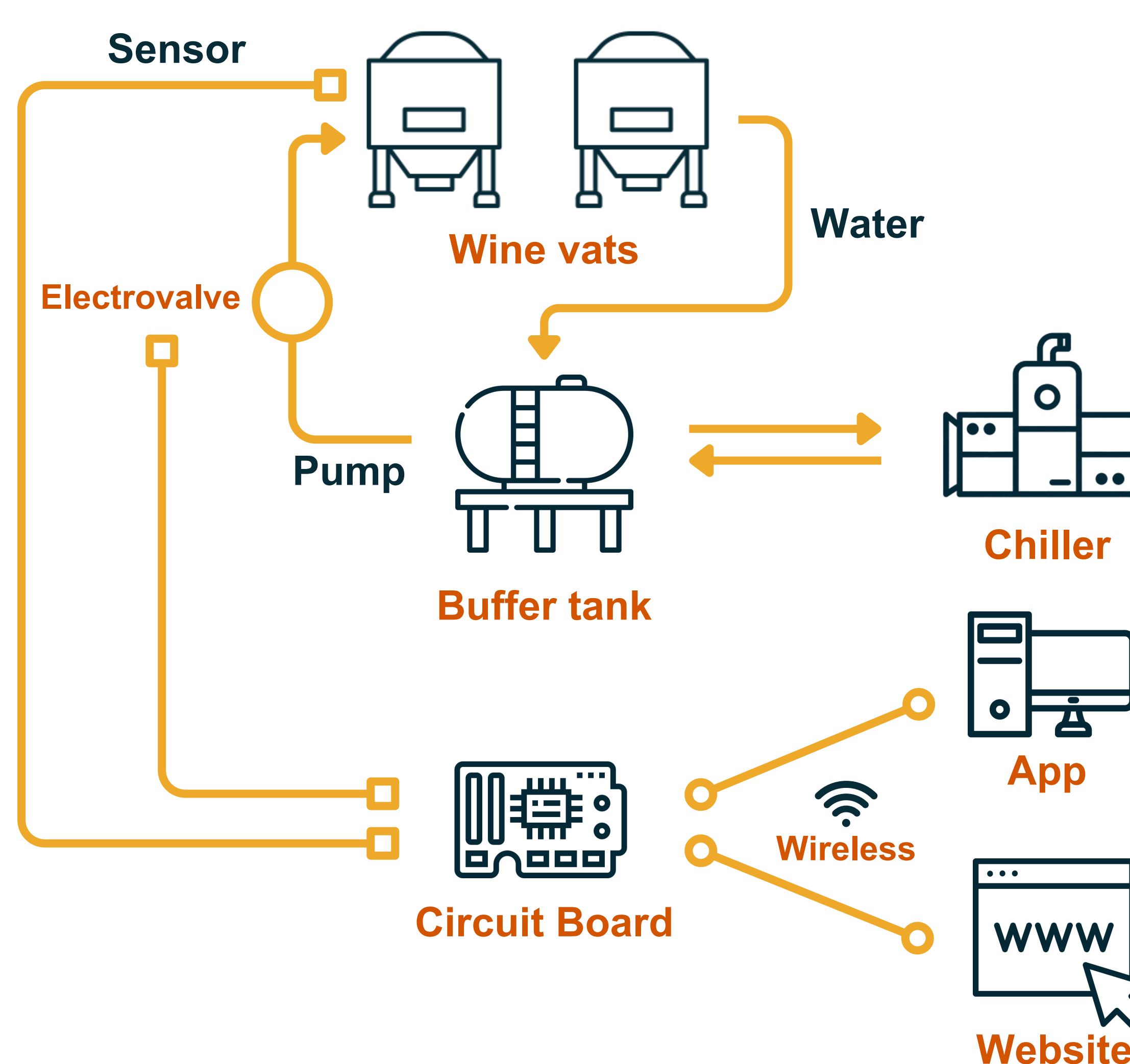
Results

With this project, we **successfully** demonstrated the benefits of advanced temperature monitoring and control in wine production. The **ecosystem** we built (hardware, app and website) features **precision**, **stability**, **security**, **user-friendly** interfaces and **great integration**. These attributes contribute to a more efficient and effective wine production process, resulting in **higher quality** products and long-term cost savings for wineries.

Team Members

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