VISTABRIGHT

VISTA BRIGHT

CONTENT

INTRODUCTION

Traditional glass facade cleaning is risky, expensive, and labor-intensive. It relies on manual methods that pose safety hazards, especially for high-rise buildings.

VistaBright offers an automated solution using microcontrollers, sensors, and a web interface. It improves safety, reduces labor, and ensures efficient, scalable cleaning.

MAIN OBJECTIVES

Saftey

Improve safety by eliminating the need for workers to operate at dangerous heights.

Consumption

Minimize water and power consumption using efficient components and sensor-driven operation.

Reduce labor

Automate the cleaning process to significantly reduce reliance on manual labor.

DESIGN OVERVIEW

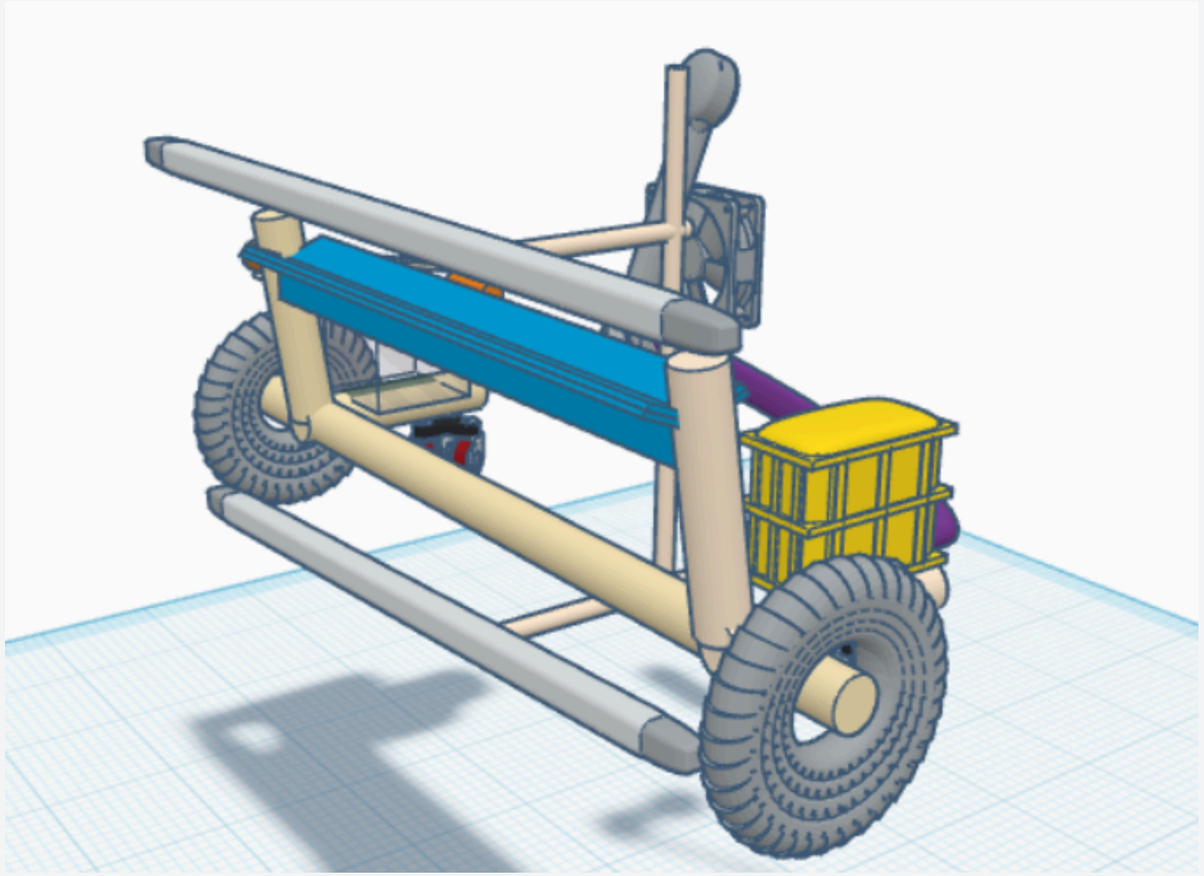
The system is divided into three main parts:

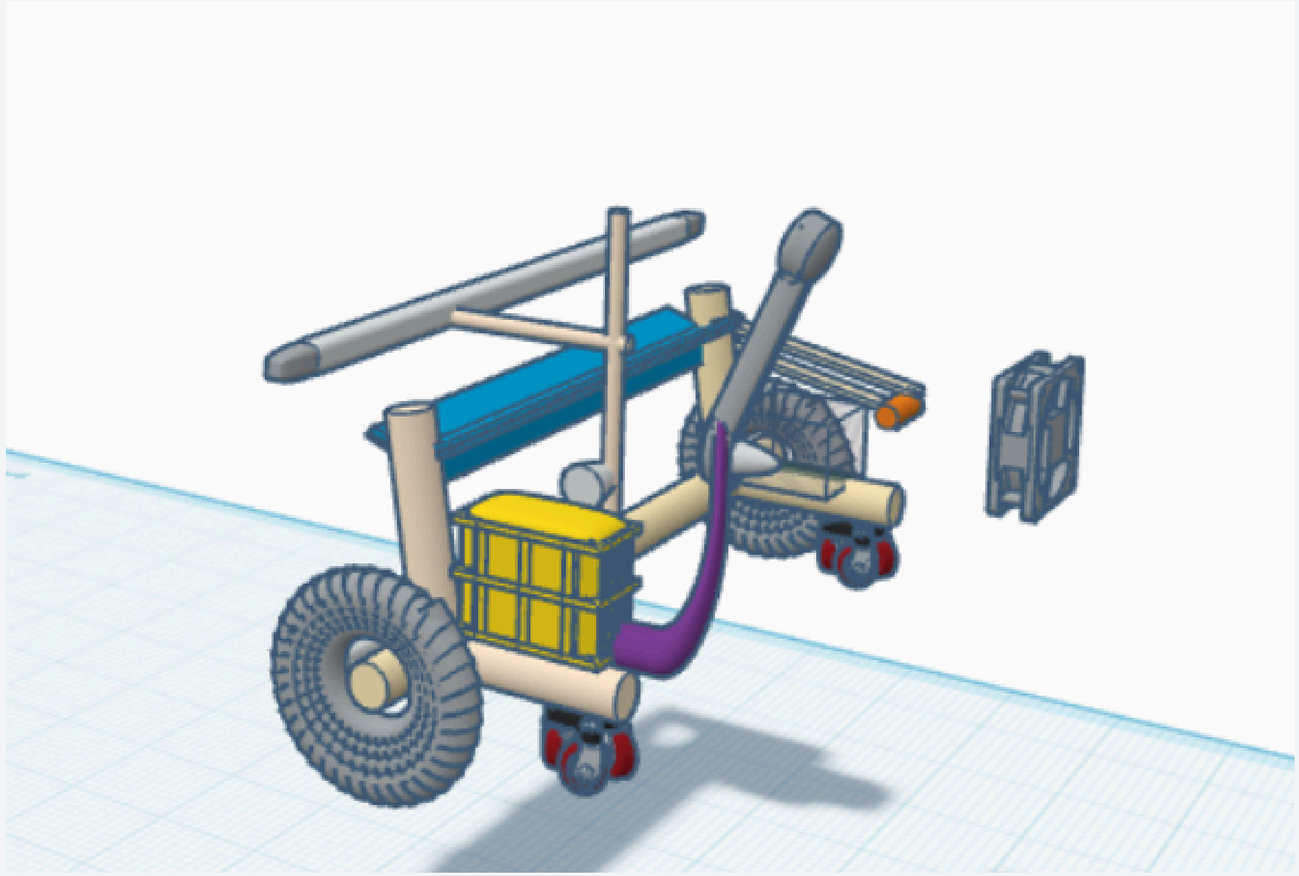
01 Cleaning Unit: Includes a spray nozzle, 12V water pump, cylindrical brush and fixed dual wipers to perform full-cycle cleaning.

02 Lifting Mechanism: A relay-controlled motor lifts or lowers the cleaning unit along the building facade.

03 Control System: An ESP32 manages user interaction via Wi-Fi, the other one receiving signals from the first, while Arduino Mega and Uno handle hardware control and sensor input through serial communication.

3D MODELING





COMPONENTS

Brushes

COMPONENTS

12V DC Motor

COMPONENTS

Wipers

COMPONENTS

Ultra Sonic

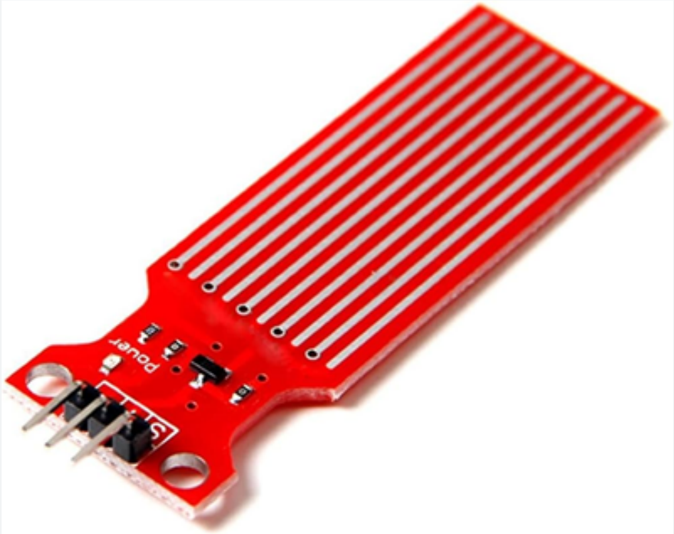
Servo Motor

12V Water Pump

COMPONENTS

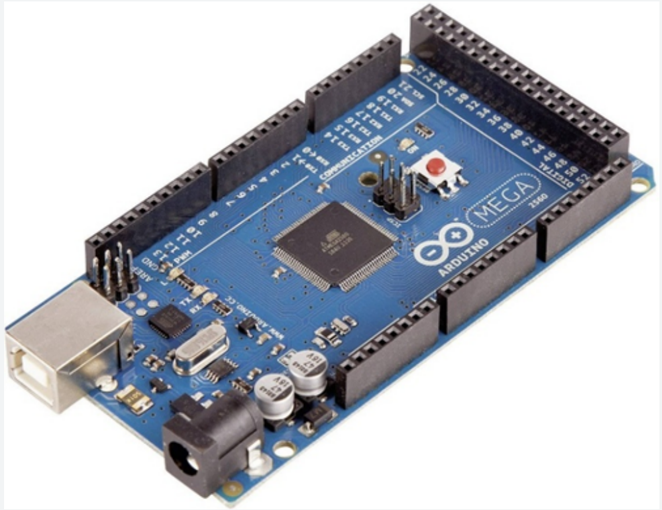
Power Supply

Temperature Sensor



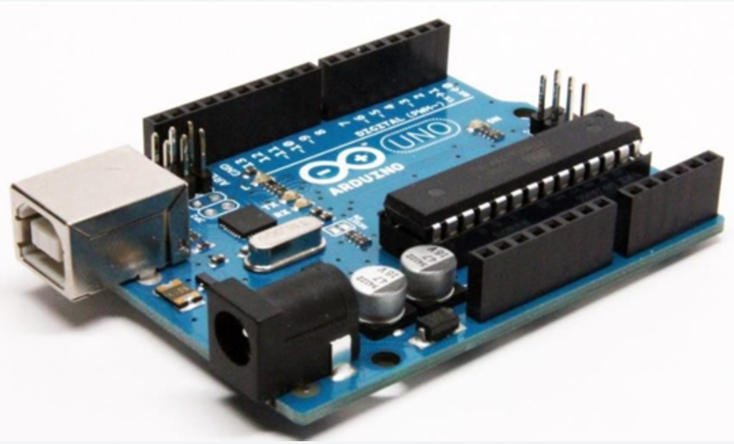
Water level Sensor

COMPONENTS



Mega 2560

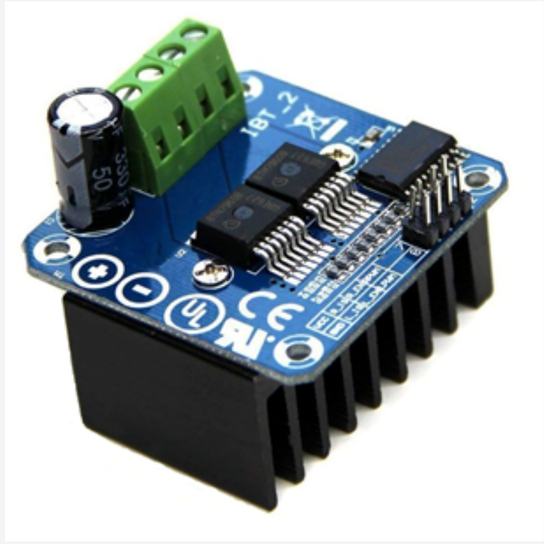
ESP32



Uno

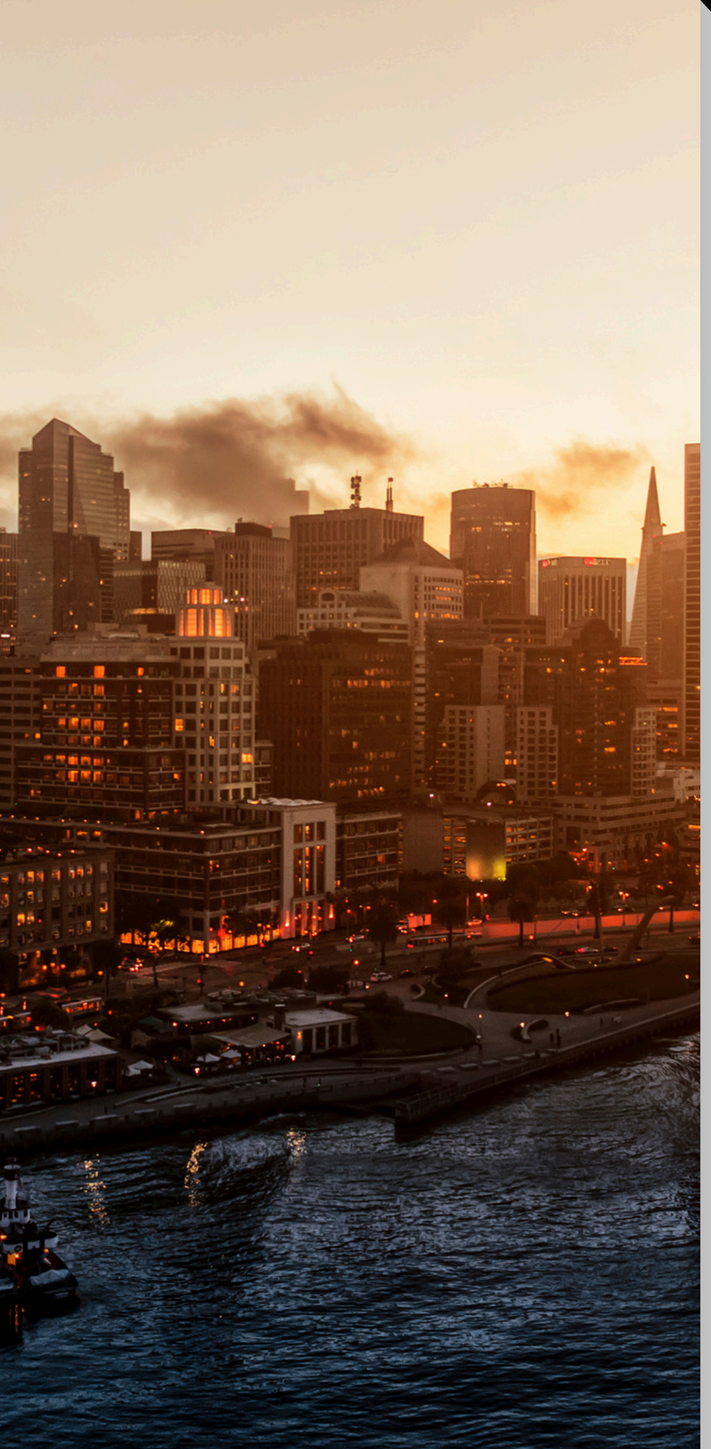
COMPONENTS

Relay



BTS7960

LN298N



METHODOLOGY

01 Communication is handled through UART for inter-device serial messaging, and IEEE 802.11 Wi-Fi for web-based control. The web interface, built using HTML/CSS, provides real-time interaction with sensor data and system status.

02 The system was developed to operate in both manual and automatic modes using ESP32, Arduino Mega, and Uno microcontrollers. A modular architecture was adopted, dividing the system into three main subsystems: the Cleaning Unit, the Lifting Mechanism, and the Central Control System.

03 Key safety features include emergency stop handling, water level sensing, and thermal monitoring to prevent overheating. The programming logic was written in C++ for the embedded controllers, ensuring efficient and responsive behavior.

RESULTS & TESTING

The system was successfully built using a Galvanized iron metal frame and waterproof electronic enclosure.

Sensors (ultrasonic, water level, temperature and humidity) responded accurately during operation.

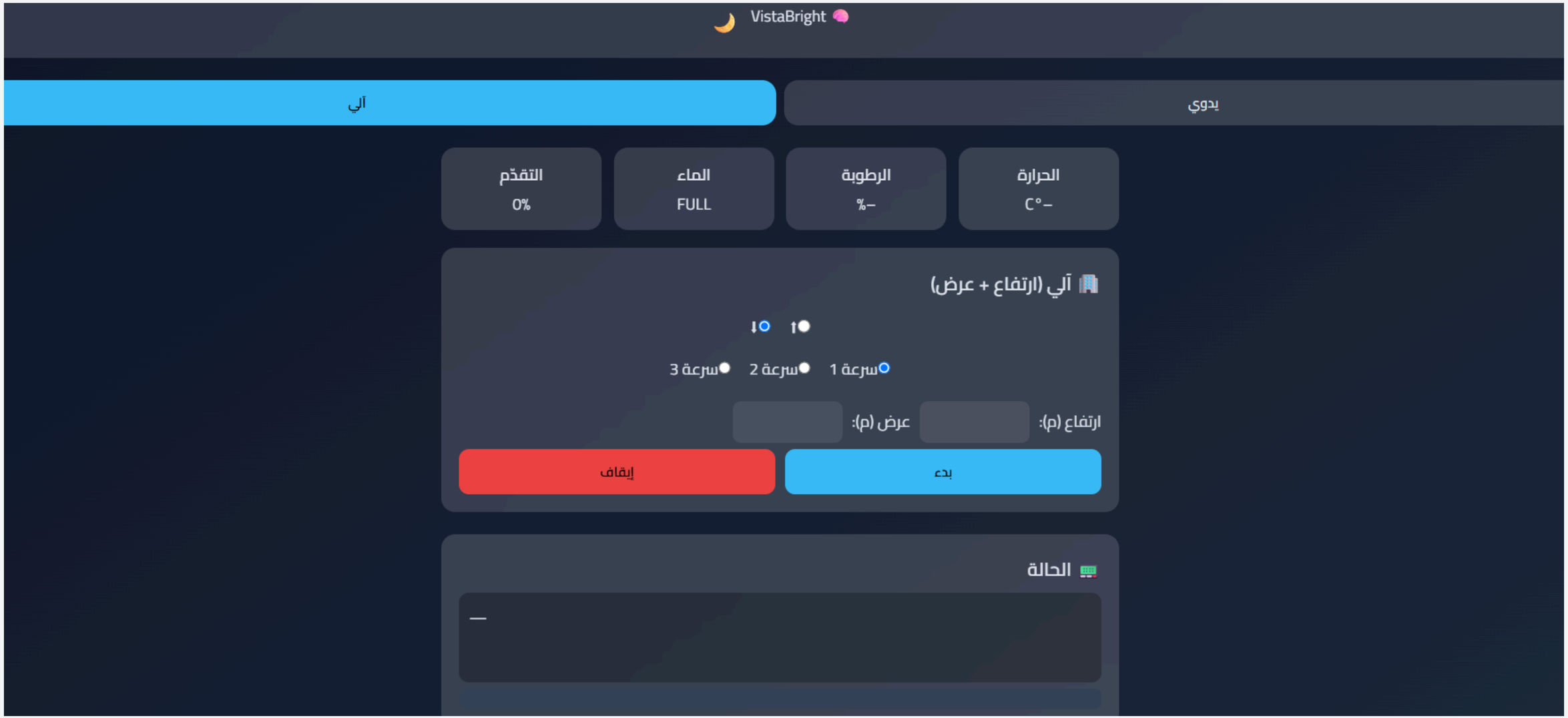
Manual and automatic cleaning modes.

The prototype met its main goals: safer cleaning, reduced labor, efficient resource use, and clear user control.

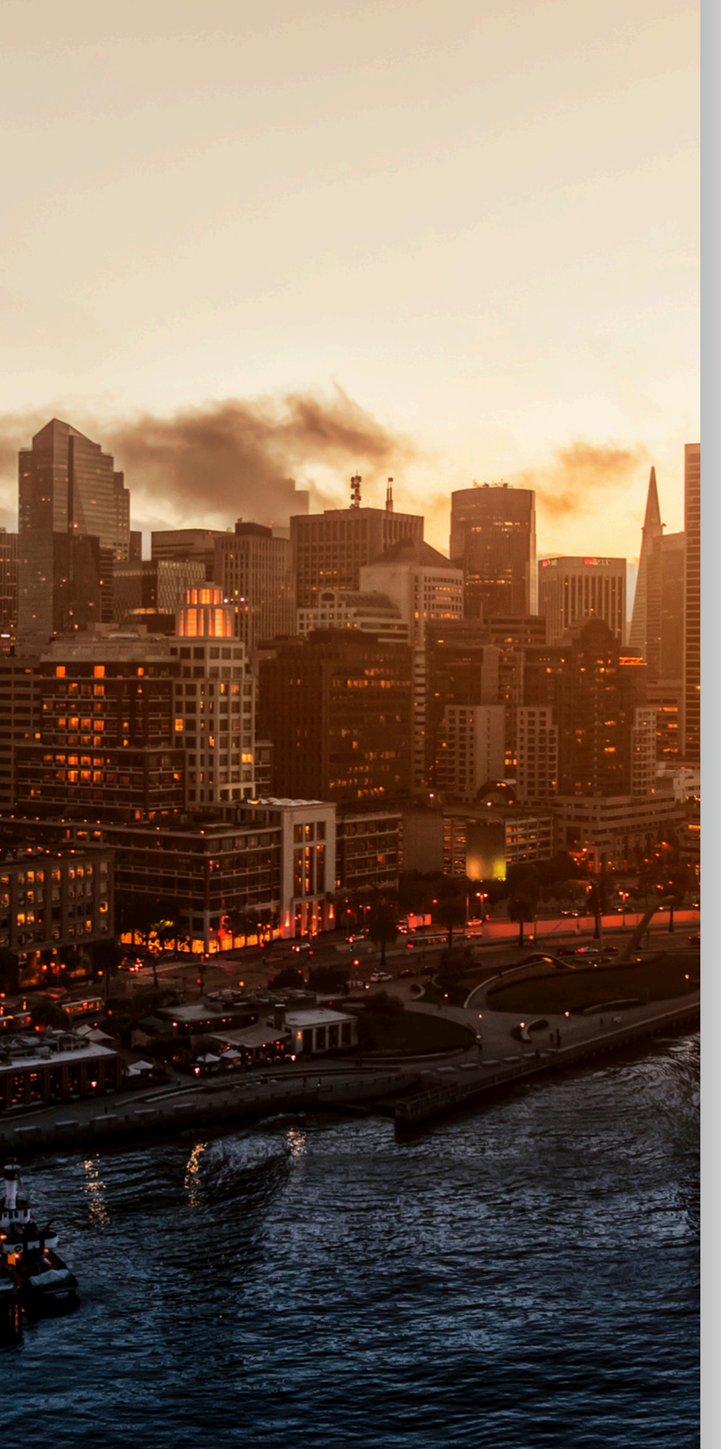
CONTROL

manual

CONTROL

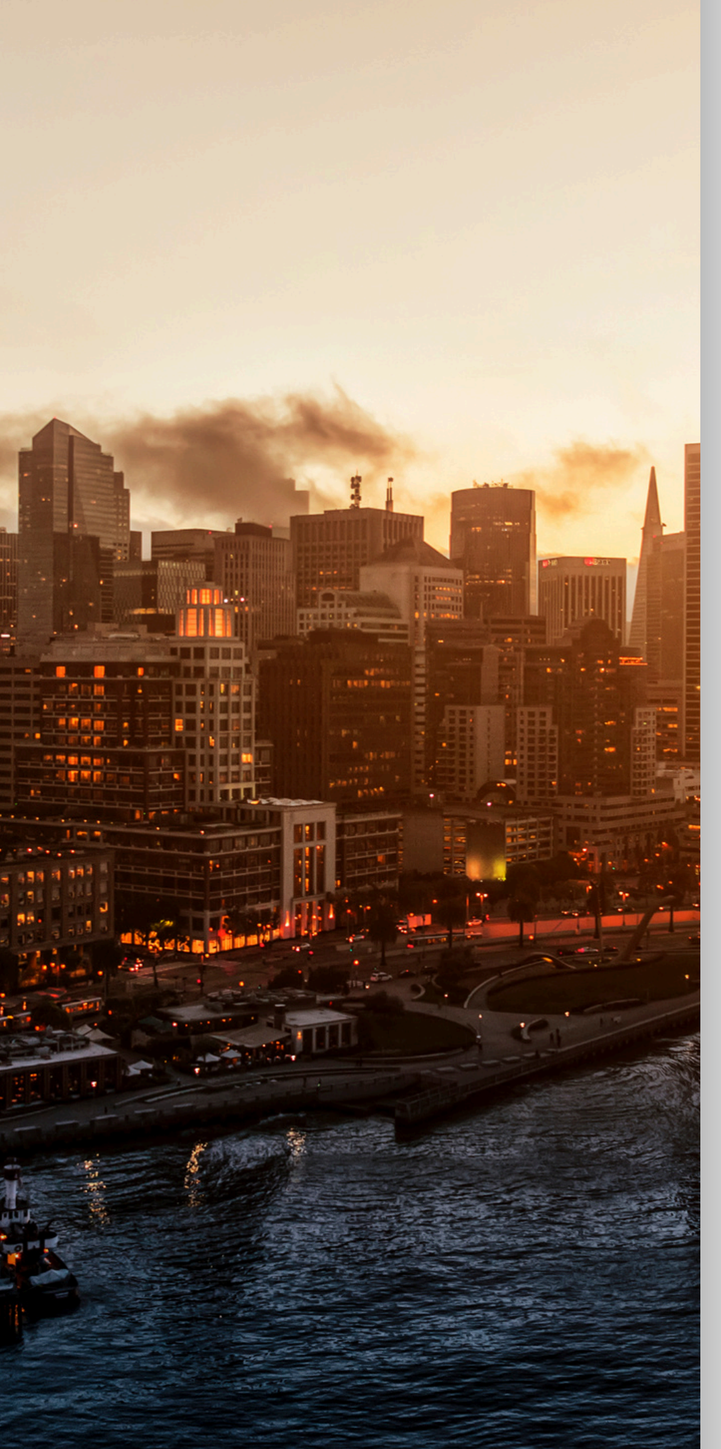


auto



FINANCIAL VIABILITY

Item	Cost (NIS)
Frame & wheels	50 + 30
Brush + brush motor	40 + 50
Power supply	50
12 V water pump	40
Spray nozzle	10
Additional drive motors	60
Hoisting rig & safety ropes	100
Arduino Mega, ESP32, drivers	220
Sensors (water, ultrasonic, temp/humidity)	50
Total hardware	**700 NIS**
Assembly, wiring & QA	~300 NIS
All-in cost	**≈ 1000 NIS (~US $330)**



FINANCIAL VIABILITY

- Launch price: 5,000–7,000 NIS with >500% profit margin per unit
- Service model: 5 NIS/m² — e.g., 15,000 NIS per 3,000 m² with >13500 NIS net profit per visit
- Break-even after one sale or one service visit
- Device cost recouped after 5–7 jobs; ROI ≈ 250–400% yearly
- Low risk: <1,000 NIS capital, scalable with bulk sourcing
- Cuts labor costs by ~30% and offers a local, low-cost alternative to imported cleaning systems

LIMITATIONS

Brush Unavailability: The cleaning brush was not locally available in the West Bank; we had to custom-build one since online options were only sold in bulk.

Power Supply Limitations: For over 1.5 months, the workshop lacked working power supplies, delaying testing and affecting voltage accuracy for key components.

Mobility & Political Barriers: Israeli checkpoints and risk of equipment confiscation limited travel and reduced working time, increasing project difficulty and safety concerns.

No Glass Faced

FUTURE WORK

Add a commercial-grade brush for better cleaning durability.

Add heated airflow with fans for improved drying.

Integrate camera + image processing to detect unclean spots.

Develop horizontal movement


THANK'S FOR
WATCHING
GAIS SALAMMA & ADAM ABAHRE