Smart Remote Control for Barriers & Blinds

Mobile Application and Automotive Integration

Version	1.5
Date	March 2025
Prepared by	Smart Software Platform Solution

This document describes the technical specifications of a smart remote control system for automatic barriers, garage doors, and blinds. The system integrates a hardware device, a mobile application, a cloud platform, and Android Auto / Apple CarPlay integration for convenient and secure operation.

1 GENERAL DESCRIPTION

The device is a smart remote control for managing automatic barriers, garage doors, and external and internal blinds. The system is designed for reliability, security, and easy integration into modern infrastructure.

Component	Description
Hardware Remote	Programmable form-factor device with LED status indication
Mobile Application	iOS and Android app for real-time management
Cloud Platform	Secure cloud infrastructure with uptime >= 99.5%
Automotive Integration	Android Auto and Apple CarPlay support

2 MAIN FEATURES

2.1 Control

- Opening / closing of barriers, blinds, and doors
- Group control (e.g. all connected barriers, blinds, or doors)
- Automated tasks ("Arrival", "Departure") - triggered by one click, timer (planned), or weather conditions (planned)

2.2 Hardware Remote Device

- Programmable device ('Cookie' form factor)
- LED status indication

- Encrypted communication
- BLE range: up to 30 m
- Wi-Fi range: depending on network

2.3 Mobile Application

- Platforms: Android / iOS
- Device discovery and management via Bluetooth / Wi-Fi / Cloud
- Real-time control
- Event history (Planned)
- OTA firmware updates
- User profile
- User management

2.4 Automotive Integration

- Android Auto and Apple CarPlay
- Automatic scenarios (e.g. approaching vehicle -> open barrier)

3 HARDWARE ARCHITECTURE

3.1 Core Components

Component	Specification
MCU	ARM Cortex-M4 / M33
BLE Module	Bluetooth 5.0+
Wi-Fi Module	2.4 GHz (802.11 b/g/n)
RF Module	433 MHz ISM - 2-FSK / GFSK / ASK / OOK
Power Supply	USB-C	PoE
Interfaces	Mobile App (iOS/Android)	Web

4 SOFTWARE ARCHITECTURE

4.1 Firmware

- OTA update system
- Power management module
- Firmware signing (secure boot)

4.2 Mobile Application

Feature	Details
Connectivity	BLE (direct)	Wi-Fi (local)	Cloud
Push Notifications	Real-time alerts for every event
Multi-device Support	Manage multiple devices from a single app
Event History	Full event log with timestamps

5 COMMUNICATIONS & RF MODULE (433 MHZ)

5.1 Communication Stack

Technology	Purpose	Range
BLE 5.0+	Local control	Up to 30 m
Wi-Fi	Local and cloud connectivity	Network dependent
433 MHz RF	RF control (barriers)	Up to 300+ m (LOS)

5.2 RF Parameters (433 MHz ISM)

Parameter	Value
Frequency Range	433.05 - 434.79 MHz
Modulations	2-FSK, GFSK, ASK / OOK
Output Power	Programmable up to +10 dBm
Receiver Sensitivity	Down to -116 dBm
Data Rate	0.6 - 600 kbps (configurable)
Range - Urban	100 - 150 m
Range - Line of Sight	300+ m
Latency	< 50 ms
TX Current	~15 - 30 mA
RX Current	~15 - 20 mA
Sleep Current	< 1 uA

5.3 RF Features

- Hardware packet processing (preamble, sync word, CRC)
- Automatic packet filtering
- Wake-on-radio (low power listening mode)
- Multi-channel mode
- RSSI and LQI signal quality indicators

5.4 Antenna

Parameter	Value
Type	PCB antenna or external antenna (optional)
Impedance	50 Ohm
VSWR	< 2:1
Tuning	Matching network optimised for 433 MHz

5.5 RF Compliance

- ETSI EN 300 220 (Short Range Devices)
- CE (RED Directive 2014/53/EU)
- Duty cycle limits: 1% or 10% depending on sub-band

6 SECURITY

Mechanism	Description
TLS 1.2+	All cloud communications are encrypted
Device Authentication	Certificate-based device authentication
Secure BLE Pairing	Encrypted device pairing
Firmware Signing	Protection against unauthorised firmware updates
Rolling Code (RF)	Replay attack protection on the 433 MHz channel
AES Encryption	Implemented in MCU for RF communications

7 PERFORMANCE

Metric	Value
Latency (local)	< 100 ms
Latency (cloud)	200 - 800 ms
Cloud Uptime	>= 99.5%
RF Latency	< 50 ms

8 POWER SUPPLY

Method	Description
USB-C	Standard USB-C power supply
PoE	Power over Ethernet - easy installation without separate power cabling

9 PHYSICAL CHARACTERISTICS

Characteristic	Value
Dimensions	~70 x 60 x 25 mm
Weight	~75 g
Enclosure	PLA
Protection Class	IP54 (minimum)

10 COMPATIBILITY

Platform	Minimum Version
Android	Android 7+
iOS	iOS 15.1+
Android Auto	Supported Android Auto versions
Apple CarPlay	Supported CarPlay versions

All parameters may be updated in future document revisions. For enquiries, please contact the technical team.

Platform	Minimum Version