Saturn-Yellow Blockchain powered IR remote controllers

A: Alexander Burovanov B: Benjamin Terrace

Introduction

Have you ever lost the remote for your TV at home? Without the remote for the TV, you can't turn it on, adjust the volume or change the channel --the TV is essentially rendered useless. These complications become worse if you own a home theatre system. Home theatres include many different systems that work together, meaning different remotes for the sound, projector, lights and even perhaps the DVD player! With modern day technology and smart home automation, how can this problem be tackled?

How does this system work?

This system uses MQTT to configure multiple remote controllers on a shared WiFi network and employs Blockchain smart contracts to trigger signals via an IR transmitter. M5Core2 devices publish transaction data to a blockchain topic, which a Peripheral Gateway subscribes to. Upon receiving messages, the gateway signs the data and sends it to the blockchain network via HTTP. The Peripheral Gateway uses MQTT to communicate with the IR transmitter (also powered by an M5Core2) to send IR scan codes. Each remote controller has a customizable button layout for universal remote control, allowing different commands based on button presses and orientation. An IR scan code receiver verifies accurate signal transmission and displays the results on PC software. This receiver can also map existing remote buttons to the universal controller. The system supports simultaneous operation of multiple controllers within the same WiFi network and uses the NEC IR protocol. The images of the M5Core2 orientations show how all the different buttons can be configured and selected using orientation of the device. The PC GUI shows how each button can be configured. It also shows how the blockchain activity is shown on the software. Please see the block diagram for a clear description of this functionality.

Key Performance Indicators:

1. Remote controllers work, using M5Core2's, anywhere within 3-meter radius of the WiFi network (mobile hotspot) to create blockchain commands for execution and receive configuration updates over MQTT.

2. Commands are read by M5Core2 to transmit specified scan code via IR transmitter, operation occurs within 2 seconds of button press from remote controller.

3. Configure appliances by reading their existing scan codes using the IR receiver sensor, display this scan code onto a PC GUI, operation is 95% accurate at correctly reading scan codes.

4. Immutable logging present on Blockchain and able to be displayed on PC GUI and refreshed automatically to be displayed in 30 seconds following a button press.

5. Effective use of multiple controllers to control the same IR transmitter, use of orientation to select IR transmission options for different devices. Orientation change on M5Core2 touchscreen is sensed and changed within one second.

Conclusions to KPI's

1. Remote controllers are well able to work within 3-metre radius of WiFi network. The system successfully creates blockchain commands and receives the configuration update for multiple controllers over MQTT.

2. Transmitting IR scan codes following a button press occurs almost instantly, this KPI is well met.

3. IR receiver functionality is closer to 100% accurate. This criteria is well met.

4. Despite the considerable delay (due to Blockchain consensus algorithm), the immutable logging is present on the PC GUI within the time specified on the KPI.

5. Multiple controllers are able to control the same IR transmitter and select multiple appliances using its orientation. Orientation screen changes are almost instant.