

ProtoGenSmartController

Mark-II

User Manual

Document V3.0
Applied to Firmware V2.1

MangMuang's Elektronik
2023

Document History

Version	Date	Description
3.0	01/10/2023	Revised document and update to current firmware
2.3	19/08/2023	Update to current firmware
2.2	11/08/2023	Fix wrong localization
2.1	09/08/2023	Fix wrong detail
2.0	04/04/2023	Update to current firmware
1.0	23/03/2023	Initial

About this manual

- This manual was made for guiding the startup, operation and configuration of your ProtogenSmartBoard.
- For your safety, please read this manual before using your Protogen.
- Information may change without further notice.
- If you have any questions, you may contact the manufacturer for help.

Manual Coverage

Which Protogen does this manual covered.

Controller Core Structure Type

- ☐ Standard Core MK-I Plus (None OS)
- ☐ Standard Core MK-II (RTOS Based)
- ☐ Extended Core MK-II (AI OS Based)
- ☒ Developer Core MK-II (AI OS Based)

Protogen Coverage

- ☒ General Universal Protogen
- ☐ Custom Protogen

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Firmware Release Note

Version	Description
2.1	<p>New Feature</p> <ul style="list-style-type: none">• WIFI/BLE Configuration• Memory Integrity Verification• Virtual Memory Mapping <p>Update</p> <ul style="list-style-type: none">• Emote Control• AT Command <p>Bug Fix</p> <ul style="list-style-type: none">• Display set brightness wrong when select IDLE State
2.0	<p>New Feature</p> <ul style="list-style-type: none">• AI-MM V2.0 Implemented• Active Dynamic Power Control• Ambient audio system• User audio system• Customizable cheek display• Enable dedicated internal memory system• Multi-tasking Optimization• Physical Sensor implemented• AT Command <p>Bug Fix</p> <ul style="list-style-type: none">• Display Memory Leak
1.1b	<p>Bug Fix</p> <ul style="list-style-type: none">• UI Correction
1.1	<p>New Feature</p> <ul style="list-style-type: none">• OTA Update System• Emote Control
1.0	<p>Initial Release</p> <ul style="list-style-type: none">• Base Program• Display Core• WIFI Control

Table of Content

User Manual	1
Document History	2
About this manual	3
Manual Coverage.....	3
Firmware Release Note	4
Table of Content	5
Major Feature Overview	6
Connect to your Protogen	7
Default WIFI Credential.....	7
Main Menu	8
Configuration	10
Visor Brightness Setting.....	10
User Voice Interactive Setting.....	10
Emote Timer Setting.....	10
Face Color Setting.....	11
Cheek LED Setting.....	11
Default Setting.....	12
OTA Update	13
RTC (Real-time-clock)	14
WIFI Config	15
Care	16
Troubleshoot	16
Technical Data	17
Contact & Support	18

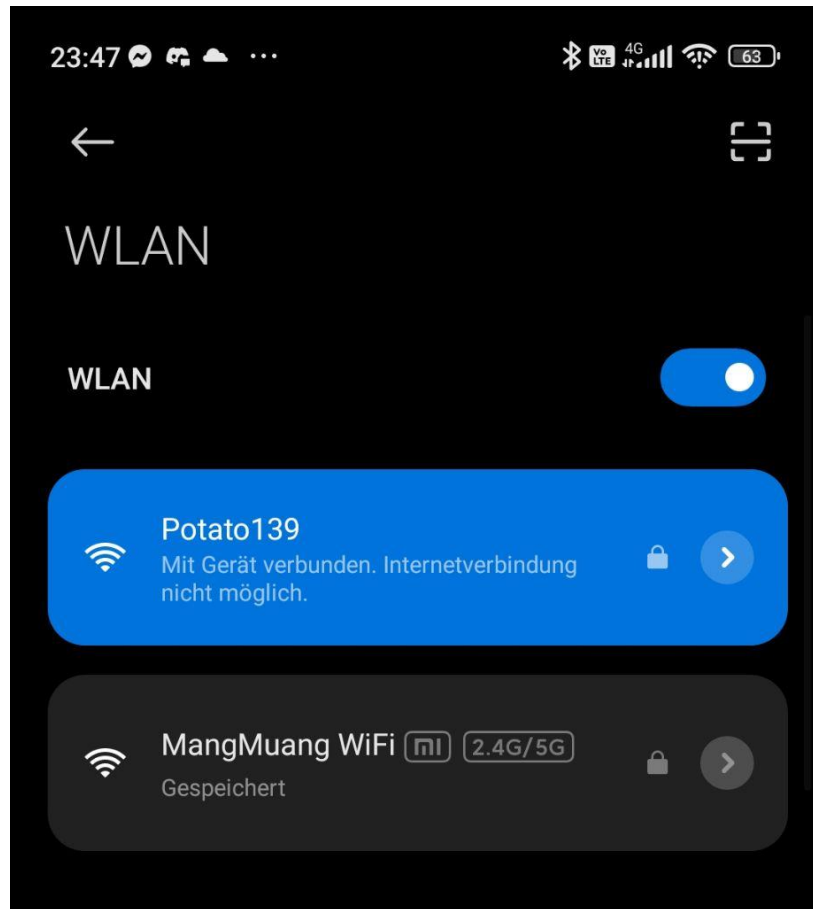
Major Feature Overview

- **PIC32MK-MIPS32 Processor®** is the latest MIPS processor by Microchip, providing extraordinary computing power.
- **Xtensa® LX7 Co-Processor** provides rich connectivity and carries sub-workload without interfering with main processing tasks.
- **Huge-Memory** your Protogen has eaten too much RAM and NAND Flash, now he can store a lot of media files up to 128GB.
- **AI-MM V2.0** your ProtogenCore OS was based on our in-house developed AI by *MangMuang's Elektronik*. The AI will handle both software and hardware tasks to real-time optimizing everything for you.
- **DynamicPower-Optimization** your Protogen will adjust power consumption dynamically, varying fps down to 1FPS and maximum at 120FPS, adjust task management and peripheral, say goodbye to bulky power-bank and enjoy without frequent recharge.
- **AI Generated Scene** thanks to our *AI-MM V2.0*, your Protogen will be Life-Like. No simple scene generating rule here.
- **CommanderPort** your Protogen can be run standalone perfectly or override or read parameter through *CommanderPort* by ATCommand with any external device (e.g. Raspberry Pi, TinkerBoard) to extend its computing capabilities without reflashing any original firmware.
- **Wireless-Control** control your Protogen wirelessly.
- **Expandable-Design** you can upgrade by adding more hardware to get much more features.
- **OTA Update** no need to send it back to us, you can update your Protogen firmware through your mobile phone.
- **ProtoOpen** uploads your C Code (.c) to internal storage and your Protogen will execute your code without reflashing the original firmware.

CommanderPort AT Command manual is available on separate documents, contact MangMuang's Elektronik for more resources.

ProtogenSmartCore OS , **AI-MM V2.0** and **ProtogenSmartBoard MK-II** are fully in-house developed. No other Library, Open Source code or other made use in this product. License and right will be fully held by MangMuang's Elektronik, Copy-Redistribute-Modify is prohibited without permission.

Connect to your Protogen



When powered up, your Protogen will create a WIFI Hotspot and wait for connection. On first startup your Protogen will use a default credential.

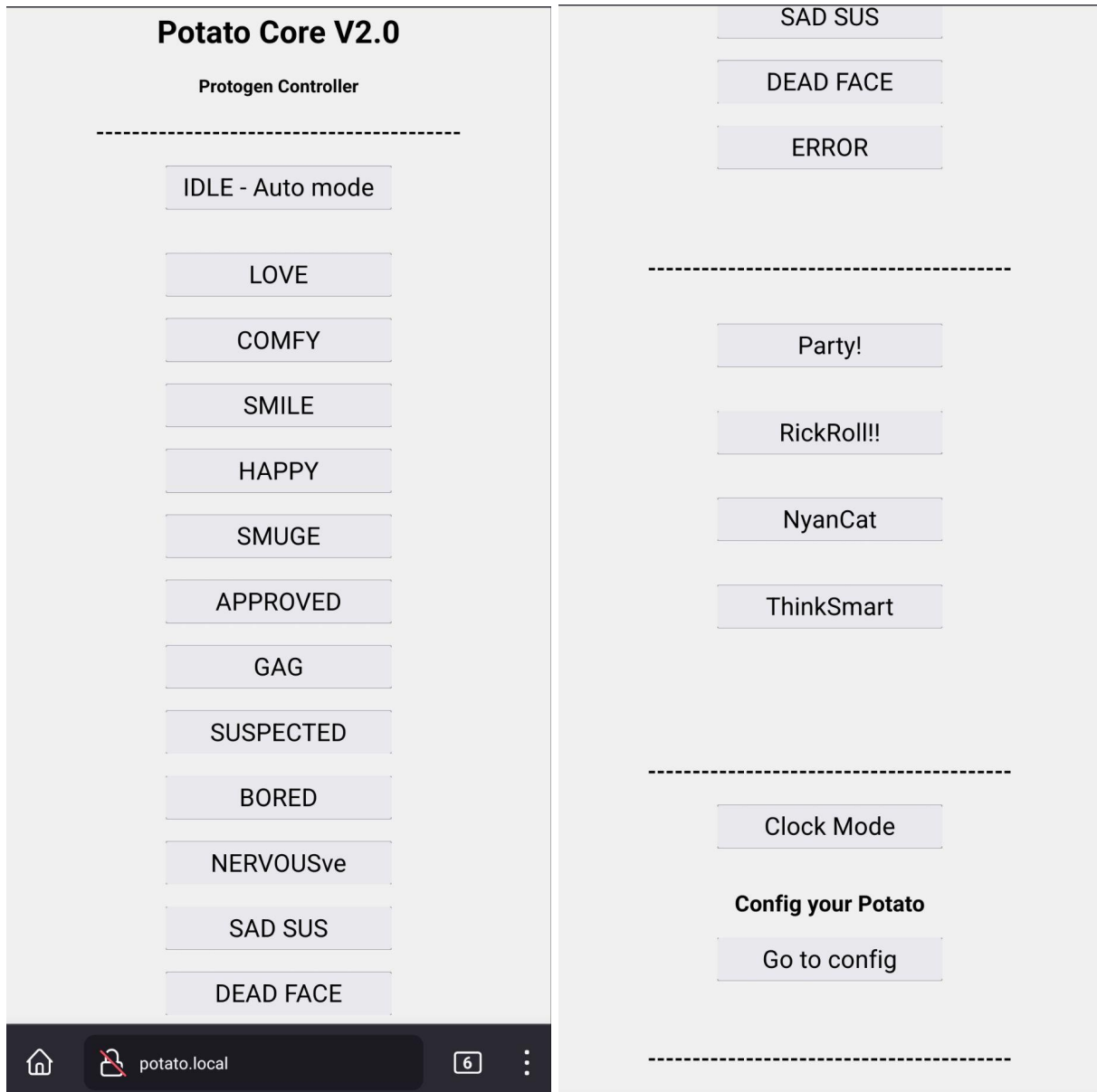
Default WIFI Credential

Default WIFI credential, this can be configurable.

Topic	Description	Remark
SSID	Protogen	
Password	*****	<i>Case sensitive</i>
Security type	WPA2	

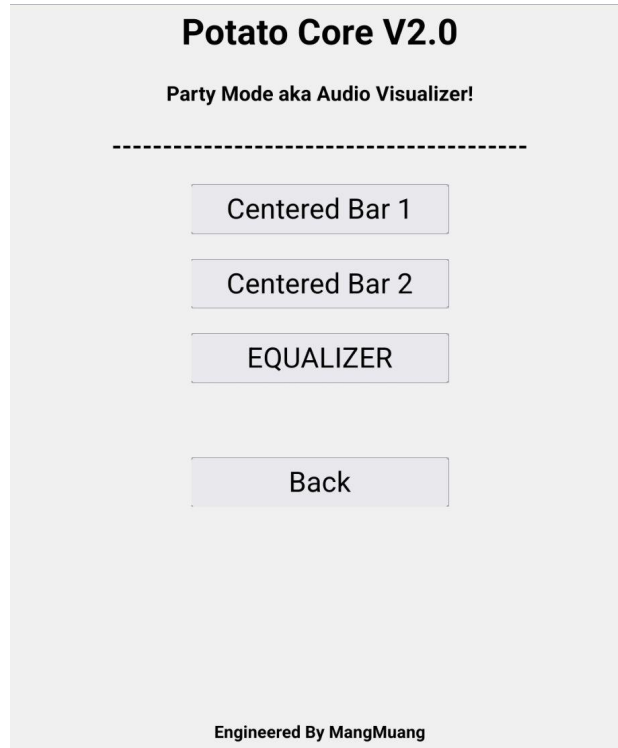
Main Menu (WEB UI)

Control your Protogen



Use your browser and navigate to “protogen.local”, If you can’t reach, try to disable cellular data since sometimes the OS will try to redirect your connection to WAN instead of Protogen soft-ap. Or check if your browser redirects to “[https](https://)” connection, try editing it to “[http](http://)” and try again. This page will allow you to control your Protogen. Select “IDLE-Auto Mode” to let software do automatic scene and select other for emot.

Remark: MDNS will change to match you SSID config



Party mode contains 3 types of Audio Visualizer. This mode will sample ambient audio and display beautifully.

Mode	Description
IDLE - Auto	Automatic Generated Scene
EMOTE (Comfy, Smile ,...)	Select your emote
Party Mode	Audio Visualization (3 Style Available)
RickRoll!	Play Rickroll meme
NyanCat	Play NyanCat meme
ThinkSmart	Play ThinkSmart meme
Simple Clock	Your Protogen will enter low power mode and turn into furniture
Config	Set-up your Protogen

Configuration

This page will allow you to configure your Protogen, see below to see config description. Click 'Save' to apply config and save to memory.

Visor Brightness Setting

Setting	Description
Visor Brighness	Adjust visor brightness, this value may override by Dynamic Brightness System
Eye Blink Rate	Adjust how frequent of eye blinking, 0 is disable eye blink.
Dynamic Brightness Enable (ON/OFF)	Enable Dynamic Brightness System
Dynamic Brightness Gain	How sensitive of dynamic brightness
Max Dynamic Brightness	Max dynamic brightness level
Min Dynamic Brighness	Min dynamic brightness level

User Voice Interactive Setting

Setting	Description
User Voice Interactive (ON/OFF)	Enable or Disable voice wearer voice interaction.
Gain	Adjust how sensitivity of user microphone

Emote Timer Setting

Setting	Description
Emote Timer (ON/OFF)	Enable or Disable emote timer.
Time	Adjust to delay reset face to IDLE after emote selected

Face Color Setting

Setting	Description
Red	Adjust cheek Red level
Green	Adjust cheek Green level
Blue	Adjust cheek Blue level

Cheek LED Setting

Setting	Description
Enable (ON/OFF)	Turn on or off cheek LED
Red	Adjust cheek Red level
Green	Adjust cheek Green level
Blue	Adjust cheek Blue level

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Default Setting

Setting	Default value
<u>Visor Brighness</u>	<u>50</u>
<u>Eye Blink Rate</u>	<u>3.0t</u>
<u>Dynamic Brightness Enable (ON/OFF)</u>	<u>ON</u>
<u>Dynamic Brightness Gain</u>	<u>1.0t</u>
<u>Max Dynamic Brightness</u>	<u>80</u>
<u>Min Dynamic Brightness</u>	<u>20</u>
<u>User Voice Interactive</u> <u>(ON/OFF)</u>	<u>ON</u>
<u>Gain</u>	<u>1.0t</u>
<u>Enable (ON/OFF)</u>	<u>ON</u>
<u>Face - Red</u>	<u>74</u>
<u>Face - Green</u>	<u>235</u>
<u>Face - Blue</u>	<u>255</u>
<u>Cheek - Red</u>	<u>5</u>
<u>Cheek - Green</u>	<u>51</u>
<u>Cheek - Blue</u>	<u>139</u>

OTA Update

Navigate your browser to “**protogen.local/OTA**” (case sensitive), browse files from your phone or PC and hit the ‘Update’ button, it will upload new firmware and do OTA Flashing in a few minutes. During update, screen and LED strip will show updating progress. After finishing, your Protogen will reboot automatically.

~~**Get Update File Here**~~

Remark: Your Protogen has dedicated physical flash memory to store configuration and all credentials, OTA Update will **‘NOT’** wipe your personal configuration.

RTC (Real-time-clock)

As version firmware 2.0, your Protogen will be able to run as a desktop clock and it needs a RTC internal clock to run properly. RTC will be set by manufacturer but you can adjust it time to match your local time by navigate to “**protogen.local/clockconfig**” to adjust your time.

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WIFI Config

To configure your Protogen WIFI credential, navigate to “**protogen.local/wificonfig**” and then input your desired WIFI configuration. If configuration is correct and successful, your Protogen will inform you to reboot to take effect.

This will also change MDNS to your SSID configure, e.g. if you set your SSID to “**ABCD**” your MDNS will change to “**ABCD.local**”

Remark: In-case of internal memory corrupted or failed, your Protogen will start to use emulated storage as a backup, WIFI configuration will be revert to default.

Mobile APP (iOS/Android)

(SOME CONTENT NOT AVAILABLE IN SAMPLE DOC)

CommanderPort (ATCommand)

Using CommanderPort to connect your Protogen to any SBC Computer to add more capabilities, command can be found at AT Command Manual.

(SOME CONTENT NOT AVAILABLE IN SAMPLE DOC)

ProtoOpen

Your Protogen is integrated with GCC Compiler, upload your C Code, compile and execute on your desire.

(SOME CONTENT NOT AVAILABLE IN SAMPLE DOC)

Care

Use only dry and soft fabric to clean your Protogen on plastic parts, and consult your fursuit maker for a proper method to take care of your Protogen fabric and fur.

DO NOT Use solvent, acid or water to clean your Protogen unless instruct by fursuit maker

Troubleshoot

Symptom	Cause	Solution
Not powering up	No power	Check your USB cable
		Check your power bank
Display not working correctly (unstable, flickering, etc)	Unstable power	Check your USB cable
		Check your power bank to have enough power
Display dimmed even increased brightness	Insufficient power	Use higher power capacity power bank and high current USB cable
WIFI Signal Weak	Too far	Come close to your Protogen
	Interference	Avoid overcrowd WIFI area
WEB UI Not accessible	Not connect to WIFI	Check you WIFI connection with your Protogen
	Mobile Phone network redirect	Disable cellular data

For other unresolvable problems, please contact *MangMaung's Elektronik* for further help.

Technical Data

Parameter	Value (Typical)	Unit
Voltage	5.0	V
Power	4.5	W
Working temperature	-5 - 60	°C
Working humidity	5-95	%rH
UART Baud Rate	115200	bps
WIFI / Bluetooth	2.4	GHz

WARNING !

I Provide only 5V to the system or it may damage the controller and its component.

I Even systems need only a little wattage to operate but it recommended providing sufficient backup power of 10W in case of transient load.

I Do not let the system in contact with water or condensation.

IMPORTANT NOTICE AND DISCLAIMER

MANGMUANG'S ELEKTRONIK PROVIDE MANUAL DATA AND OTHER RESOURCE "AS IS", A "PROTOGEN CONTROLLER BOARD" HAS BEEN ELECTRICAL, ENVIRONMENTAL TESTED IN APPROPRIATE CONDITION. MANGMUANG'S ELEKTRONIK WILL NOT RESPONSIBLE OF USING "PROTOGEN CONTROLLER BOARD " OUTSIDE IT RECOMMENDATION CONDITION.

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