Electronics

Rainbow Clock

User’s manual

Document Revision. A

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Glossary

1. Microcontroller

An embedded computer integrating a whole range of peripherals in a small package for convenience.

2. Bluetooth

A wireless communication standard permitting short-range exchange of data between electronic devices.

3. Refresh rate

A measure of the number of times an image can be drawn completely over the period of a second; this value is expressed in Hertz. Synonymous to *“FPS”*.

Product overview

1. Description

Rainbow Clock is an unusual timekeeping device characterized by an exotic look and designed with electronics in mind.

2. Capabilities

- Display the current time of the day
- Synchronize itself via a Bluetooth connection
- Alter its color scheme depending on events

3. Quick specs

- Microcontroller: PIC32MZ series
- LEDs: 60, RGB type
- Refresh rate: ~10Hz
- Power: 15Watt max, 0.5Watt minimal, 0.6Watt typical

Basic operation

1. Reading the time of day

Each color encodes a distinct time unit. For each unit:

- 3 red adjacent LEDs represent the hours.
- 2 green adjacent LEDs represent the minutes.
- The remaining blue LED represents the seconds.

To ease reading, the clock's display is subdivided in four quadrants.

4. Changing the color scheme

Using the central dial, navigate the menu looking for "Color Config." Validate your choice. You will be presented with a choice of colors on the screen. Use the dial again, select a color and validate your choice.

5. Updating the time on the clock

Using the central dial, navigate the menu looking for "Time Config." Validate your choice.

Advanced operation

1. Synchronizing the clock using Bluetooth

Initiate a serial connection to the Rainbow Clock's Bluetooth module configured for a rate of 115200 bauds. The code to be sent is structured as follows:

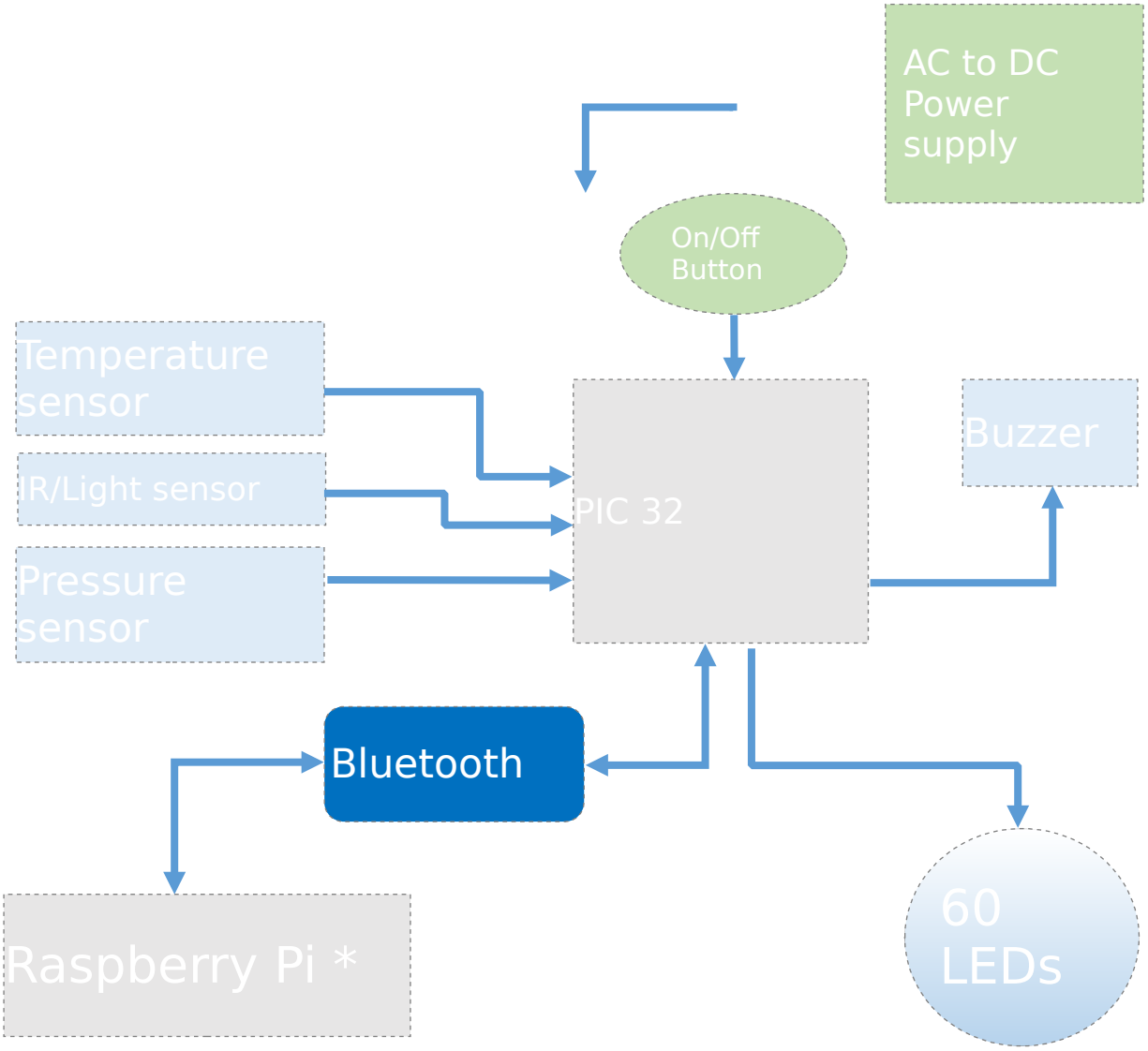
"T**ssmmhh**ddMMYYYY"

With 'T' designating the Time config function.

Technical details

1. Block diagram

Vivien peux-tu ecrire “UART” sur la double fleche entre le PIC et le bluetooth la meme chose sur la fleche entre le pic et les leds avec le texte “1 Wire”



* Optional

4. Components required for the project

• 1 *(one)*	PIC32xxxxxx microcontroller.	Ref: xxxxxxx
• 1 *(one)*	strip of 60 RGB LEDs 1 wire.	Ref fab: WS2812b
• 1 *(one)*	incremental rotary encoder	Ref: 1191733
• 1 *(one)*	20x4 alphanumeric LCD screen	Ref: 2063162
• x *(xxx)*	resistors xΩ	Ref: xxxxxxx
• x *(xxx)*	capacitors xF	Ref: xxxxxxx
• 1 *(one)*	tension regulator	Ref: xxxxxxx
• 1 (one)	Pressure and temperature sensor	Ref fab: BMP280
• 1 (one)		

5. …

* Optional

6. Planned features

- ***Display basic weather data and forecast using built-in sensors***

7. Data gathering could reveal itself being a nice addition to the project.
8.

* Optional

9. Contributions

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11. *Page layout by:* vchesnea

12.

* Optional

13. Endnotes

* Optional