A. TFT Version (2.4"/2.8" ILI9341 SPI Display)

☑ Required Libraries

Purpose	Exact Library Name (Arduino Library Manager)	Author / Publisher	Notes
Display Driver	**Adafruit ILI9341**	Adafruit	For TFT display (SPI interface).
Graphics Core	**Adafruit GFX Library**	Adafruit	Required by ILI9341 for drawing text, shapes, etc.
RFID Reader	**MFRC522**	GithubCommunity / Miguel Balboa	Library for MFRC522 RFID module.
JSON Parser	**ArduinoJson**	Benoit Blanchon	For saving and reading student data from flash.
Filesystem for ESP32	**LittleFS_esp32**	lorol / ESP32 team	Allows ESP32 to store credits locally (like a small hard drive).
QR Code Generator	**qrcode**	Richard Moore (or Project Nayuki variant)	For generating and drawing QR codes on TFT.
ESP32 Core (board)	**esp32 by Espressif Systems**	Espressif	Board manager install (Tools → Board → Boards Manager → esp32).

⚙ Optional / Alternatives

Purpose	Alternative Library	Use When
Display driver alternative	**TFT_eSPI**	Use instead of Adafruit ILI9341 for faster rendering (if you reconfigure pins in `User_Setup.h`).
QR Generator backup	**qrcodegen**	If `qrcode` library doesn't show in your library manager.
Filesystem fallback	**SPIFFS (built-in)**	If you don't want to use LittleFS.

B. OLED Version (0.96" SSD1306 I²C Display)

☑ Required Libraries

Purpose	Exact Library Name (Arduino Library Manager)	Author / Publisher	Notes
OLED Driver	**Adafruit SSD1306**	Adafruit	For SSD1306 / SH1106 0.96″ displays.
Graphics Core	**Adafruit GFX Library**	Adafruit	Required for text/graphics drawing.
RFID Reader	**MFRC522**	GithubCommunity / Miguel Balboa	RFID tag reading.
Filesystem	**LittleFS_esp32**	lorol / ESP32 team	Local flash storage.
JSON Parser	**ArduinoJson**	Benoit Blanchon	To read/write credits and data.
ESP32 Board Core	**esp32 by Espressif Systems**	Espressif	Board definition package.

⚙ Optional / Enhancements

Purpose	Alternative Library	Use When
OLED alternative	**U8g2**	For SH1106 displays or advanced fonts/animations.
Filesystem fallback	**SPIFFS (built-in)**	If LittleFS fails to mount.
Tone library	**ESP32Tone**	If you get tone() undefined error (rare case).

🧩 Version check (as of late 2025)

Here are stable library versions that work perfectly with both codes:

Library	Stable Version
Adafruit GFX Library	1.11.10
Adafruit ILI9341	1.6.1
Adafruit SSD1306	2.5.9
MFRC522	1.4.11
ArduinoJson	7.0.4
LittleFS_esp32	1.0.6
qrcode	0.1.2
esp32 board	3.0.5