**Week 1: Software Foundation, Memory & Hardware Testing (June 10 - June 16)**

**Goal:** To establish a strong software foundation, understand data persistence with memory, and confirm all hardware components are working correctly.

- **Software & Coding Fundamentals:**
  - Set up the Arduino IDE and install the necessary libraries: MFRC522, IRremote, Adafruit_GFX, and Adafruit_SSD1306.
  - Learn the core software architecture: program structure (state machine), menu navigation logic, and button input handling.
  - **Memory Management:** Research and learn how to use the microcontroller's non-volatile EEPROM memory. Write test programs to save and retrieve data to ensure it persists after power is turned off.
- **Hardware Module Testing & Preparation:**
  - Finalize and order the list of required components:
    - Arduino Nano
    - I2C OLED Display (e.g., 0.96 inch)
    - MFRC522 RFID Module
    - IR Receiver and a high-power IR LED
    - Transistor to drive the IR LED
    - Push-buttons
    - LiPo battery charging/protection circuit or a 5V power bank.
    - Breadboard and jumper wires.
  - Individually test each hardware module by connecting it to the Arduino and running example sketches to verify functionality (e.g., "DumpInfo" for RFID, "IRrecvDump" for IR).

**Week 2: Prototyping, Core Software Development & PCB Introduction (June 17 - June 23)**

**Goal:** Assemble a working prototype on a breadboard, build the main software structure, and begin learning PCB design.

- **Prototype Assembly:**
  - Connect all components (microcontroller, RFID, IR, OLED, buttons) together on the breadboard.
  - Connect the IR LED through a transistor to ensure sufficient transmission power.
- **Core Software Development:**
  - Implement the main program structure as a state machine.
  - Create the "Main Menu" state to be displayed on the OLED screen.
  - Program the logic for the buttons to allow the user to switch between states

(e.g., from the Main Menu to "RFID Read Mode").

- **Introduction to PCB Design:**
  - Begin learning to use PCB design software (e.g., EasyEDA, KiCad).
  - Practice by creating the circuit schematic based on your working breadboard prototype.

**Week 3: Function Integration and Data Storage (June 24 - June 30)**

**Goal:** Finalize the primary functions and ensure data can be saved reliably.

- **Finalize Operating Modes:**
  - **RFID Read Mode:** Program the device to continuously scan for a tag. When a tag is detected, display its UID on the OLED screen.
  - **IR Receive Mode:** Program the device to wait for an IR signal. When a signal is received, decode it and display the infrared code information on the screen.
- **Store and Replay IR Signals:**
  - Implement the functionality to save the last captured IR code into the EEPROM.
  - Create a "Replay IR Signal" option in the menu that reads the code from EEPROM and transmits it via the IR LED.

**Week 4: Integration Testing and Optimization (July 01 - July 07)**

**Goal:** Test the complete system, fix bugs, and prepare for the final version.

- **Integration Testing:**
  - Test the entire workflow: boot -> menu -> select function (read RFID, capture IR) -> execute -> display result -> return to menu.
  - Verify the IR signal save and replay functions, ensuring they work reliably across multiple power cycles.
- **Field Testing:**
  - Evaluate the effective range of the infrared transmitter.
  - Test the battery life under normal usage conditions (if using a LiPo battery).
  - Gather feedback and fix any bugs that arise (e.g., confusing interface, unresponsive buttons).

**Week 5: Final Product Design and Assembly (July 08 - July 14)**

**Goal:** Transition from the prototype to a compact and durable final product.

- **PCB Design and Manufacturing:**
  - Finalize the schematic and create the PCB layout in your design software.
  - Send the design files to a PCB manufacturer for fabrication.
- **3D Enclosure Design and Printing:**
  - Design an enclosure (case) that fits the PCB and all components.

    - Use a 3D printer to create the enclosure.
- **Final Assembly and Soldering:**
    - Once the PCB arrives, solder all components onto the board.
    - Assemble the completed board into the 3D-printed enclosure. Conduct a final test to ensure everything works as expected.