

GE107 – TINKERING LAB PROJECT REPORT

GROUP NO:29

Name of the Project: MARATHON RUN TIME RECORDER

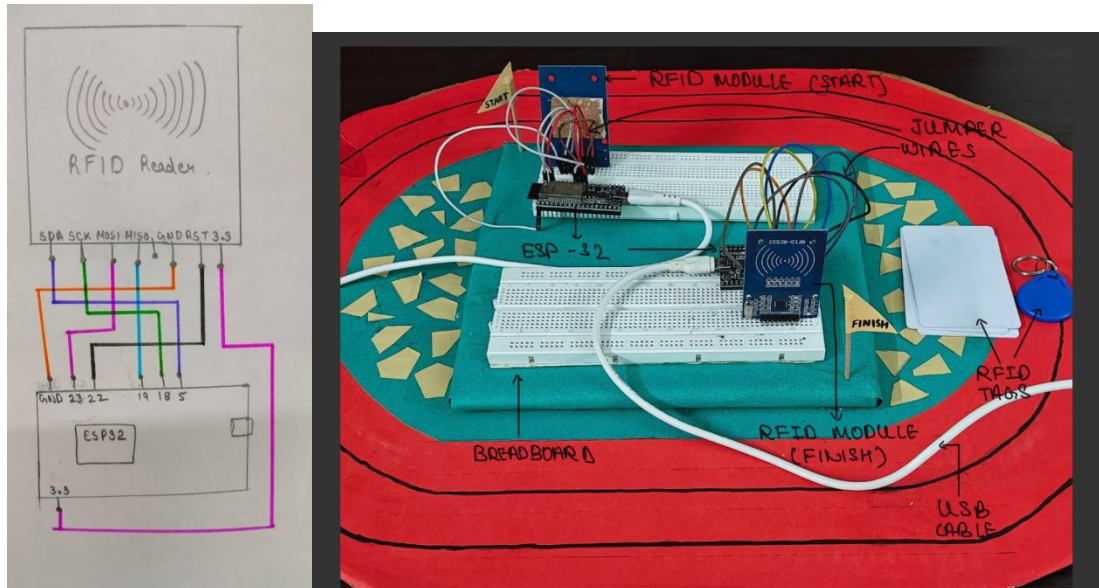
LIST OF THE COMPONENTS:

- 1) Breadboard(2)
- 2) RFID Reader module(Scanner-2)
- 3) RFID Tags/cards for person identification
- 4) ESP-32(2)
- 5) Mobile(Blink app-wifi connected)
- 6) Laptops(arduino ids implementation)
- 7) Wired and breadboard for connections

PROJECT PLAN:

This project aims to develop an RFID-based marathon run time recorder that ensures accurate tracking of RFID tags through two checkpoints: a start line and an end line. At the start line, all RFID tags are scanned and stored in memory. The system is designed to detect and display a message — "RFID tag already scanned" — if a tag is scanned more than once at the start line. If one tag is not scanned at the start, then all tags are scanned again at the end line, the system compares each tag with the list from the start line and flags any that were not previously scanned, displaying the message "Unrecognized RFID tag." The hardware includes two RFID readers, RFID tags, and a microcontroller like ESP-32, along with the blink app in the mobile using wifi connection. The software will be developed using the Arduino IDE and will include logic for duplicate detection and end-line verification. Project was done including setup, programming, testing, demonstration through a screen recording, and it can also show the position of the RFID tag in blink app.

CIRCUIT DIAGRAM:



Link for the video:

<https://drive.google.com/file/d/1AXMlnliw6EshKd5oBbNTkyMz3i456MLm/view?usp=sharing>

Link for the code:

<https://gist.github.com/Riya-gupta-debug/c9fe12b5b0c7922d7d4b0a21af66cc42>
<https://gist.github.com/Riya-gupta-debug/877b43d0167e2e2124c08e690a974787>

CHALLENGES FACED:

- 1. Identifying each RFID tag's unique ID** – Required scanning and recording each card's address manually.
- 2. Inconsistent RFID tag reading** – Tags sometimes failed to read due to distance or orientation issues.
- 3. Installing Arudino IDE** – It failed in 3 laptops because of some port issues in the lapton of different generations.

4. Scanning of Multiple RFID Tags: Initially it was only scanned for one RFID tag.

5. Repeatedly Scanned Tags: Initially it once scanned when we scan it again it will update new start time in the mobile app.

SOLUTIONS FOR THE CHALLENGES FACED:

1. Identifying each RFID tag's unique ID

→ Use a simple RFID scanner code to print tag IDs on the Serial Monitor and record them in a table.

2. Inconsistent RFID tag reading

→ Ensure the tag is placed close and flat to the reader; increase antenna sensitivity if needed.

3. Installing Arduino IDE → Used some many apps in the laptop so that port is working for arduino IDE

4. Scanning of Multiple RFID Tags: We created an array in the code to store the RFID tag addresses. When we scan the tags, the system checks and saves each tag's address in memory. This helps us count how many people took part in the marathon based on the number of tags scanned.

5. Repeatedly Scanned Tags:

We set up the system so that if a tag is scanned more than once, it will show a message saying "Already scanned." We did this by storing each tag's address in an array, so when a tag is scanned again, the system checks the array and recognizes that it has already been scanned

USES AND ADVANTAGES :

1. Efficient Attendance and Access Control:

Accurately tracks individuals at entry and exit points, making it ideal for schools, offices, and secure areas.

2. Reliable Event and Race Management:

Ensures all participants are properly scanned at start and end points, with instant detection of missing or duplicate tags.

3. Fast and Automated Inventory Verification:

Speeds up item tracking in warehouses or shipping, reducing manual errors and improving logistics.

4. Cost-Effective and Scalable Solution:

Uses affordable hardware like RFID and Arduino, with simple logic that can be expanded for larger smart systems.