

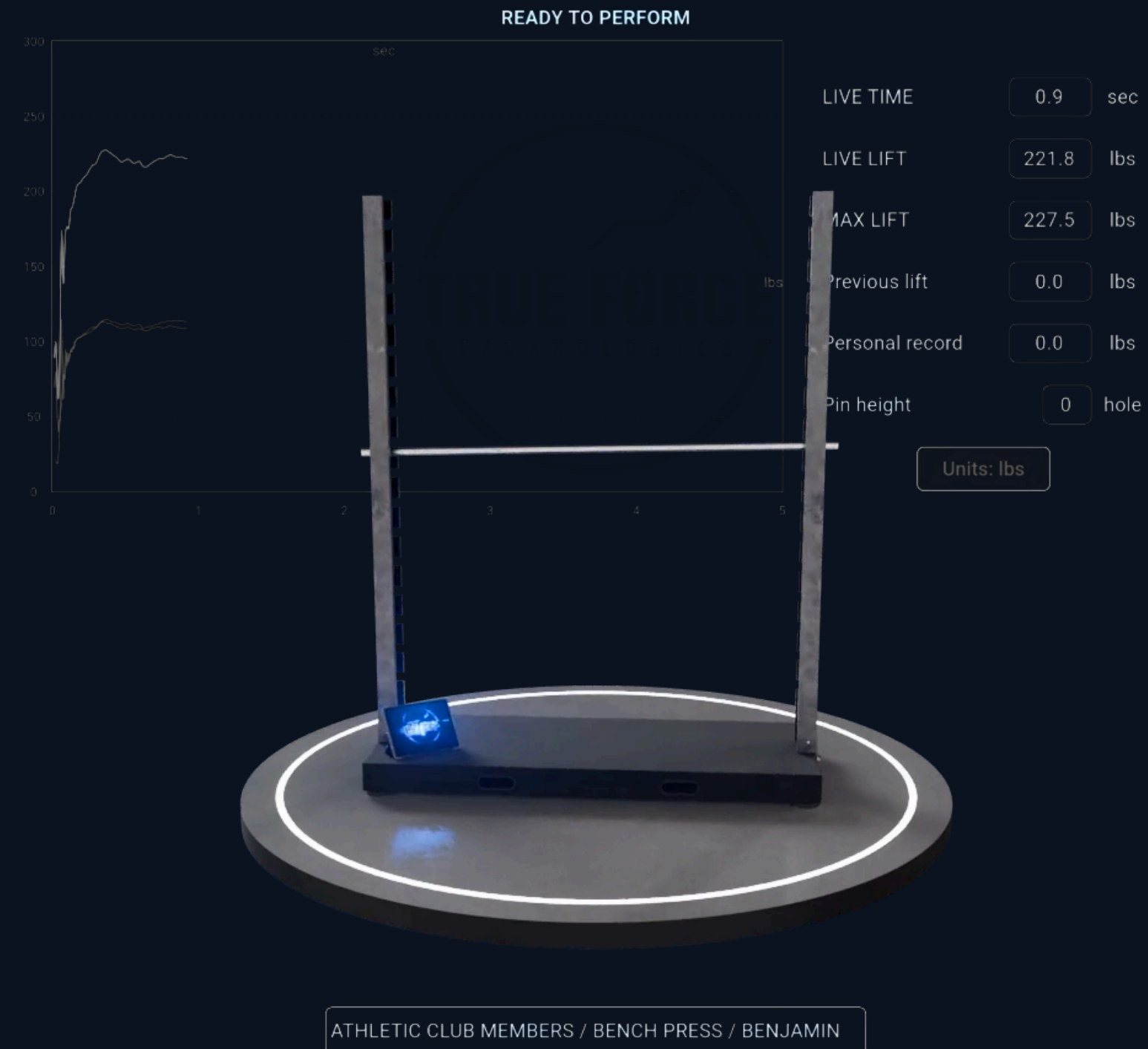
TRUE FORCE ARCADE RACK

Presented by
sdmay26-40



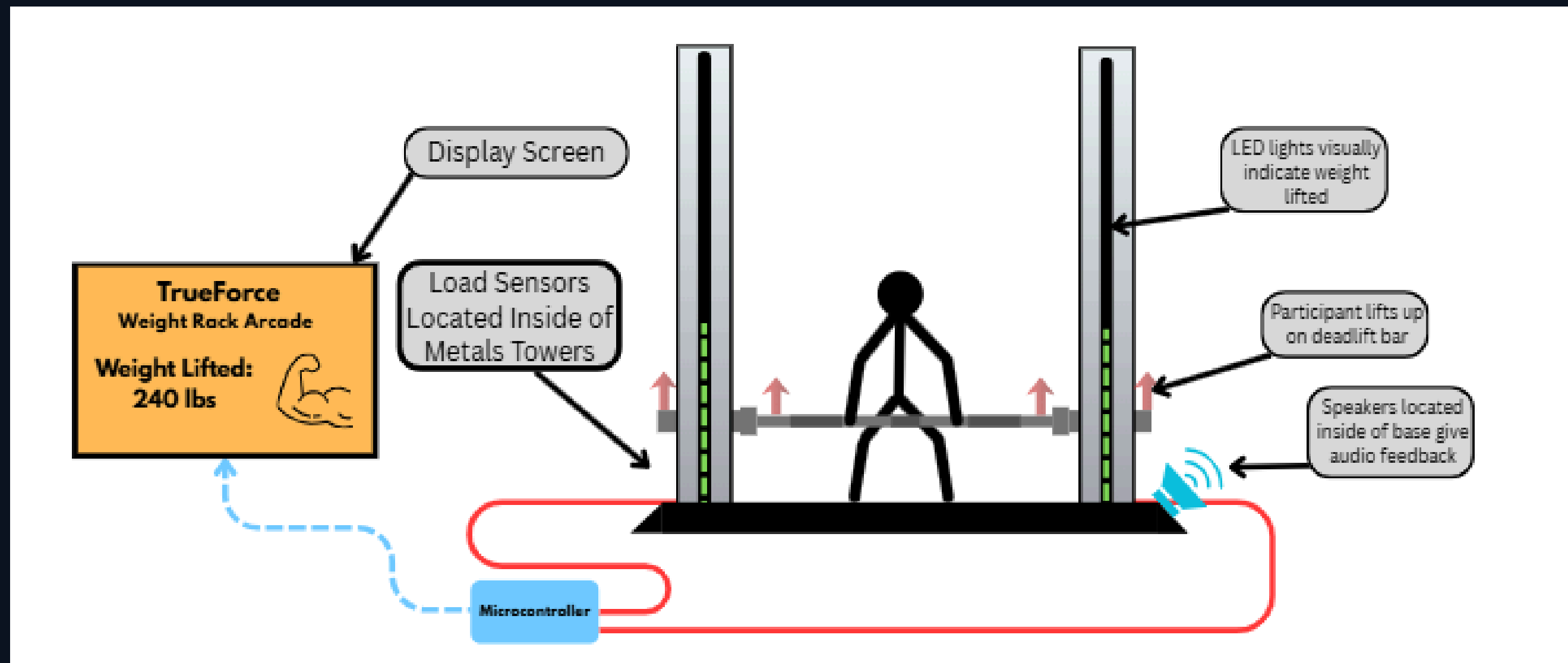
PROJECT OVERVIEW

- Rack: Bar + sensors, LEDs, speaker
- Microcontroller: Converts signals, Bluetooth to display, controls feedback
- Display/App: Runs on tablet/PC → mirrored to TV, Arcade vs Custom modes



PROBLEM

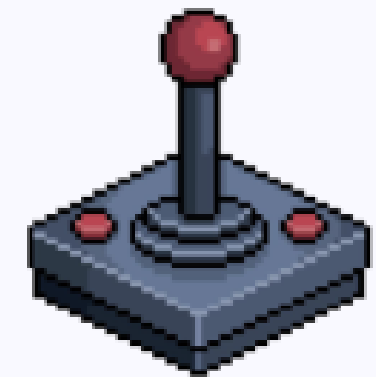
- The Force Rack already exists, but the client wanted more interactivity.
- The client raised the challenge, “What about corporate events?”



CONTEXT

Two Audiences:

- Public Events (fairs, festivals) → Arcade Deliverable
 - Highly detailed visuals (animations, LEDs, sound effects)
 - Fixed “set design” for quick walk-up play
 - Competitive features like leaderboards
- Corporate/Private Events → Custom Deliverable
 - Simplified visual layout
 - Options to upload logos, colors, or themed items
 - Focus on personalization and brand connection



Arcade Mode



Custom Mode

REQUIREMENTS

CORE

- React App + Python App
- Bluetooth
- Animated Avatars
- Local Data Storage
- Units: lb/kg/Newtons/custom units

Arcade Deliverable

- Super-hero style avatars
- Local leaderboard with toggle visibility
- Male/Female selection
- Persistent leaderboard data
- Printable leaderboard summary

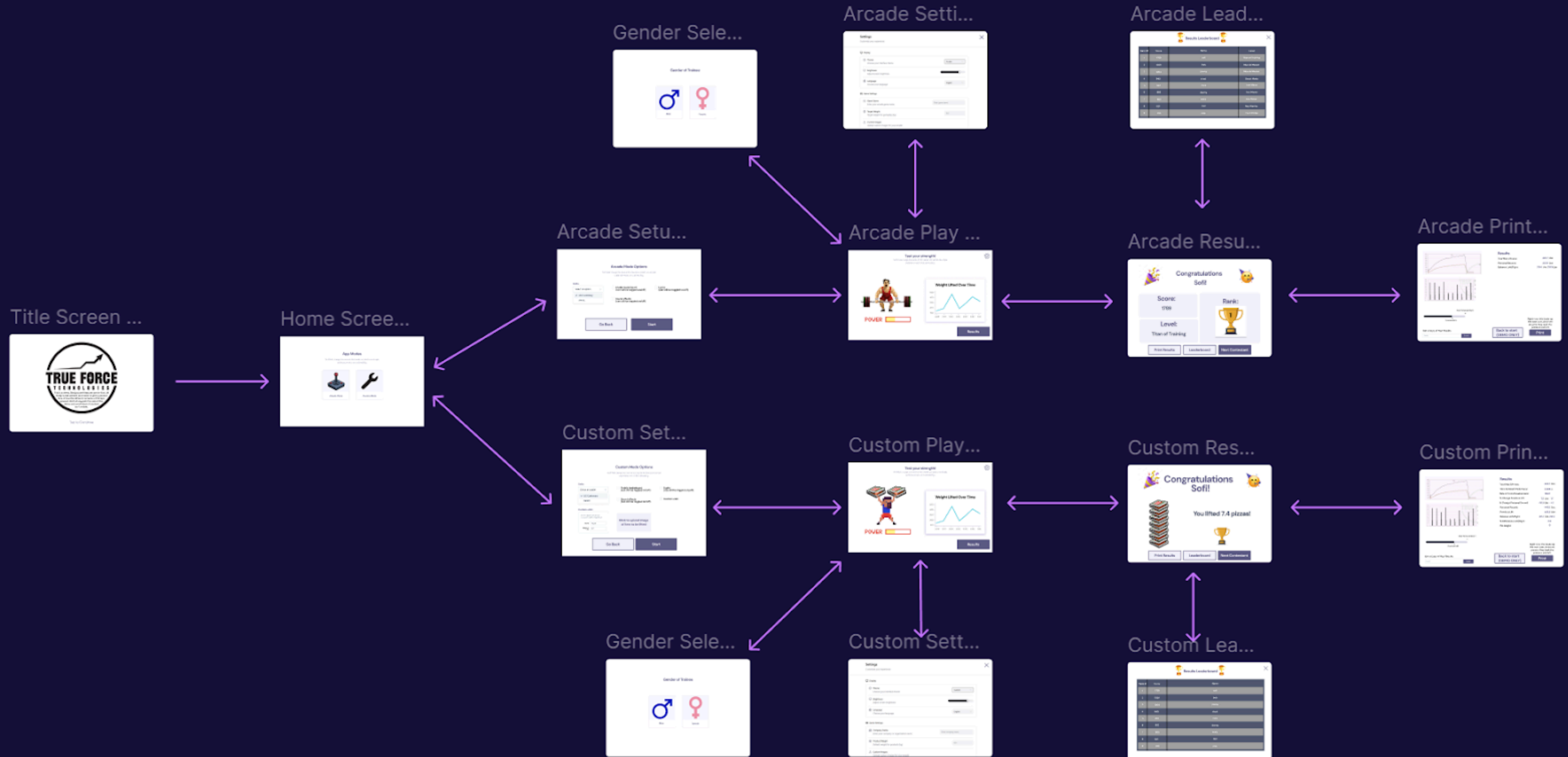
Output

- Clean and formatted print ready reports
- Optional email delivery

Custom Deliverable

- Admin-coach-player hierarchy
- Add custom units (pizzas, boxes, etc)
- Cloud based storage
- Printable and emailable reports
- No logins for players, only coaches

DESIGN - FIGMA APP FLOW



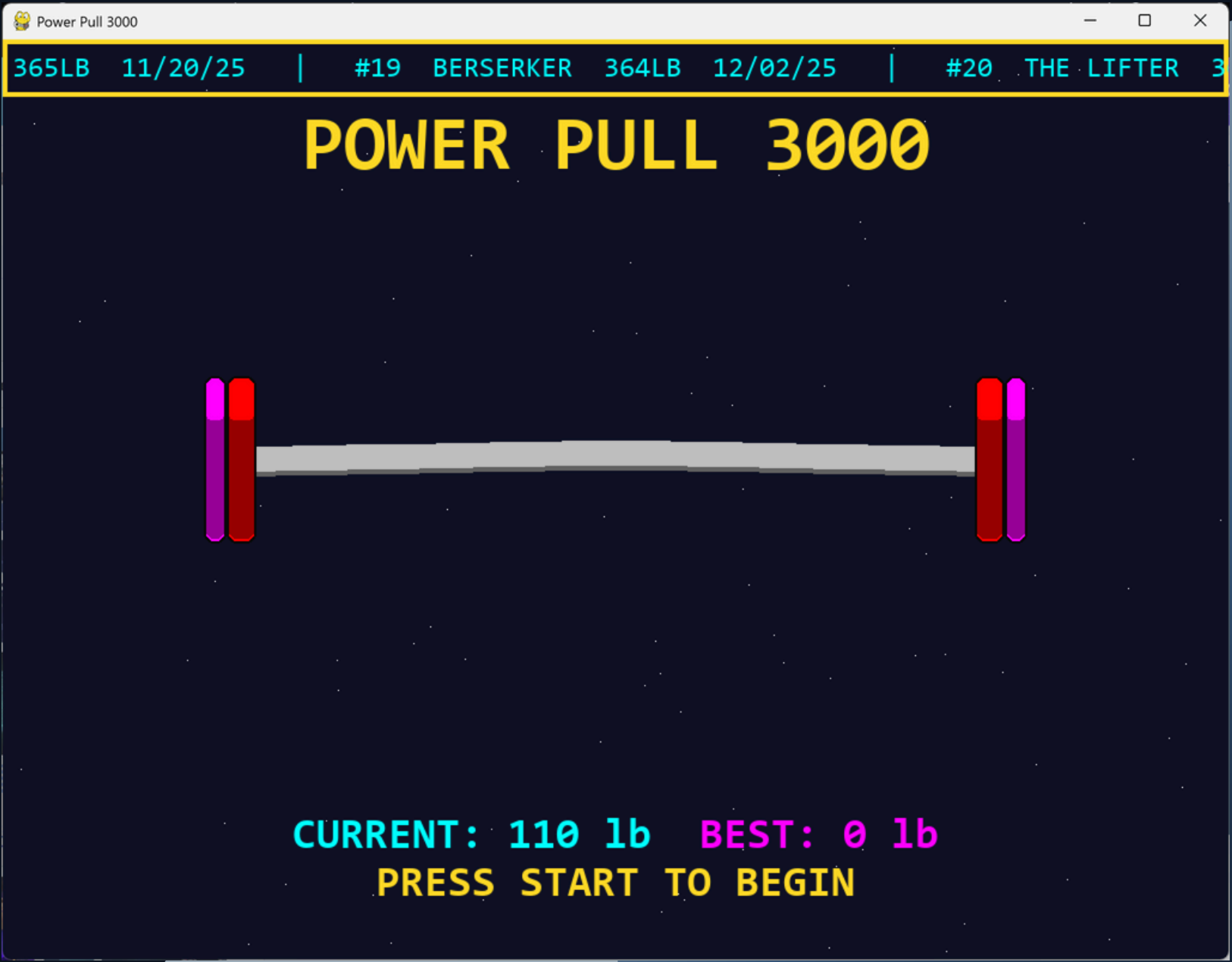
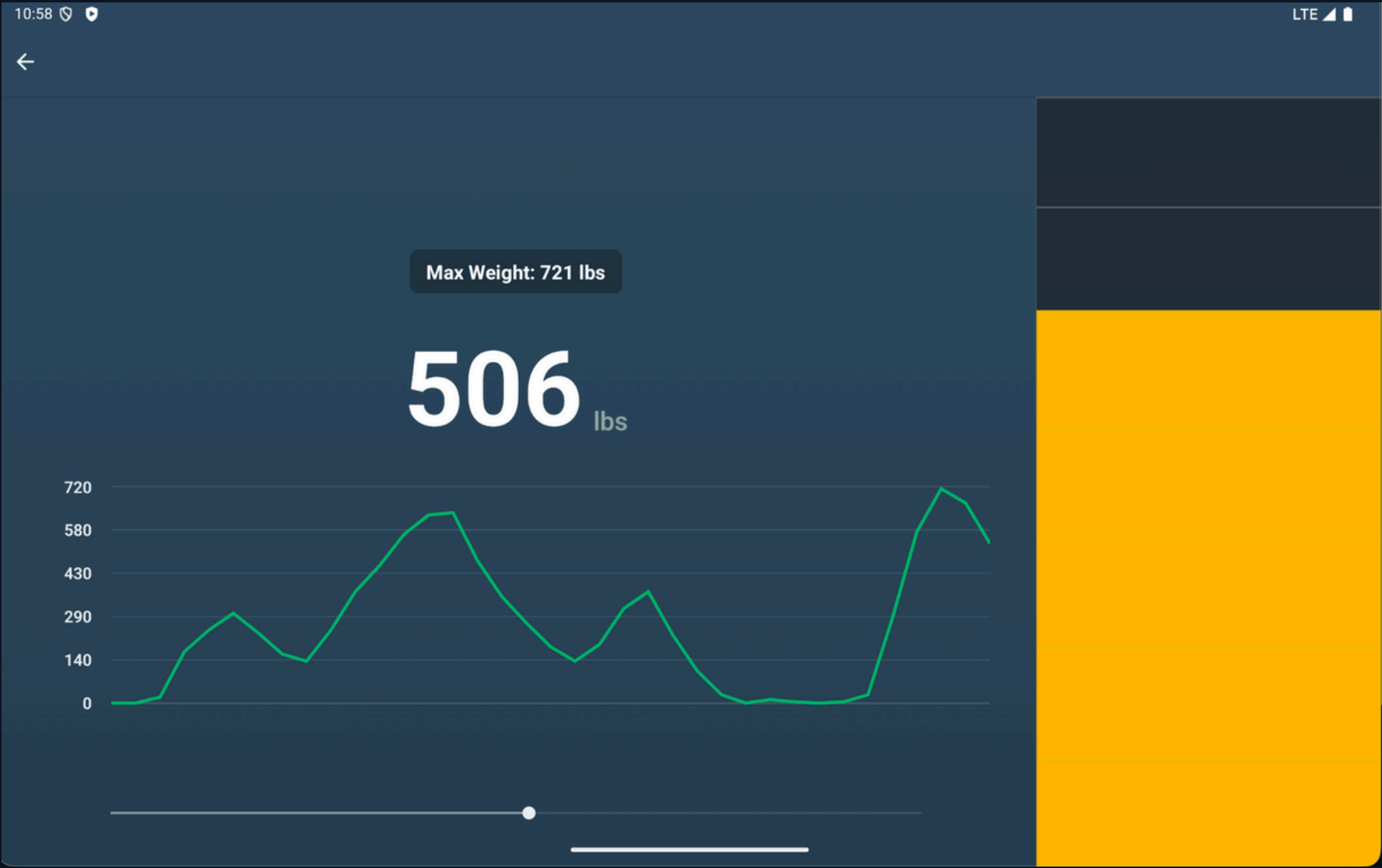
DESIGN - CODEBASE ARCHITECTURE

- Clean separation of concerns, reusable components, and code that's easy to understand and modify.
- Rebuilt architecture around reusable UI components, clean separation of concerns, and consistent design patterns.
- Screens now use a structured layout: UI components, smart containers, and future hooks for settings, animations, and image handling.
- Scalable foundation ready for backend integration, dynamic data loading, polished animations, sound, and full user experience enhancements.

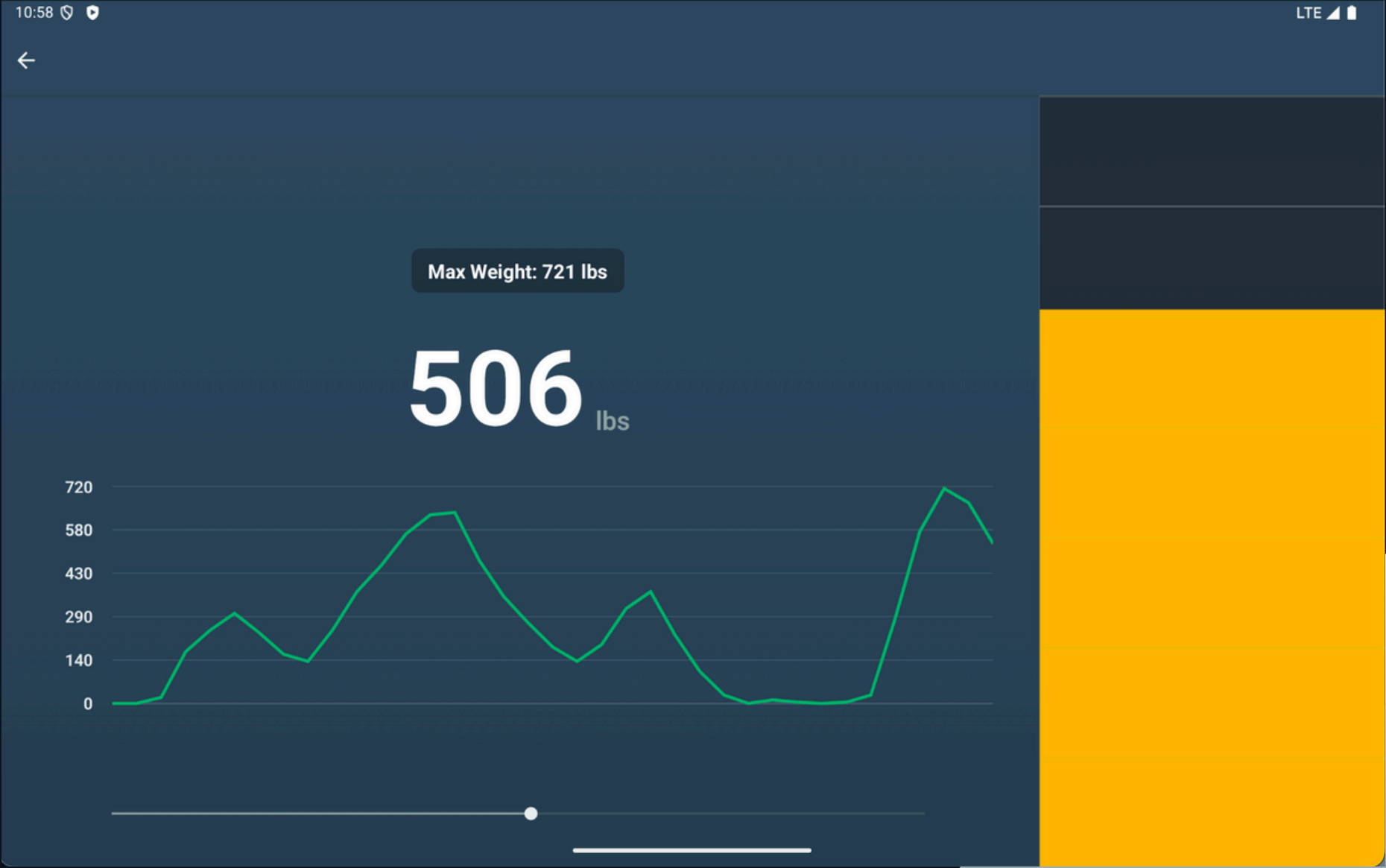
PROTOTYPING / TESTING

- Built early prototypes to test Bluetooth stability and real time data flow
- Implemented custom and arcade prototypes to validate responsiveness
- Identified bugs in BlueTooth connectivity and refined architecture based on findings
- Iterative and modular testing using the Jest Library and manual testing

CURRENT PROGRESS



CUSTOMIZE MODE



CUSTOMIZE MODE - SETTINGS

- Set custom units
- Set color palette
- Leaderboard toggle
- Sound effect toggle
- Lights toggle
- Custom image upload

Custom Mode Options

Subtitle

Units

✓ US Customary

Metric

Click to upload image of item to be lifted

Primary Color

#34495e

Secondary Color

#2c3e50

Tertiary Color (Accents)

#3cb371

☐ Enable leaderboard

☐ Sound effects

☐ Lights

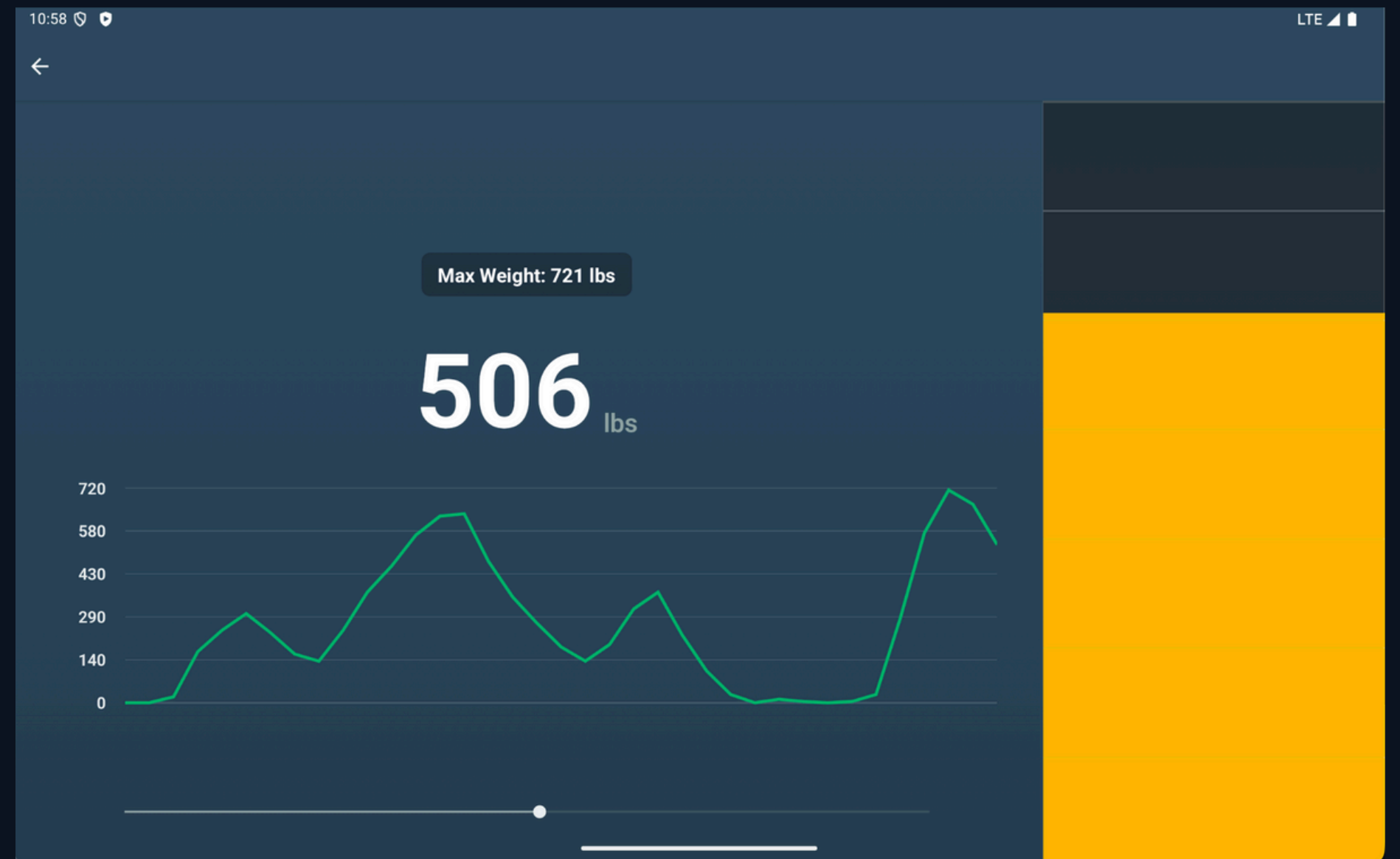
☐ Custom units

Go Back

Start

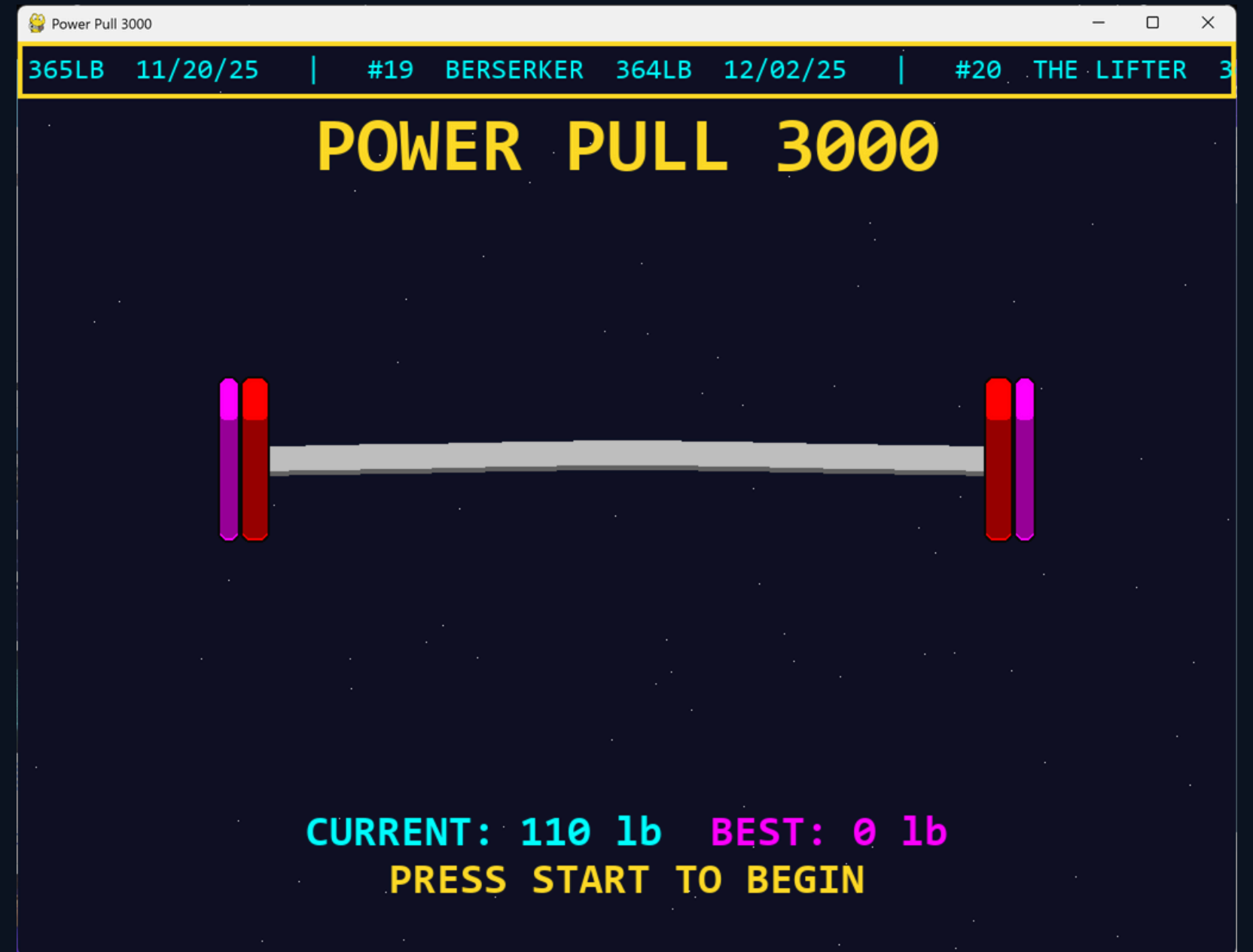
CUSTOMIZE MODE - GAME VIEW

- Dynamically changing graph to show weight lifted
- Current weight being lifted
- Max total weight lifted
- Strength bar that changes color based on level



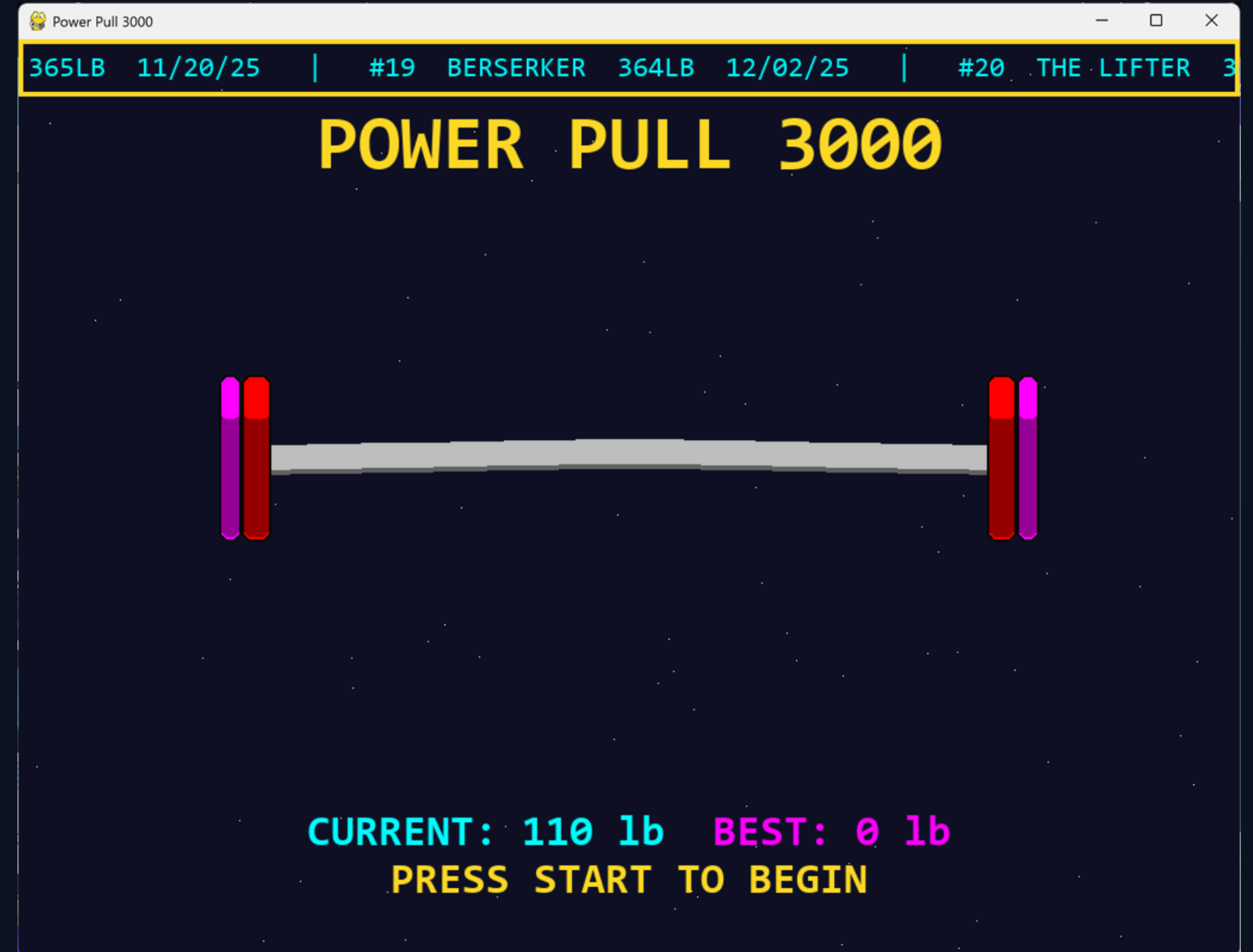
ARCADE MODE

- Why the program switch?
- Program simplicity, resilience, robust
- Easy display
- Easy implementation



ARCADE MODE - IDLE VIEW

- Count down to initiate lift giving user time to set up
- Live responsive feed back to strength
- Count down to end game
- All fitted with sound effects and music for user enjoyment and emersion



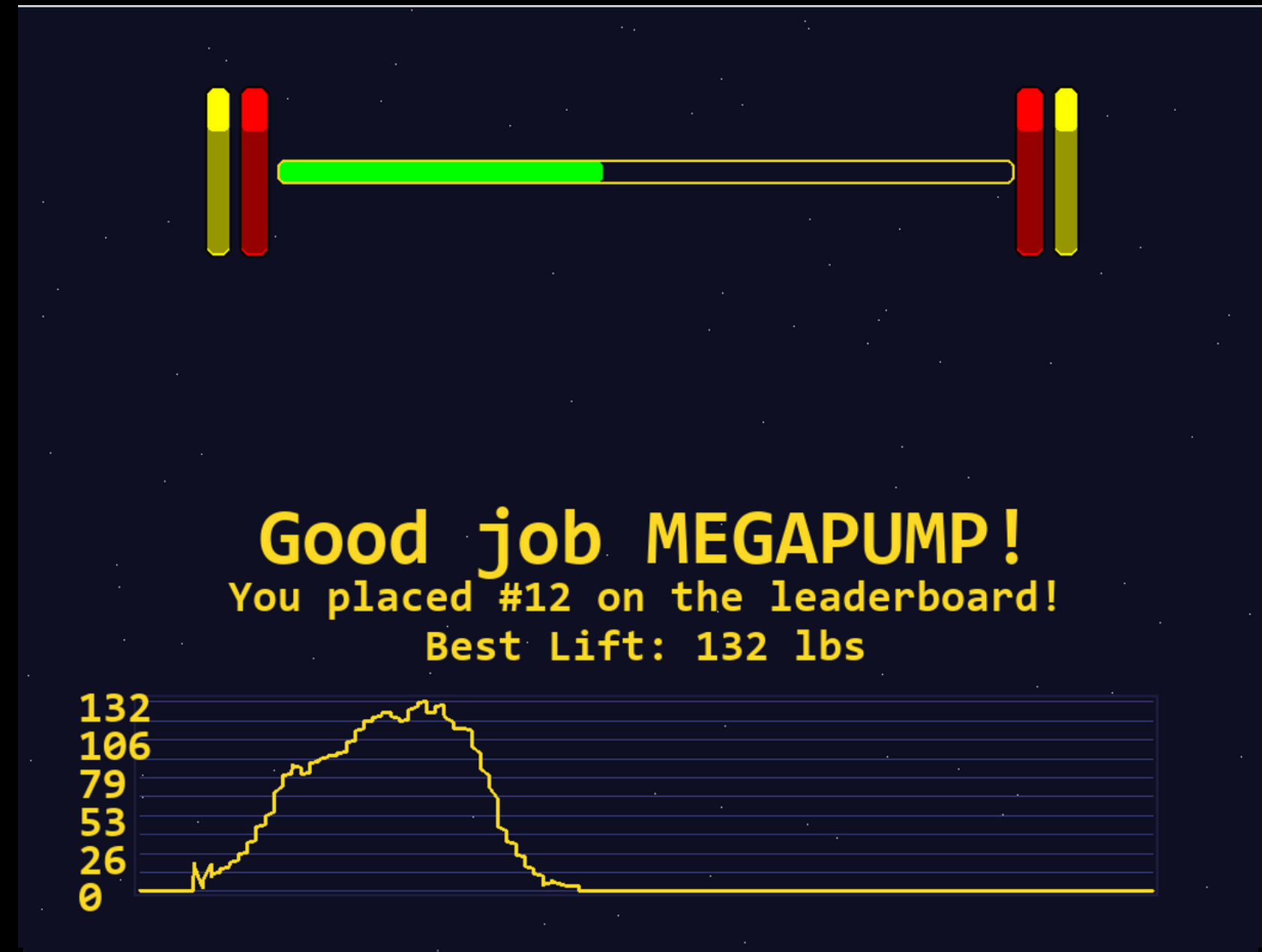
ARCADE MODE - GAME VIEW

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ARCADE MODE - RESULTS VIEW

- Graphical display of strength over time
- Assigns random name for leaderboard
- Displays the plates you lifted in game



ARCADE MODE - LEADERBOARD VIEW

- Scrolling leaderboard that displays placement, name, weight, and date
- Local Json to handle and update leaderbaord



```
Power Pull 3000

LEADERBOARD
#1  HULK  516 lbs  11/17/25
#2  RAMPAGE  482 lbs  11/17/25
#3  IRONCLAD  456 lbs  11/17/25
#4  HEAVY REP  454 lbs  11/17/25
#5  BARBELL KING  451 lbs  11/17/25
#6  BARBELL BRUTE  440 lbs  11/17/25
#7  VORTEX  438 lbs  11/17/25
#8  SLAYER  432 lbs  11/17/25
#9  THE LIFTER  424 lbs  11/17/25
#10 STEEL TITAN  416 lbs  11/17/25
#11 CHAMPION  399 lbs  11/17/25
#12 SWOLE MASTER  398 lbs  11/17/25
#13 HULK  393 lbs  11/17/25
#14 THE UNIT  391 lbs  11/17/25
#15 WARRIOR  389 lbs  11/17/25

Press SPACE to continue
```

ARCADE MODE - PHYSICAL IMPLEMENTATION

- Arcade mode is simply implemented on a raspberry pi that can be ran without connection to the internet making easy and reliable deployment



ARCADE MODE - DEMO



TRUEFORCE ELECTRONICS

- LED lights are run on STM32 Nucleo Microcontroller
- Software uses a process of building frames sent to the LED via a comparator function to simulate a gradual increase of light as input increases



CONCLUSION

- We have a stable foundation for both modes, core loop fully functional
- Next: connect backend and load data (e.g.. leaderboards) instead of mock data
- Enhance animations, transitions, and sound for a polished user experience
- Key lessons: early testing, consistent architecture, and client communication