Paymodoro Design Presentation

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Introduction and Use Cases

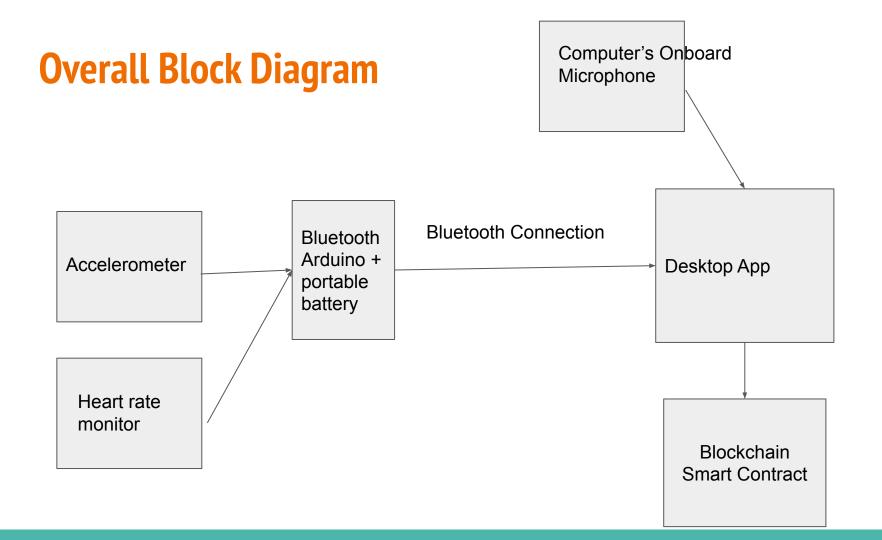
Pomodoro is a technique for working efficiently through cycles of work and breaks. Temptations such as social media, messages from friends are constant, and, with our decreasing attention spans, many of us simply just fail to put the effort into the 25 minute focused period.

Solution: Paymadoro

- Determine a user's focus during a pomodoro session by analyzing
 - Environment sounds levels
 - User's acceleration and heart rate
- The blockchain will reward or penalize the user depending on their focus during the session

Quantitative Use Cases:

- Users of the application will be able to set 25 minute timers and monitor their Heart Rate (BPM), surrounding noise (DB), and movement (m/s^2).
 - Be able to detect if users are excited or not (a change of heart rate of > 40% after initial calibration)
 - Be able to detect if user is in a quiet environment (noise <10 Db increase after initial calibration)
 - Be able to detect if user is moving around or not (any > 0.2g is loss of focus and deceleration is resume focus)
- Based on completion of the focus session, users will be awarded or penalized in the form of Cryptocurrency (Near Tokens).

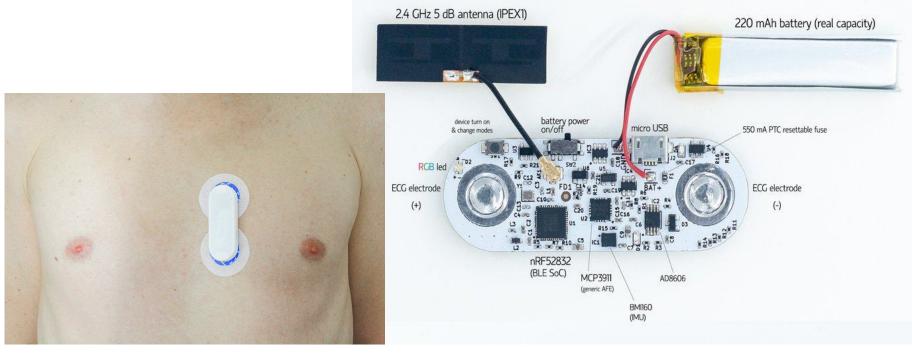


Hardware Specification

There are 3 main hardware devices we will use/implement

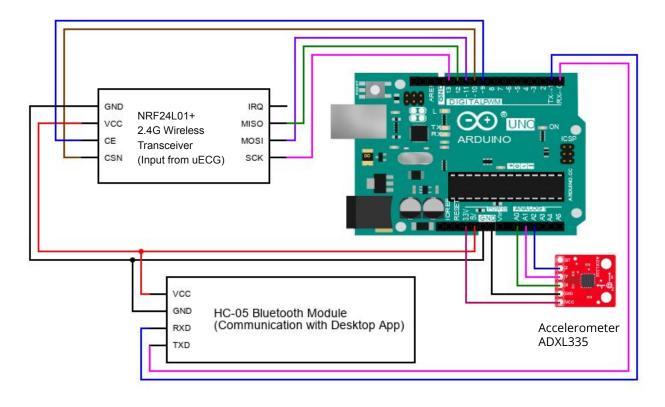
- 1. Wireless heart rate monitor uECG (Purchased)
 - a. Single chest mounted enclosure with 2 electrodes
 - b. ECG data sent wirelessly to belt clip via 2.4GHz antenna
- 2. Belt Clipped Device (Designed by Us)
 - a. Arduino for signal processing
 - b. Accelerometer
 - c. 2.4 GHz Wireless Receiver for uECG
 - d. Bluetooth Transmitter to send data from sensors to desktop application
- 3. Computer
 - a. Run desktop application
 - b. Onboard microphone input to desktop application

Hardware - uECG



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Hardware Circuits - Belt Clipped Device



Desktop Application

We will be utilizing node.js and Electron app to create a desktop application, which will serve as the connection between the hardware and blockchain.

Functionalities:

- Begin and end Paymodoro sessions via Bluetooth using the "node-bluetooth" package
- The desktop application will receive signals from the Arduino and compute the focus score using our aforementioned algorithm
- Update the results of Paymodoro sessions to the blockchain via our smart contract ELECTRON

Desktop Application Algorithm

Epochs: Every 15 seconds, measurements are taken for each criteria and used to determine criteria failure

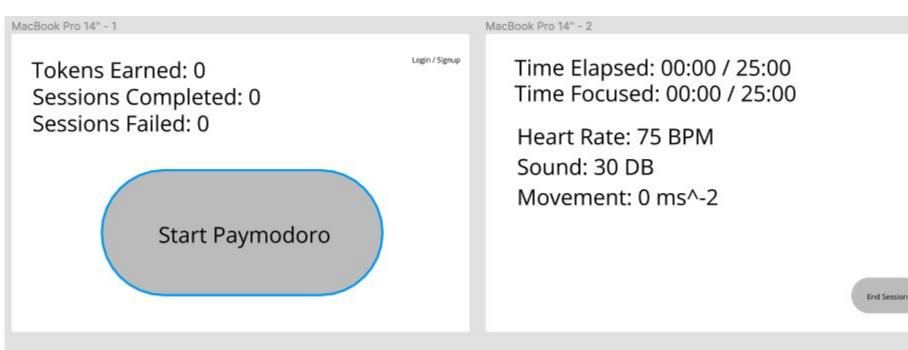
Baseline: baseline measurements taken at the start of a session

Fail if:

- 2+ criteria are failed for 30+ seconds at a time
- 1+ criteria fails for 6.25+ cumulative minutes

Sensor	Microphone	Accelerometer	Heart Rate Sensor
Epoch Failure	+10dB from baseline	0.2g	> 140% baseline
Real World Relation	Conversation \rightarrow Vacuum	Acceleration first 5s walking	Calm \rightarrow excited heart rate

Desktop Application Mockup



Smart Contracts

What is a smart contract? A program which can mutate certain data. The mutations are done so in a completely trusted environment. I.e. the program's execution can be trusted to be correct **Global Data:**

- Contract confiscated balance: amount of Near (native currency to the Near Blockchain) taken from unsuccessful users
- Active users: Users actively engaged in a Pomodoro Session
- Lock amount: amount the users have to lock for a session. Set to 0.1 Near (~\$1)

Global Methods:

- Start: start a Pomodoro session and user to "Active users"
- End: ends a Pomodoro session. Pays out successful users "contract confiscated balance" or confiscates the user's locked amount





Test, Verification and Validation

Test	Verification	Why?	Risks	Mitigation
Ending session time	< 15 seconds	Usability	The blockchain is slow, bluetooth issues	Strong bluetooth connection Getting a premium blockchain connection
Error of sensor measurement	+/- 5% error	Accuracy is important for the right "zone"	Comparison measurements are faulty	Measuring from multiple devices
Criteria failure: fail each criteria purposefully	Failed criteria are properly marked	Ensure that our algorithm computes correctly	Faulty sensor measurement	The "error of sensor test"
User agreement with result	< 20% false positive < 10% false negative	User satisfaction	The users each have different standards of what focus means	Tell testers our definition of focus

Project Management

Paymodoro

ad-only view, generated on 02 Feb 2022

Feb 2022 Mar 2022 W15 Apr 2022 ACTIVITIES ASSIGNEE EH START DUE 56 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 0 (Proposal Presenation 01/Feb 05/Feb 0% Proposal Presenation Design Review: 10/Feb 30/Apr 0% Design Review: 14/Feb 0% 2 Spec out the interfaces for L. 10/Feb Spec out the interfaces for the Smart Contract. 12/Feb 0% 3 🕗 Status Report 1 Status Report 1 4 🕗 Create a rough mock up of t. 16/Feb 0% Create a rough mock up of the desktop app 5 🕗 Design Circuitry For Sensors 15/Feb 18/Feb 0% Design Circuitry For Sensors 6 🕗 Design Attachment Strap a... 22/Feb 0% Design Attachment Strap and Hardware 7 🕢 Status Report 2 19/Feb 19/Feb 0% Status Report 2 8 🕗 Design Review Presentation. 20/Feb 20/Feb 0% Design Review Presentation: Slide Submission 9 🕑 Tune Design 24/Feb 28/Feb 0% Tune Design 10 🕢 Status Report 3 26/Feb 26/Feb 0% Status Report 3 11 🕑 Design Review Report Subm.. 02/Mar 02/Mar 0% Design Review Report Submission 12 🕢 Status Report 4 19/Mar 19/Mar 0% Status Report 4 13 🕑 Status Report 5 26/Mar 26/Mar 0% Status Report 5 14 🕢 Status Report 6 02/Apr 0% Status Report 6 15 🕗 Status Report 7 10/Apr 0% Status Report 7 10/Apr 16 🕑 Status Report 8 16/Apr 0% Status Report 8 17 🕑 Status Report 9 23/Apr 23/Apr 0% Status Report 9 24/Apr 0% Assignment Final Presentation: Slide Submission 18 🕑 Assignment Final Presentati. 24/Apr 19 🕢 Status Report 10 30/Apr 0% 30/Apr Status Report 10 06/Apr 0% Interim Demo: 07/Mar Interim Demo: 21 (Final Assembly 28/Mar 31/Mar 0% Final Assembly 22 🕑 Create the Desktop App fro. 07/Mar 10/Mar 0% Create the Desktop App frontend skelton 23 🕗 Desktop App and Device Co. 21/Mat 25/Mar 0% Desktop App and Device Communication 24 🕗 Create the Smart Contracts D7iMar 11/Mar 0% Create the Smart Contracts 25 O Program the RPI with dumm. 07/Mar 11/Mar D% Program the RPI with dummy input values 26 🕑 Link Circuits with the RPI 14/Mar 18/Mar 0% Link Circuits with the RPI 27 🕗 Create Circuits 11/Mar 0% Create Circuits 28 🕗 Desktop App UI 21/Mar 24/Mar 0% Desktop App UI 21/Mar 24/Mar 0% 29 🕑 Desktop App and Smart Co... Desktop App and Smart Contract Communication 30 🕗 Interim Demo 06/Apr 0% 01/Apr Interim Demo Final Presentation and Demo: 11/Apr 22/Apr 0% Final Presentation and Demo: 32 🕑 Create the final presentation 18/Apr 22/Apr 0% Create the final presentation 33 🕗 Prepare Demo 11/Apr 14/Apr 0% Prepare Demo 34 🕑 User testing: measure metr... 11/Apr 14/Apr 0% User testing: measure metrics 35 🕢 Adjust the algorithm based . 18/Apr 22/Apr 0% Adjust the algorithm based off of metrics 36 Optimize usage: decrease I... 11/Apr 15/Apr 0% Optimize usage: decrease latency, increase physical comfort

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