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.

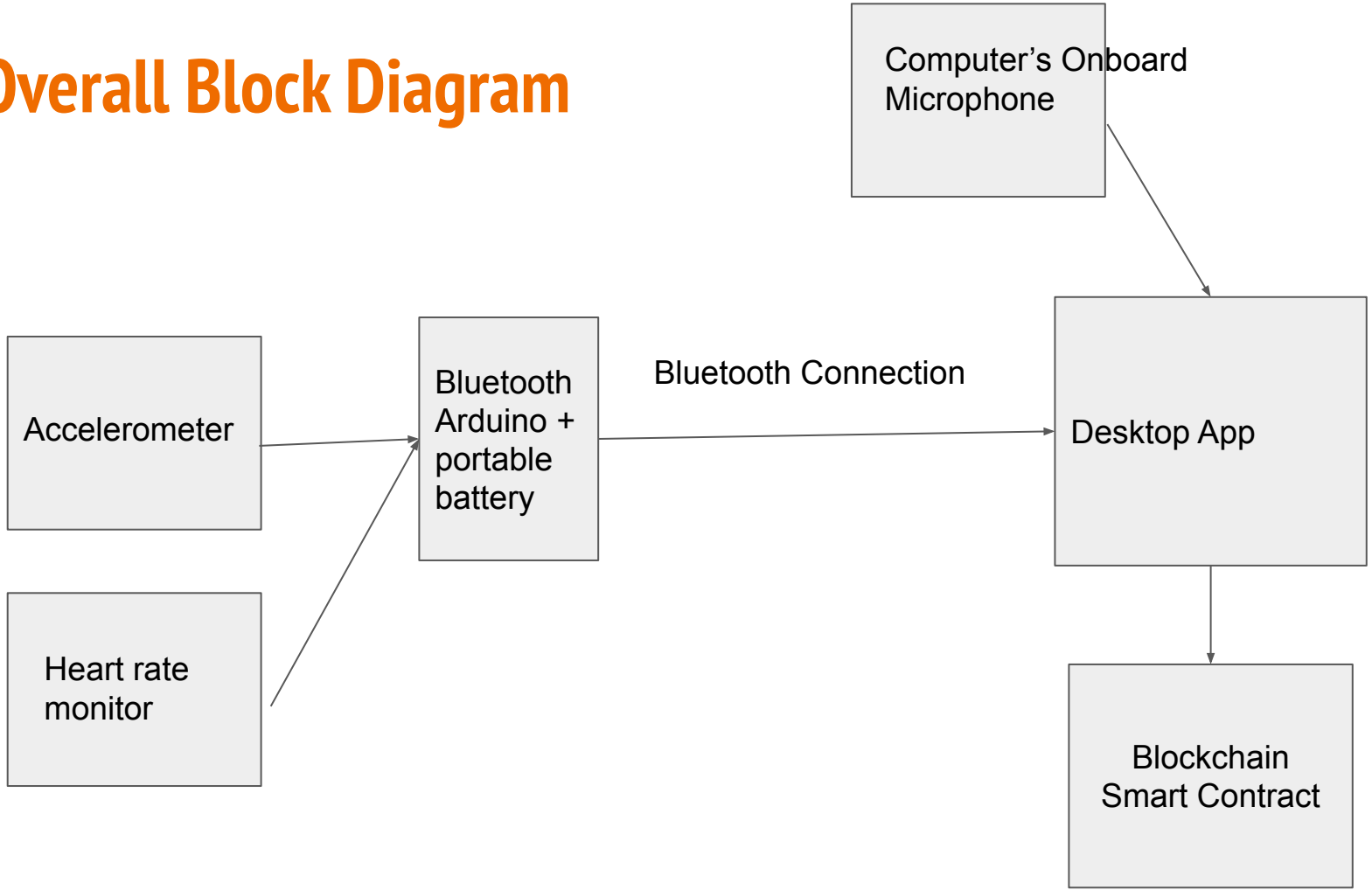
Solution: Paymadoro

- 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).

Overall Block Diagram



Hardware Specification

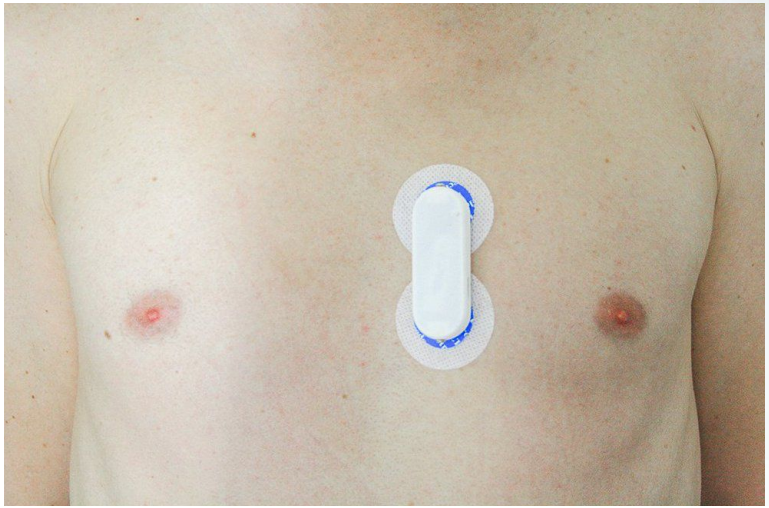
There are 3 main hardware devices we will use/implement

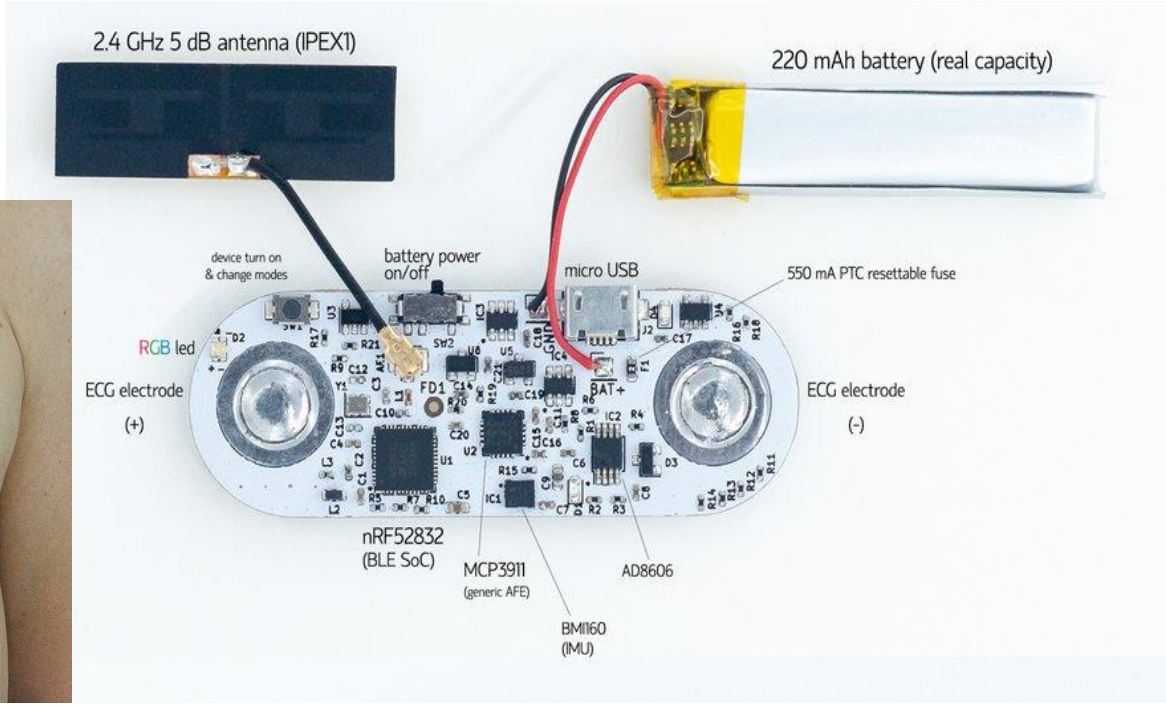
1. Wireless heart rate monitor - uECG (Purchased)
    a. Single chest mounted enclosure with 2 electrodes
    b. ECG data sent wirelessly to belt clip via 2.4GHz antenna

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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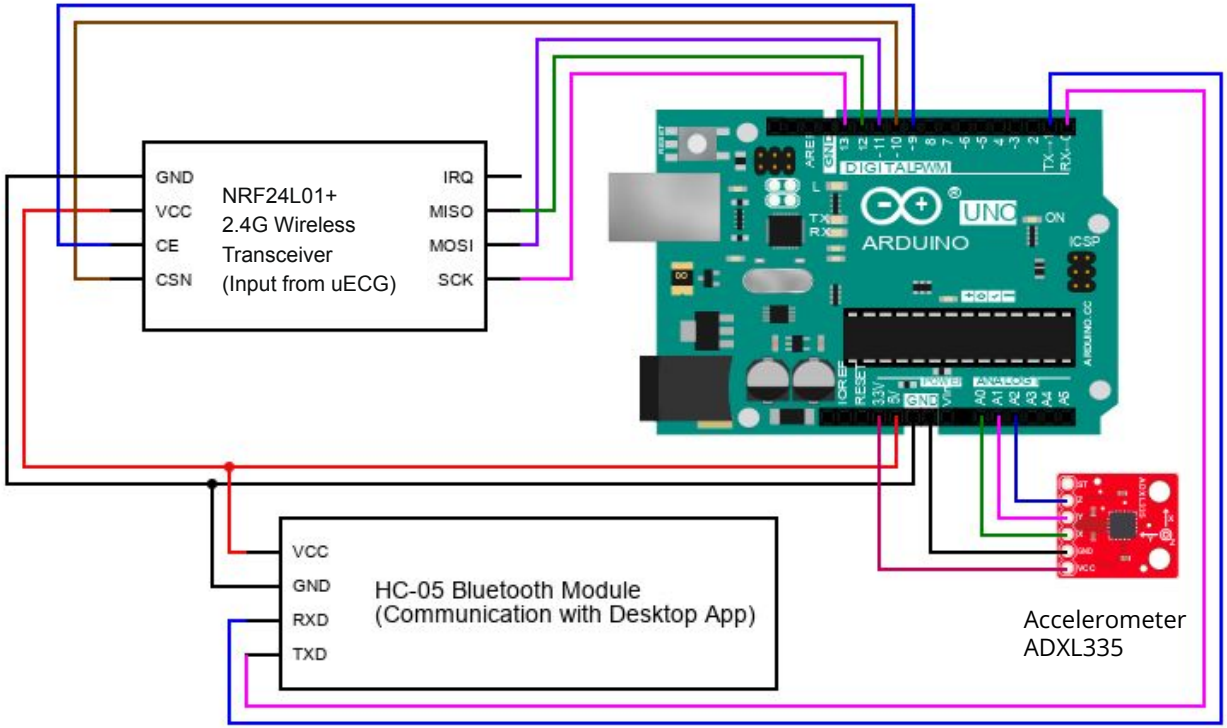
Hardware Circuits - Belt Clipped Device



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

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 → Vacuum	Acceleration first 5s walking	Calm → 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

NEAR

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