**Engineering Project Detailed Research Plan**

**Please complete the information/questions begun/seen below in red ink. Save this document to your computer, and add a printed hardcopy to your application.**

**Date: 10/20/21  
Student Name: Ananya Mehta  
Project Title: Screen Time to Green Time**

Parts of the generic engineering project are listed below with descriptions to the students in the boxes. Students may provide a detailed research plan by describing their specific project in response to each box below.

**Engineering Goal**: PROBLEM BEING ADDRESSED:  All engineering projects solve a problem or fill a need.  This goal should be a simple statement that describes the product being designed, the customer it is for and the problem or need it satisfies. Example” “The goal is to design a solar powered lawn mower for inexpensive automated lawn care for homeowners”

**My Project Goal i**s:

The design and construction of a desktop application that can process data from a fitness tracker and use it to control access to the WiFi router, to help balance screen time and physical activity.

**Design Criteria:** Design criteria define the product’s required performance . Examples: “ It will have a minimum speed of 10 KPH”, The output will be within 15% of the mean of the experimental data”. “It must withstand 15 repetitions of a 10N impact” The International System of units (SI) required.

**My Project Design Criteria are the following:**

* The application should be able to retrieve the correct data for the users at least 90% of the time.
* The desktop application should be able to disable the internet access for the correct user at the correct time with 90% accuracy.
* The application should be able to detect additional physical activity and allocate time accordingly at least 90% of the time.

**Constraints:** Constraints are factors that limit the engineer’s flexibility such as size, cost, and time limitations. Examples: “It must fit in a box no larger than 10x20x50 cm” “The maximum cost is $50” “The software must run in real time on a Raspberry Pi”

**My Project Constraints are the following:**

* The user needs to wear the fitness tracker for the S2G application to analyze the physical activity, and they should upload the data to the Google Fit database.
* The router used must provide an application programming interface (API) to control internet access.
* Should be able to prototype the system in 6 weeks.

**Provide your chosen design.** For hardware, provide a sketch.For software, provide a flowchart. Indicate the components you will develop, and the libraries you are using.

**My Project Design is shown below: insert photos, diagrams, or illustrations below.**



**Test and evaluate your prototypes against the design criteria listed above to show how well the product meets the need/goal.** Provide a test plan describing how you will test the design criteria and constraints you listed above., How will you analyze the data? If the product requires human testing please fill out and append https://science-fair.org/wp/wp-content/uploads/2015/10/Research-Plan-Human-Participants.docx

**I test and analyze my prototypes using the following methods:**

My testing procedures have been listed below:

**Criteria #1 - Retrieve the correct data for the users at least 90% of the time.**

1. Pair the bracelet with a mobile device using its designated app.
2. Install and connect the Google Fit app, and connect it to the bracelet’s app to fetch and upload the data into Google Fit database.
3. Take 100 steps on tracker 1.
4. Run the Python script to fetch the health data and compute the number of steps.
5. Compare steps taken and steps recorded by the tracker.
6. Repeat steps 3-5 five times in increments of 100 steps each.
7. Repeat steps 3-6 for the second tracker.
8. Record results.
9. Repeat steps 1-8 five times (5 trials).

**Criteria #2 - Disable the internet access for the correct user at the correct time with 90% accuracy.**

1. Log different amounts of exercise data on each tracker.
2. Fetch and compute the screen time for each client.
3. Set up the firewall to block internet access for each of the clients at the designated time.
4. Ensure that their internet access is disabled after the allocated time.
5. Repeat steps 1-4 five times using different increments of exercise data for each tracker.
6. Record results.
7. Repeat steps 1-6 five times (5 trials).

**Criteria #3 - Detect additional physical activity and allocate time accordingly at least 90% of the time.**

1. Change evaluation interval to 1 hour.
2. Ensure that internet time has exhausted and access is blocked for both clients.
3. Log 100 steps for one of the clients.
4. Compare expected and earned screen time after 1 hour.
5. Repeat steps 3-4 in increments of 100 to 500 steps.
6. Repeat steps 3-5 for the second client.
7. Record results.
8. Repeat steps 1-7 five times (5 trials).

**Bibliography:** List at least five (5) major references (e.g. science journal articles, books, internet sites & dates of review) from your literature review. If you plan to use vertebrate animals, one of these references must be an animal care reference.

1. “Fitbit Development: Application Design.” *Fitbit*, Viewed September 26, 2021. <https://dev.fitbit.com/build/reference/web-api/developer-guide/application-design/>.
2. “Fitbit Development: Getting Started.” *Fitbit*, Viewed September 26, 2021. <https://dev.fitbit.com/getting-started/#>.
3. “Lack of Physical Activity.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 25 Sept. 2019, Viewed September 25th, 2021. <https://www.cdc.gov/chronicdisease/resources/publications/factsheets/physical-activity.htm#>.
4. “Video Game Demographics - 27 Powerful Stats for 2021.” *TechJury*, 9 Sept. 2021, Viewed September 25th, 2021. <https://techjury.net/blog/video-game-demographics/>.
5. “Top 10 Parental Control Apps of 2021.” *Top 10 Parental Control Apps of 2021*, 10 Apr. 2018, Viewed September 26, 2021. <https://www.consumersadvocate.org/parental-control-apps/a/best-parental-control-apps?pd=true&keyword=app+that+tracks+screen+time&bca_campaignid=333739434&bca_adgroupid=1207264130537424&bca_matchtype=e&bca_network=o&bca_device=c&msclkid=7436c5f7f8301a59d944a4a742550e5d>.