Script for StressLess PP

Slide One

Nana – Our project aim was to create a wearable stress monitor using the user's body temperature to calculate the stress levels. We originally planned to use a heart rate sensor to calculate the stress levels but changed to temperature to conserve power for our device. On our wristband, we planned to have LEDs embedded into it and have them show a guided breathing sequence to lower their stress. The embroidery that will embed the lights will also act as a fidget toy, as an additional way to lower the users' stress levels. Our device will be geared towards younger people, especially those in higher education.

Slide Two

Neha – Our main project demographic is students in higher education. A study done in 2022 discovered that young persons aged 18 to 24 were more likely to experience moderate to severe stress, sadness, and anxiety symptoms, so we felt they were the most suited age group for our project. Students encounter many stressful situations where they are unable to leave the environment in which they are. This can include the settings of lecture theatres, libraries, exam halls and meetings with supervisors. To provide them with a method to deal with their stress and prevent harm, we implemented the use of beads, buttons and other accessories with which the students can fiddle with.

Slide Three

Aqdas – When we were selecting our project, we carefully considered all the provided tracks and ultimately chose wearables because we wanted to explore a new area of technology. As a group, we realised that wearables were the only track that was completely unfamiliar to all of us, making it an exciting challenge and a valuable learning opportunity. The idea of creating something that could be worn and interacted with in real time intrigued us, as it combined hardware, software, and user experience design in a way that no other track did.

Another major reason for choosing wearables was our interest in sensory experiences. We wanted to explore how subtle vibrations and tactile feedback could enhance interaction, and we felt that a wearable device would be the most natural way to incorporate this technology. By working on a wearable stress monitor, we could experiment with real-time feedback, biofeedback loops, and interactive design, pushing our skills in new and meaningful directions.

Slide Four

Neha – Within our project, we wanted to take in the user’s heart rate data, which a wide range of sensors can do. Looking into already existing projects would help inform us of what current designs are and any positives and negatives of the sensors used. The two studies we looked at led us to adopting the use of non-intrusive sensors like ECG and EDA for stress monitoring, emphasising aesthetic appeal and data privacy, while avoiding machine learning to maintain battery efficiency and ensure a user-friendly experience.

Slide Five

Aqdas – For our mood board, we took inspiration from a range of existing projects relating to mainly LEDs (often controlled by data produced by the body/a person) or wearable technology that produced an outcome (such as music) based on data received by the body, as we wanted our project to have a similar design. We felt these topics correlated well with our chosen subject,

as we wanted our device outputs to be based on data taken from the user and in the form of LEDs.

Slide Six

Aqdas – In our mood board, we found that examples such as LED Cable Wristers were a good example of what we wanted to achieve. Smart and E-Textiles were a huge focus for our project since we wanted our device to be as basic as possible to allow for Ubiquitous Computing in our project. We also wanted to achieve a sense of human design through anthropometric design ideologies since that is very synonymous with ubiquitous computing and other variables we took into account, such as style.

Slide Seven

Nana – The first inspiration for our mood board was Breathing Pavilion by Ekene Ijeoma. The art piece consists of 20 3-metre inflatable pillars arranged in a circle, with glowing orange LEDs within them. The artist intended for the work to be used for meditation as a response to the pandemic and uncertain times. In our project, we wanted to incorporate the idea of lights as guided breathing. We also liked the soft and calming orange lighting and how it resembles the sun, and wanted to add this sort of thing to our devices as well.

Slide Eight

Nana – We decided to look at artwork for inspiration for what we should put on the wristband and settled on space artwork. The two artists we looked at, Pandora Mond and Larisa Murariu, also known as Morysetta. Pandora Mond is an oil painter from London who mainly paints large-scale planets. Her artwork leans towards abstract and experimental because of her paint strokes lacking precision and the occasional splatter. We like how this makes her work feel more relaxing. Mond's artwork is often textured to add depth to the paintings. This made us certain we wanted our wristband to have textured elements. Morysetta is a graphic designer and digital collage artist originating from Romania. Most of her art explores surrealism and revolves around distorting reality by combining images of different places and space elements. Her work varies from album covers to NFTs. We were inspired by her bold use of colour when creating the space elements of her artwork and wanted to include this in our work to make our device more visually engaging.

Slide Nine

Neha – Incorporating the concept of space into our embroidery was important to us, as we felt it created a calming effect since it emphasises how small and inconsequential our worries can feel when viewed in relation to the vastness of the universe. This idea aligns with the message conveyed by the artists we researched, who also used cosmic imagery to evoke a sense of peace and perspective. It felt like an appropriate message to include, as we wanted our users to feel more at ease. We then looked at different existing space embroidery designs, and we were drawn to the idea of having the whole solar system in order, in addition to beads and sequins. For our colour scheme, we wanted fairly bright colours to make the wristband to be more engaging.

Slide Ten

Neha – For the material of the wristband itself, we did research on rubber/silicon, nylon and felt to see what would be most suited for our project based on durability, wearability, convenience, comfort, versatility and whether it was allergenic or not. Rubber, despite its durability and common usage in wristbands, lacks versatility and would be difficult to embroider onto. Felt,

though much easier to embroider onto, is not the strongest material and is not resistant to stretch or moisture and would therefore degrade much faster than the other two materials. This left us with nylon, well suited for all our needs – lightweight, durable and not allergenic.

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Slide Twelve

Nana – After making a mood board for the embroidery, we sketched out two designs for our wristbands and converted them to digital designs. Both wristbands use a black background, like space, and the nylon material we have for wristbands is black. The key difference between the two designs is the planet arrangements. The designs also have a lightbulb in the sun to indicate where the LEDs would be. In this stage, we also allocated specific textures to each planet. We decided to pick the design on the left since it made the most practical sense to have the LEDs securely in the middle rather than hanging off the end. We also realised we liked the idea of stars and wanted to implement that in our chosen design.

Slide Thirteen

Aqdas – For our prototype, we prioritised the key features such as the wristbands/embedded fidget toys, the temperature sensor triggering the LED sequence and the screen displaying when stress levels are high.

Slide Fourteen

Aqdas – For our project, we needed a microcontroller to read data from a temperature sensor. At first, we thought about using an Arduino Nano, but in the end, we went with the Arduino Uno R3. It’s super reliable, easy to use, and there’s loads of help online if you get stuck. For the sensor, we used a DHT11 to measure temperature, it’s simple and does the job well. The Uno worked great with it and didn’t need any extra setup or drivers. We powered everything using a micro-USB cable and a battery pack, which worked fine for testing, though we know a Li-ion battery would be better for a final version. We also added some LEDs to give visual feedback, for example, lighting up more LEDs as the temperature went up, kind of like a warning system. We programmed it all using the Arduino IDE, which made it easy to test and change things quickly.

Slide Fifteen

Nana – To prototype what we wanted the screen on our wristband screen would look like, we made sketches of the screen, trying to make them minimalistic and clean. We only wanted key information to be displayed on the screen. After making these initial designs, we further simplified them for practicality and reduced the number of screens from 5 to 2.

Slide Sixteen

Aqdas – the circuit shown here uses the temperature sensor as an input while using basic LEDs as an output. When the daemon function is begun, the temperature sensor initialises and automatically calibrates itself by testing if all components within it are working. The Pi then

sends out a signal asking the sensor to check for the temperature. The sensor computes the rate of temperature by measuring the increase or decrease between data sampling. The sensor then sends the calculated data as integers, and then at the end of the loop cycle, we can decide whether we want to continue with the function or not.

Slide Seventeen

Nana – For the code, we used Arduino to program the temperature sensor to collect data, and if a rapid increase in temperature is detected, the LED sequence we programmed was executed. Stress levels are usually calculated by the variability in data received from the body rather than just a greater result equating to higher stress; that is not always the case. This meant that we looked at when the data received would increase rapidly. After looking at studies, we decided on a rapid increase threshold of 0.5 degrees in 2 seconds would be an appropriate measurement to tell when a user is stressed. For the light sequence, after a rapid one-second flash, the LEDs turn on and off gradually for a minute, as guided breathing. The data received from the sensor is then all sent from Arduino to processing. On processing, we have a screen to indicate when high stress levels are detected for debugging purposes.

Slide Eighteen

Neha – For our final prototype, we put together our LEDs and temperature sensor with our wristband to go along with the on-screen display. *DEMONSTRATION*

Slide Nineteen

Neha – We created a poster to advertise our wristband, aiming to visually communicate its key features. The poster highlights the built-in fidget elements, which are designed not only for interaction but also to provide a sense of calm and engagement. These include clickable buttons representing Mars and Mercury, pushable sequins symbolising Earth, and rollable beads integrated along the rest of the band. Each element was chosen to reflect both the sensory experience and the planetary theme of the design.

Slide Twenty

Anyone – We would try to implement a heart rate sensor into our device if we were to have more time, as well as a more suitable closure of the band.