**What:**

As part of this project, I built a temperature detection and alarm system using the Micro bit, which relied on its onboard temperature sensor, to simultaneously monitor environmental temperature in real-time. The complete system was set up to respond interactively to changes in temperature, allowing for warnings signalling when the temperature exceeded a set threshold visual and audibly. In normal range, the display would emit a "smiley face" icon, which would indicate that everything was safe and stable. On the contrary, when it exceeds the preset threshold, the device will instantly signal an alarm sound as the display on LED switches to a "sad face" icon, therein providing a friendly visual warning to the user. In case the alarm was set and the temperature drops back down into normal range, the alarm immediately goes off, and the display is reverted to a "smiley face." This approach allows me to interact directly with the Micro bit’s hardware and learn how to handle sensor data in order to make practical feedback loops. This describes a really simple and easy prototype to understand how this basic sensor setup becomes functional: translating some raw data into meaningful feedback to humans, using the coding techniques provided. Beyond making me acquainted with the programming, the experience is valuable in gaining perspectives on building interactive systems, the foundation which contributes to practicality with human-centered technology solutions.

**So What:**

Implementation involved several steps. The first step was setting the temperature threshold at 25°C as a baseline for alarm activation. The live temperature is continually checked by the Micro bit’s temperature sensor and compared with this threshold. The system performs different actions depending on the outcome of these comparisons: it switches on the alarm when the threshold is being crossed, and switches off when temperatures return back to normal. This embodies the core idea of an "algorithm" which is defined as "a finite sequence of precise instructions for carrying out a sequence of operations" (Domingos, 2015). With conditional statements, I wrote a specific response for the different ranges of temperature that made me understand how algorithms can dictate system behavior by making decisions based on sensor inputs.

The project lays emphasis on the importance of modular design and abstraction in coding (Ford, 2015). By breaking down the project into modules-temperature detection, alarm activation, and LED display control-it enabled me to develop each functionality independently, thus improving readability and flexibility. Modular design smooths changes; I could modify each function without really having to change the entire system. Abstraction concisely represents functionality, such as using methods like basic.show\_icon() for displaying icons and input.temperature() for sensor data. This makes the program more concise and thus easier to maintain and expand, which proved vital as the project grew.

The hardware module in this course has given insight into the Micro bit's components, including data travel from sensors to code. Working with the temperature sensor has given me firsthand knowledge of how sensors change physical information into digital data that the system uses to execute its functions. This interaction opened the door for me to datafication, making me think of several other ways of obtaining digital data from different factors of the environment for future expansions. For example, adding additional sensors for humidity or motion could bolster the device's capabilities into a reliable environmental monitoring system (Mayer-Schönberger & Cukier, 2013).

Along from this, an equally important subject for discussion was, in another direction, "structured versus unstructured data." Sensor-collected temperature data is structured and easy to make comparisons with, and in favor of sound and logical decision-making. This structuring allows for ease of processing; unlike unstructured data, it may require a complicated parsing before any analysis can take place. This project taught me that structured data can very much be a useful way of having a basic decision-making system, whereas more complicated systems may come about that require both structured and unstructured data for systems such as pattern recognition. This further got me in the direction of thinking to add another form of structured data, such as humidity, to engage in multi-dimensional observation in keeping with big data's contribution to bettering decision-making accuracy (Mayer-Schönberger & Cukier, 2013).

The concept of "data ethics and trust" really opened eyes toward the peripheral systems of monitoring. In real monitoring systems, trust and transparency are vital-given the reliability of user trust on monitoring. False alarms and missed detections compromise trust and cause users to ignore alerts and worry about faults in the system. The knowledge I gained made me think about augmenting the system through the possible addition of a degree of manual control, such as a threshold that could be adjusted, giving the users some autonomy and possibly an increased confidence in the system.

**Now What:**

The foundational objective of this project has been achieved, and considerable opportunity still exists for building upon this prototype into something that can be realistically captured in actual implementations. Currently, monitoring the temperature becomes its only application. I will thus view the addition of other sensors, such as humidity, smoke, or air quality sensors, a way through which various environmental parameters can be monitored in addition to temperature to be of greater application. This would, therefore, enable the system to accommodate a much wider application range, including home safety and industrial temperature and air quality monitoring. Variation of data can also be invaluable in enhancing the precision of decision-making through the delivery of more analytical insights to enable the systems to make informed decisions, as indicated by Kitchin and McArdle (2016).

Future integrations within the project could involve networking capabilities to advance the device concept as an IoT-based monitoring system. This would enable users to collect environmental data remotely from any location and store it in the cloud. This reflected the course discussions of the Internet of Things and data interoperability, which articulated how these integrations could be exploited to leverage big data and artificial intelligence for extending any device capabilities. After clouding environmental data, machine-learning algorithms can be employed to discover patterns or forecast trends, thereby opening doors to proactive alerts and allowing users to anticipate and manage potential environmental threats before they escalate (Mayer-Schönberger & Cukier, 2013).

At the end of this project, I have learnt a lot about the integration of hardware and software, especially in sensor data handling and environmental monitoring. Furthermore, the lessons learned from this experience have inspired me to keep exploring sensor technologies, data analytics, and networking, which I can apply to create smarter and more responsive monitoring systems. The concepts learned in class regarding modularity, algorithms, data ethics, and IoT integration have provided a solid foundation that I intend to build on for future projects, especially as I seek to develop smarter and more adaptive devices that very effectively meet real-world needs.

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