REPORT-I

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ATTENDANCE AND TEMPERATURE CAPTURING DEVICE FOR EMPLOYEES

Aim: To build a system which captures and stores attendance and temperature of all the employees and sending a notification if an employee is detected with high body temperature.

Overview: The objective of this device is to efficiently capture and store attendance and body temperature of an employee entering the powerplant. RFID tags will be embedded in the ID cards of each employee which will contain the essential information about the person. RFID scanner will scan the tag to read the Employee ID Number (EIN) and will correlate it with its existing database of employees. This will mark the attendance and then the IR thermometer will scan the body temperature and store it along with the attendance. If the temperature is higher than a certain limit (here, 100 F), the device will automatically send an SMS to the concerned person whose contact no. is fed into the device. The need for such a device arose when a pandemic called COVID-19 halted the world. This device will try to make safe disease-free working environment for the employees, and they will be able to concentrate on their work with worrying about getting infected.

Things Studied for the project:

- Completed:
  - Introduction and Programming with IoT boards (A course on Coursera offered by POSTECH)
    -This course gave am introduction to programming with various microcontroller boards like Arduino, Raspberry Pi, Samsung ARTIK etc.
  - Programming with Cloud IoT platforms (A course on Coursera offered by POSTECH)
    -This course was an introduction to cloud programming platforms like ARTIK Cloud, AWS and Google Cloud Platform.
- Ongoing:
  - Arduino Bootcamp: Learning through projects (From Udemy)
    -This course teaches how to make circuits and related sketches through projects.
  - Arduino Step by Step: Getting Serious (From Udemy)
    -This course is offers the step by step procedure on how to approach an Arduino projects
  - YouTube Tutorials
  - Tutorials from Arduino.cc

    -The YouTube and Arduino.cc tutorials help in understanding the very basic elements of Arduino like minor details about the functions used to write sketches.

This project makes use of the following technologies:

- **Arduino Board:** It is a microcontroller board which is used as a base for electronics projects. It was developed for a faster prototyping. It can be used in automation systems and development of Internet of Things (IoT) based devices. It is based on a programming language called 'Wiring' and is compatible with most of the programming languages like C, C++, python etc.

  Some uses:

  - DIY projects for beginners
  - Development projects which have code-based control
  - Development of embedded systems and automation technologies
  - Wearables and other IoT devices.

- **RFID:** It stands for Radio-Frequency Identification. It uses electromagnetic fields to automatically track and identify tags which are generally attached to objects. It consists of a radio receiver and a transmitter.

- Types of tags-

  Active RFID

  - Active RFID tags have their own transmitter and power source (usually a
  - battery) onboard with the tag
  - They read ranges that can extend up to 100 m.
  - They are usually larger and more expensive than their passive counterparts

  Passive RFID

  - The tag reader and reader antenna send a signal to the tag, and that signal is used to power on the tag and reflect energy back to the reader.
  - They read ranges are shorter than with active tags and are limited by the power of the radio signal reflected back to the reader.
  - They are usually smaller, less expensive, and more flexible than active tags.

  It has variety uses, for example, in automobile industry it is used to track the progress through assembly line. It is planted on objects in supermarket for security reasons, supermarkets have RFID receivers on the exit doors which can trigger an alarm if a person tries to take something from supermarket without getting it billed. It is also planted on livestock and pets to monitor them.
  This project uses RFID scanner and tag to capture the attendance of employees.

- **IR temperature scanners:** It finds its use in healthcare industry to make IR thermometer which can detect a person's body temperature without making any contact with skin. It came into limelight during the COVID-19 pandemic where it replaced the traditional mercury-based thermometers, which apparently aided in stopping the spread of virus through contact.

- **GSM module:** This is an extension of Arduino which enables it to send and receive calls and SMS. A Subscriber Identity Module (SIM) card is required in addition to the board. It uses GPRS/GSM technology to make calls and send and receive SMSs.
  This project uses this module to send an SMS with the employee's credentials to notify the "Security-in-charge" that the employee has a high body temperature. This can help in monitoring the employee's health and controlling the spread of a pandemic such as COVID-19.

- The device also uses some minor components like:
  - Breadboards
  - LED lights
  - Jumper Cables
  - USB Cables etc.