**Question 1**

IEEE code of conduct has following clauses:

1. to hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding by individuals and society of the capabilities and societal implications of conventional and emerging technologies, including intelligent systems;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons and to not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Following are the ethical aspects related to our project and related code of ethics:

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| # | Aspect | IEEE code of conduct |
| 1 | Safety | [1] to hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, and to disclose promptly factors that might endanger the public or the environment; |
| 2 | Honesty | [3] to be honest and realistic in stating claims or estimates based on available data; |
| 3 | Accessibility of data | [1] to hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, and to disclose promptly factors that might endanger the public or the environment; |
| 4 | Professional development | [10] to assist colleagues and co-workers in their professional development and to support them in following this code of ethics. |
| 5 | Societal implications | [6] to improve the understanding by individuals and society of the capabilities and societal implications of conventional and emerging technologies, including intelligent systems; |

**Question 2**

1. **Safety**

The aim of this project is to monitor the industrial plant remotely which cannot be monitored by the operators due to safety concerns. They might be located either in remote or hazardous areas where it is risky and unsafe to deploy the staff. Furthermore, when developing prototype we will be using the motor to mimic the plan as it is a key component of a plant. These motor normally operate at a 230 Volts which is risky and might not be safe for the group members as they do not have prior experience of dealing with higher voltage devices. Therefore, we have decide to use the low voltage dc motor (12V) in order to mitigate the risk and make it safe.

1. **Honesty**

Another ethical aspect related to our project is honesty. In this project, we are required to work equally and report the result precisely. We ensured it equal contribution by breaking down the project in different tasks and each of the group member assigned the tasks based on her area of expertise. We also consulted heavily with our supervisor to ensure the task is distributed equally and no one is burdened more than others. Furthermore, we intend to provide the experimental set up details and data so that other researchers can reproduce our work and verify our claims. A working prototype will help validate our claims.

1. **Accessibility of data**

Another safety concern arising in this project is due to possibility of accessibility of data by unauthorized person. The data collected is stored on a PC and an attack might cause information loss. A virus or hacker attack in the IoT based plant might have serious effects on human life. Therefore, we will make sure that we use an encrypted communication mechanism which is secured and only authorized personnel has access to data.

1. **Professional development**

This is a group project which requires a lot of collaboration between different group members. The group members possess different skills as they belonged to different departments as well they pursue different interest. But, during the course of development, they might need to develop a different skill which other group members is good at. As guided by the code of ethics, it is my ethical responsibility to share my skill and knowledge with the colleague and help them develop professionally.

1. **Societal implications**

This project is based on Internet of Things which is relatively new technology and society might not be aware of the implications as a result of deployment of this technology. Therefore, as an responsible professional engineer, it is our responsibility to study the impact of this technology and inform the society of the positive as well as negative impacts it might have on the society.

**Question 3: Impact of Design**

* **Global Impacts**

Positive: The proposed system will make life more convenient without the need of staff otherwise the organization will have to deploy the staff putting their life in danger. Also, automatic monitoring eliminate any chances of errors due to human involvement. Furthermore, the industries located in different parts of the world will be able to connect and share data globally for further analysis. It will help industries perform in a more effective and efficient manner. It will enhance the production by reducing the downtime of plant due to sudden failure, reduce the cost thus increasing the profit margins.

* **Environmental**

The use of remote monitoring system will reduce the energy expenditure which will result in reduce fuel consumption and less carbon emission. This help in reducing the global environment. Automatic data collection is more efficient, more reliable and more consistent than manual data collection. Also, automated logging of data results in paperless environment which is good for environment. This project will help in cutting waste, pollutants and greenhouse emissions, making our modern lives more sustainable over the long run.

This project involves the storage of excessive amount of data storage on the cloud which is stored on the servers increasing the amount of energy consumed to store this data. This excessive use of energy has negative impact on the environment. This also results in more usage of the batteries which end up in the waste which are harmful for the environment.

* **Economic**

The remote monitoring of the industrial plant is an effective and efficient method reducing not only operating cost but also down time. This results in reduced production cost and economic gains of the organization. Also, autonomous devices to sleep during inactive periods and work during active periods. This saves energy and in turn saves cost of providing energy to power devices.

This type of project will attract investments, create jobs in the IoT area, and increase imports or exports for such solutions. This will in turn push up economies and give rise to supporting industries.

* **Societal**

Since IoT is a relatively new technology and requires highly skilled worker for operation and maintenance. This will create new hi-tech jobs thus provide new jobs for the members of society and also guide it towards more hi-tech skill development.

On the other hand, automated systems could potentially reduce jobs, such as the traditional manual labor required to monitor manufacturing processes.

* **Health**

Positive: The employee in the hazardous area are going to be safe since they will control and monitor all the data remotely. Automated data collection is done without the involvement of humans which is perfectly safe and especially in this era of pandemic as it minimizes the human interaction and reduces the spreading of the disease.

This IoT based solution needs connectivity to the internet which normally achieved through Wi-Fi. Researchers have found that Wi-Fi can have harmful effects on human health and causes oxidative stress, neuropsychiatric effects including EEG changes, apoptosis, cellular DNA damage, endocrine changes, and calcium overload.