

REQUIREMENTS OF THE PROJECT

Hardware Requirements :

1. Piezoelectric Sensors/Generators:

- To convert kinetic energy from body movement into electrical energy.

2. Energy Harvesting Circuit:

- Rectifier Circuit: To convert AC voltage (from piezoelectric sensors) to DC.
- Capacitors: To smooth the output voltage.
- Voltage Regulator: To stabilize the output voltage for consistent charging.

3. Rechargeable Battery or Supercapacitor:

- To store the harvested energy for later use.
- Example: Lithium-ion battery or supercapacitor.

4. Wireless Charging Modules:

- Transmitter Module: Converts DC electricity into an electromagnetic field for wireless energy transfer (e.g., Qi wireless charging transmitter).
- Receiver Module: Attached to the small device to receive and convert the electromagnetic field back into electricity (e.g., Qi wireless charging receiver coil).

5. Microcontroller (Optional):

- To monitor and manage energy flow, battery status, and charging efficiency.
- Example: Arduino, ESP32, or Raspberry Pi Pico.

6. Wires and Connectors:

- For connecting components in the circuit.

7. Wearable Enclosure:

- To house the system and attach it to the body (e.g., wristband, shoe insole, or knee brace).

8. Small Electronic Device:

- A device capable of wireless charging (e.g., smartphone, smartwatch, or fitness tracker).

Software Requirements :

1. Circuit Design and Simulation Tools:

- KiCad or Eagle: For designing the energy harvesting and wireless charging circuit.
- Proteus or Multisim: For simulating the circuit before implementation.

2. Microcontroller Programming:

- Arduino IDE: For programming microcontrollers like Arduino or ESP32.
- Python or C/C++: For advanced energy management algorithms.

3. Data Monitoring and Visualization:

- MATLAB or Python (with libraries like Matplotlib): For analyzing and visualizing energy generation and consumption data.

4. Wireless Charging Protocol Libraries:

- Libraries for implementing Qi wireless charging standards (if using a programmable wireless charging module).

5. Power Management Software:

- Custom software to optimize energy flow, battery charging, and wireless transmission efficiency.

