

Correspondence Table: Concept vs. Model

Concept Element	SysML v2 Model Element	Description
Plantar Pressure Sensor	PlantarPressureSensor	Measures the pressure distribution on the user's foot.
Microcontroller (Data Processing Unit)	ESP32 (Microcontroller)	Handles data processing, AI-based gait analysis, and wireless communication (Bluetooth/Wi-Fi).
Wireless Communication (Bluetooth/Wi-Fi)	WirelessTransmitter and ESP32 (Wi-Fi/Bluetooth)	The WirelessTransmitter sends data to medical institutions or external systems, while the ESP32 manages wireless connectivity.
Battery (Power Supply)	LiPoBattery and PowerSupply	LiPoBattery provides power to the system, while PowerSupply manages and ensures continuous operation of all components.
Wearable Device (e.g., Fitbit, Apple Watch)	WearableDevice and WearableDeviceInterface	Represents the wearable device, which pairs with the insole to enhance performance. The WearableDeviceInterface facilitates communication between insole and wearable.
Enhanced Data Processing from Wearable	WearableDataProcessor	The WearableDataProcessor processes data from both the insole and wearable device for enhanced gait analysis and performance.

Pressure Data Storage	MemoryModule	Stores the collected pressure data history for later use and analysis.
Gait Analysis	DataProcessor and WearableDataProcessor	The DataProcessor performs AI-based gait analysis on pressure data, while the WearableDataProcessor enhances the performance using wearable data.
User Feedback (via Display or Alerts)	UserInterface	Displays feedback to the user, such as gait analysis results, alerts, or summary information.
Communication with Medical Institutions	MedicalInstitutionInterface	Facilitates data transfer to medical institutions for further analysis and monitoring.
Insole Fit (in the Footwear)	FootwearInterface	Ensures the insole fits securely and comfortably within the user's footwear.
Power Management	PowerManagement	Manages power consumption across all components, ensuring long battery life.
Pairing with Wearable Device	PairWithWearableDevice	Handles the process of pairing the smart insole with the wearable device to enhance the overall performance and gait analysis.
Enhanced Performance from Combined Data	EnhancedPerformance	Combines data from both the insole and wearable device to provide improved gait analysis and feedback.

Data Transmission to External Systems (Cloud/Medical)	TransmitData	Sends processed data (gait analysis results) to external systems or cloud storage, allowing medical professionals to access it for further analysis.
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