# **🤖 Skynetic – Giving Robots the Power to Feel**

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## **🧾 Introduction (What is Skynetic?)**

**Skynetic** is a smart robotic skin system that allows robots to **understand physical touch**. If you gently touch it, the robot lights up a **green LED**. If you slap it, a **red LED** glows instead. This is made possible by combining **flex sensors** (which detect bending) and a **pressure sensor** (which senses the force applied), all controlled by an **ESP32 microcontroller**.

It’s a step toward teaching machines how to recognise **human interaction**, not just commands, but **feelings through touch**.

## **🧰 What We Used**

* 🧠 **ESP32-S2-WROVER** – The brain of the system
* 🪢 **Flex Sensor** – Detects cloth movement when touched or slapped
* 🌡️ **MS5837 Pressure Sensor** – Measures pressure applied on the skin
* 🔀 **74HC4051 Multiplexer (MUX)** – Used to read multiple sensors through one pin
* 💡 **LEDs (Green & Red)** – Green for touch, Red for slap
* 🔧 **10kΩ & 220Ω Resistors** – For voltage divider and current limiting
* 🔌 **Breadboard and Jumper Wires** – To build the circuit

## **🛠️ How It Works**

1. A person touches or slaps the robot’s cloth-covered surface
2. The **flex sensor** bends, and the **pressure sensor** reads the force
3. The **ESP32** receives both values and checks:  
   * If pressure is low → **Green LED ON** (gentle touch)
   * If pressure is high → **Red LED ON** (slap)
4. The robot now knows the **type of touch** and responds

## **🌍 Applications**

* 🤝 **Human-Robot Interaction–Robots** that can understand human intent
* 🦿 **Prosthetics** – Artificial limbs that can sense handling pressure
* 🧸 **Smart Toys** – Toys that respond emotionally to children’s interaction
* 🏥 **Medical Robots** – Ensure safe and gentle human contact
* 🎓 **Engineering Projects** – Sensor-based learning tool for ECE students

## **✅ Advantages**

* 🛠️ Simple and budget-friendly
* 🔌 Expandable with multiple sensors
* 💡 Instant visual feedback
* 💾 Easy to program and update
* 🔧 Platform-independent

## **🚀 Why It Matters**

As robots become part of our everyday life, they need to understand more than just code — they need to recognise **human emotions and behaviour**. Skynetic gives robots the ability to feel, helping them become **safer, sensitive, and interactive**.

This project proves how **soft circuits can carry deep meaning** — it's not just about voltage and pressure, it's about connection.

## **🔄 Comparison**

| **🏭 Traditional Robots** | **🤖 Skynetic** |
| --- | --- |
| No sense of touch | Senses gentle and harsh touch |
| No feedback to the user | Gives a visual response |
| Complex or costly hardware | Made with basic ECE components |
| Doesn’t detect pressure | Uses flex + pressure sensing |

## **🎯 Conclusion**

With **Skynetic**, robots can finally **feel**. It’s not just about motion or intelligence anymore — it’s about building machines that can **sense** and **respond** like living beings. For B.Tech ECE students, this is more than a project — it’s a **glimpse of tomorrow’s human-aware technology**.

*"We didn’t just wire up sensors — we gave emotion to electronics."* *"Skynetic is where circuits meet sensitivity, and code learns compassion."*

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