

Team 17

Three Projects

Project 1: Adjustable Louver Based on Light Intensity

Concept:

A louver system that adjusts automatically according to changes in light intensity, maintaining the set optimal light level inside a room.

- **Sensor:** Light detection module
- **Controller:** Main control chip
- **Actuator:** Electric motor
- **Processor:** Controls the motor to adjust the louver based on the light sensor readings.

Specifications:

- The system processes light data from the sensor and adjusts the louver through the motor, controlled by the main chip.
- The project meets all safety standards, and the design will include documentation, PCB layout, and testing.
- The project will use at least 10% surface mount components and a 2-layer PCB for the circuitry.

Project 2: Room Humidity Regulator

Concept:

A system that automatically adjusts humidity levels in a room. It sprays water vapor when the humidity falls below a set threshold and stops when it reaches a balanced state.

- **Sensor:** Humidity sensor
- **Controller:** ESP32
- **Actuator:** Atomizer
- **Processor:** The ESP32 microcontroller processes the data from the humidity sensor and controls the atomizer to maintain the desired humidity.

Specifications:

- The system monitors and controls humidity in real-time using the sensor and atomizer.

- This project will also have at least 10% surface mount components and use a 2-layer PCB.
- All components will be documented and assembled according to project requirements.
- Live documentation will be maintained throughout the project.

Project 3: Backpack Shoulder Pressure Sensor

Concept:

A system integrated into a backpack's shoulder straps to monitor and detect uneven pressure distribution on the shoulders. The system helps users correct their posture by providing real-time haptic feedback.

- **Sensor:** Piezoelectric pressure sensors
- **Controller:** ESP32
- **Actuator:** Vibrating motor (provides feedback to alert the user)
- **Processor:** Monitors data from pressure sensors and activates the motor when a significant pressure difference is detected between the two straps.

CHOSE ONE

Our team discussed the feasibility, innovation, and practicality of these three solutions. Each solution has different characteristics and application scenarios, and each has its own advantages. After repeated discussions, we decided to use **Adjustable Louver Based on Light Intensity** project as the main body of the project. Because the design of this project is relatively simple and clear, and does not require too complicated debugging. It is more suitable to be developed as a basic project plan. At the same time, it means the project itself may lack certain innovation and difficulty to some extent, we may also add other environmental parameters, such as temperature and humidity sensors, in the subsequent improvement process. In this way, the system will not only adjust the blinds according to the light, but also adjust the opening and closing angle according to the room temperature to optimize the comfort of the room. For example, when the sun is strong and the temperature is high, the blinds automatically close to prevent overheating in the room, and it can automatically open at low temperatures to use the sun to increase the temperature. We may also introduce machine learning algorithms to enable the system to automatically adjust the blinds according to the user's daily usage habits and preferences. For example, it can learn over a period of time how much natural light the user likes in a certain period of time, and automatically set the opening and closing angle of the blinds under similar conditions. (But the difficulty may be greater) We will make improvements based on the specific situation.