

# MICROPROCESSORS

Victor Fernandez, Cesar Delgado, Jason Gutierrez

Final Project: Turn THAT Light On!

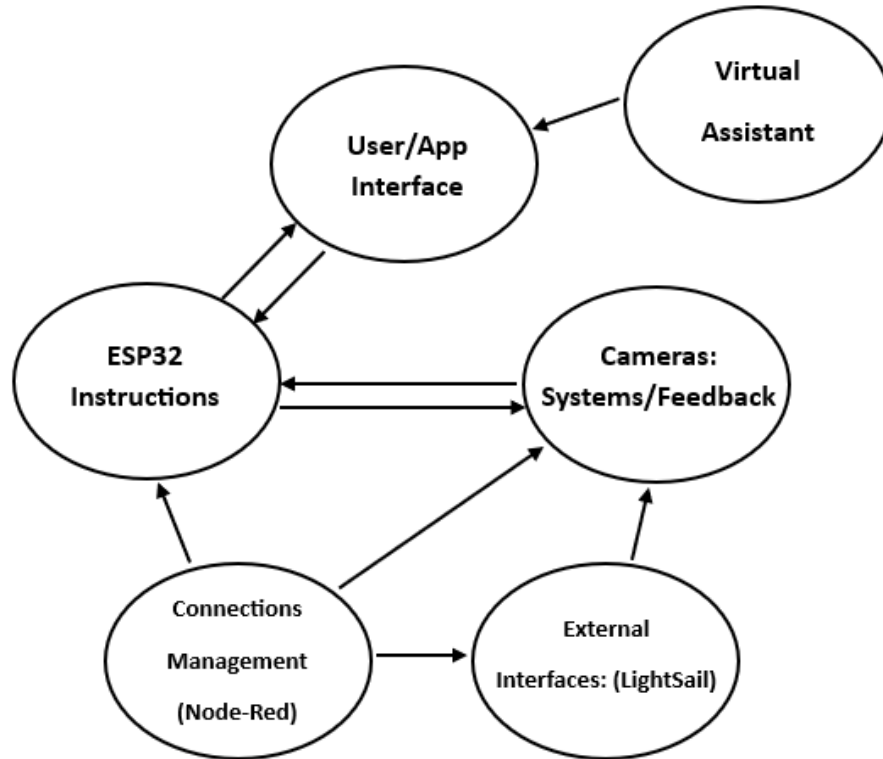
Architectural Design Plan

INEL4206-030

Luis B. Roa Pichardo

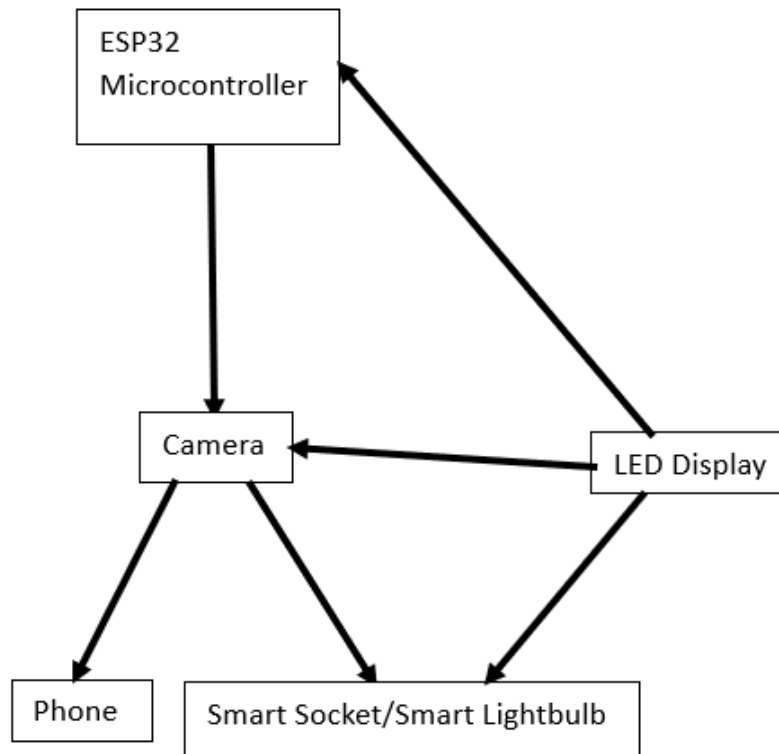
Marzo 24, 2023

### Logical Architecture



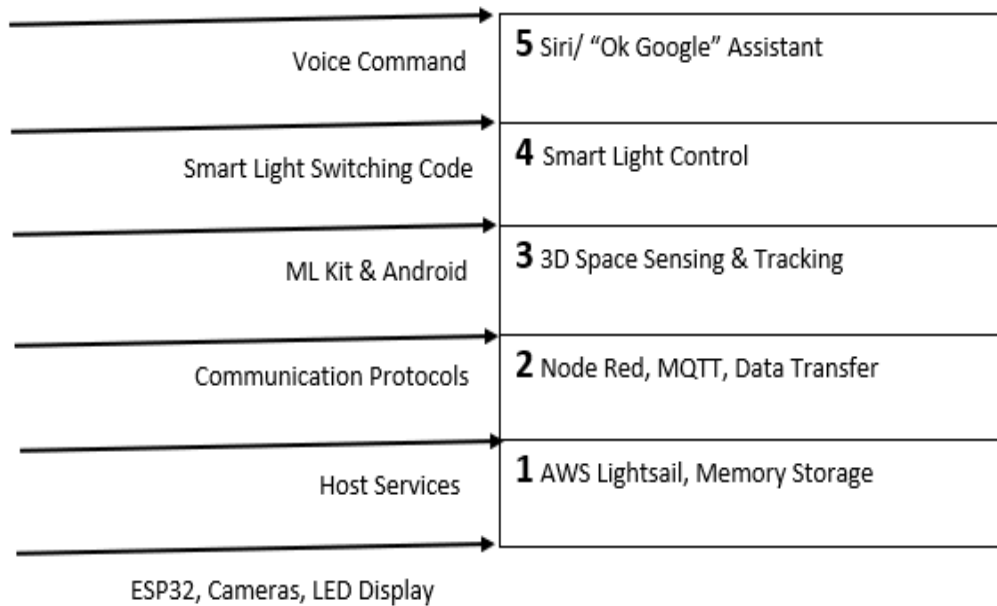
- **Virtual Assistant:** Google or Siri, will send commands to app.
- **User/App Interface:** App that will control voice commands from the user and will send the set of instructions given by the user to the ESP32.
- **ESP32 Instructions:** Instructions received will then be interpreted and sent to the different components.
- **Cameras System/Feedback:** System to detect and interpret user poses that will communicate with the ESP32 and other components.
- **Connections Management:** Will control or supervise connections between hardware components and APIs.
- **External Interfaces:** Internet/Cloud connections, manages all cloud interfaces.

### Physical Architecture



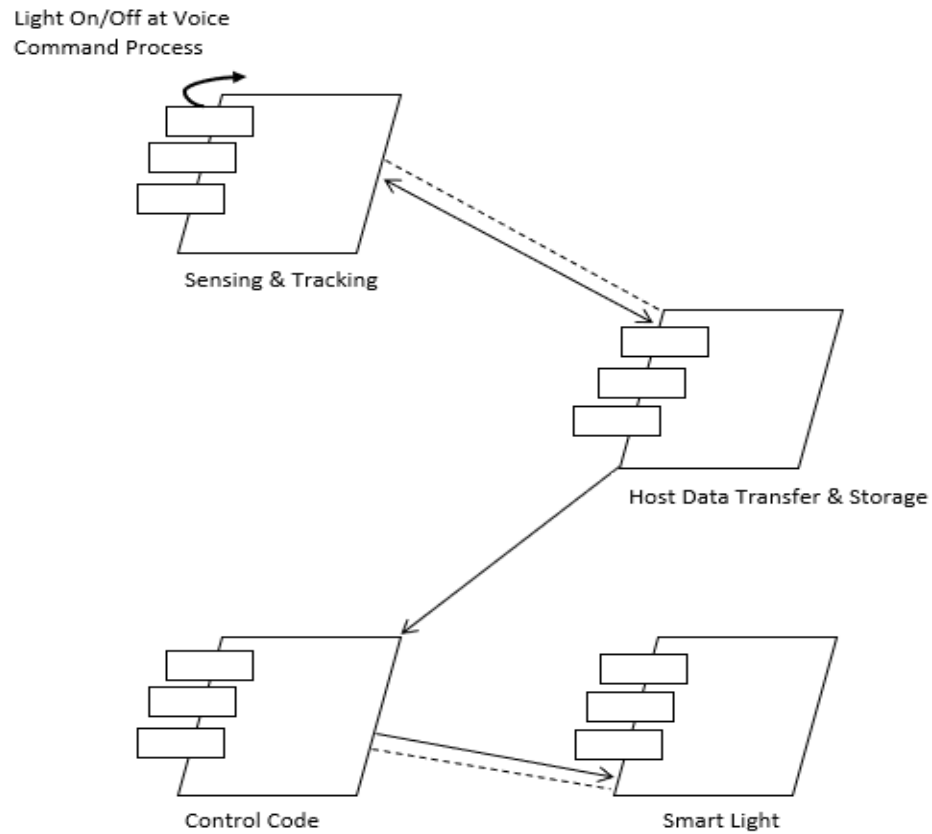
- ESP32: Microcontroller, allows for required real-world scenarios when communication with other components is established.
- Camera: One or multiple camera system that handles pose information when called for by phone component.
- Phone: Cellular device that begins general operation when it receives voice command.
- Smart Socket/Smart Lightbulb: Device that turns on when receiving corresponding pose information, depending on the nature of the aforementioned information.
- LED Display: Device that turns on or off depending on the efficiency and functionality of the various components in the system, working as a signal representing troubleshooting necessities or correct operation.

### *Development Architecture*



Layers 1 and 2 contain the general requirements for this project: a host server for data storage and transfer as well as general access to the cloud for ESP32. We can start to see the specific subsystems required for this project. At this level communication between the ESP32 and host is handled via MQTT protocol, while backend development is built with Node Red. Layers 3 & 4 are the essence of the project. By utilizing three-dimensional body tracking provided by ML Kit API, ESP32 can interpret data through implemented code and determine which light to turn on. Finally, Layer 5 contains the higher level of subsystem abstraction which is the triggering voice command issued via Siri or Ok Google assistants.

### **Process Architecture**



Body tracing is periodically performed once given voice command. At this event, positional data is fed to the host server where it is stored and sent to the next process. After receiving all the necessary information, the control code in the ESP32 determines which Smart Light to turn on, which terminates the Light On/Off at Voice Command Process.

### Scenario

