



CTIS - 477 System Engineering Project

Project Proposal Report

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CTIS
COMPUTER TECHNOLOGY AND
INFORMATION SYSTEMS

1. Project Name

- Project Name: A Smart Life and Home Security System
- Short Name and abbreviation: SLS

2. Project Subject and Contents

- SLS is a small Smart Home System that manages and tracks curtains, lights, temperature and motion in a given area.
- A user of SLS can automatically open and close a room curtains and lights, also they can monitor the rooms temperature and humidity.
- All hardware components will be connected to a breadboard to ease the hardware development process.
- An Open-source software names Node-Red will be used for the dashboard panel which controls the hardware
- The communication between the ESP8266 and the Node-RED software is achieved with the MQTT communication protocol.

3. Project Description

- SLS is a home automation system with small home security aspects.
- Aside from the Motion sensor all hardware is used for changing the conditions of a specified room. Like, opening and closing lights, opening and closing of curtains, checking for light levels for night and day cycles or for movie nights. So, whit the LDR SLS can adjust curtains automatically.
- The motions sensor will be used for security in the room or the house. Which dan can alert the user and open lights.
- SLS's main system components and functions are the flowing,
 - **Motion Sensor:** his sensor will send alerts to the dashboard and activate the LED connected to the circuit.
 - **LDR Sensor:** When the room becomes dark, the sensor will send a query to the dashboard and activate a motor (I assume that this is connected to a curtain or a similar object.) and activate the LED connected to the circuit.
 - **Temperature and Humidity Combo Sensor:** The data will be displayed in the dashboard.
 - **LED:** From the dashboard the user will be able to open and close the LED connected to the circuit.
 - **Motor:** From the dashboard the user will be able to activate the motor. (To move a curtain or a similar object)

3.1. References

- Interface PIR Sensor With NodeMCU - <https://www.instructables.com/Interface-PIR-Sensor-With-NodeMCU/>
- Interface DHT11 DHT22 w/ ESP8266 NodeMCU - <https://lastminuteengineers.com/esp8266-dht11-dht22-web-server-tutorial/>

- LDR to an ESP8266 - <https://www.chilids.be/blog/post/how-to-connect-a-photoresistor-or-light-dependant-resistor-to-an-esp8266-12e>
- ESP8266 Servo Motor Control - <https://circuits4you.com/2019/01/12/esp8266-servo-motor-control/>
- ESP8266 NodeMCU Projects - <https://randomnerdtutorials.com/projects-esp8266/>

3.2. Similar Systems and Literature survey

- **Smart Curtains:**
 - Turns existing curtains to a Smart Curtain - <https://slide.store/>
 - Smart Home Blinds <https://getkeego.com/>
 - Spikebot Curtain Device - <https://spikebot.io/spikebot-curtain-device/>
- **Smart Home Light:** Philips Hue lights and Xiaomi Mi Smart lights.
 - Smart Motion Detectors: Bosch Motion Detectors and SONOF Motion Sensors.
- **Software:** This software is used to combine different smart home automation vendors.
 - OpenHAB, Open-Source Home Automating Software - <http://www.openhab.org/>
 - PiDome, - <https://pidome.org/>
- **Literature**
 - NodeMCU V3 For Fast IoT Application Development
 - <https://www.researchgate.net/publication/328265730>
 - Taking MQTT and NodeMcu to IOT: Communication in Internet of Things
 - <https://doi.org/10.1016/j.procs.2018.05.126>

4. Project Schedule

Task	Assignee	Start Date	Duration	Due Date
Project Proposal Report	Levent Durdali	02 February 2021	6 Days	07 February 2021
Project Requirements Report	Levent Durdali	07 February 2021	22 Days	28 February 2021
Architecture/Design Report	Levent Durdali	28 February 2021	19 Days	18 March 2021
Development and Test Report	Levent Durdali	19 March 2021	18 Days	04 April 2021
• Hardware Development and Prototyping	-	19 March 2021	3 Days	21 March 2021
• Software Development for Dashboard and MQTT	-	20 March 2021	6 Days	25 March 2021
• Software MQTT and Hardware Connection	-	24 March 2021	5 Days	28 March 2021
• Final Testing and Bug fixing	-	27 March 2021	4 Days	31 March 2021
• Additional Functionally and Testing, Project Report	-	31 March 2021	4 Days	04 April 2021
Final Report	Levent Durdali	04 April 2021	24 Days	27 April 2021
Presentation	Levent Durdali	30 April 2021	5 Days	04 May 2021

5. Methods to be used

- During the development of this project, an Incremental Development Model will be used, since this project is going to have different sensors, hardware and software to develop, we can make incremental products. Inside each increment we can use a agile development

method. For programming, C/C++ will be used with Arduino IDE or VS Code Arduino extension.

- According to the specified dates in the project schedule the following reports will be submitted,
 - Project Proposal Report
 - Requirements Report
 - Architecture/Design Report
 - Development and Test Report
 - Final Project Report
 - Project Presentation
- **Technical issues:**
 - Not knowing electronics and electric diagrams.
 - Frying electronics.
 - Having very little electronic experience
- **For Electronic Design and Diagrams:** Fritzing will be used to make necessary diagrams

6. Estimated Cost and Effort

6.1. Hardware Cost

Name	Price
NodeMCU V2 ESP8266 Development Board	₺ 26.45
Medium size Breadboard	₺ 4.61
5 mm LDR Sensor	₺ 0.84
DHT11 Temperature and Humidity Sensor	₺ 7.30
HC-SR501 PIR Motion Detector	₺ 8.79
5mm LED	₺ 1,51
Tower Pro SG90 RC Mini (9gr) Servo Motor	₺ 10,21
Total	₺ 59.71

6.2. Effort Estimation

- There will be one developer,
 - Every week, the developer will spend approximately 4-5 hours for the project.
 - The project will be completed in 9 weeks according to my schedule.
 - Considering this, average work is about 40 (36-45) hours.
 - Estimated man hours in Turkey is **₺ 15,90**
 - Estimated labour cost is $40 \times 15,90 = \text{₺ } 639$

6.3. Software to be used

- Mosquitto for MQTT Connection
- Node-RED for building an IoT application and dashboard for IoT control.
- Arduino IDE or VS Code Arduino Integration.
- Some open-source libraires for sensor control.