Sylvanian Tech Family
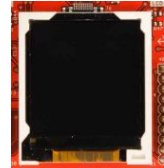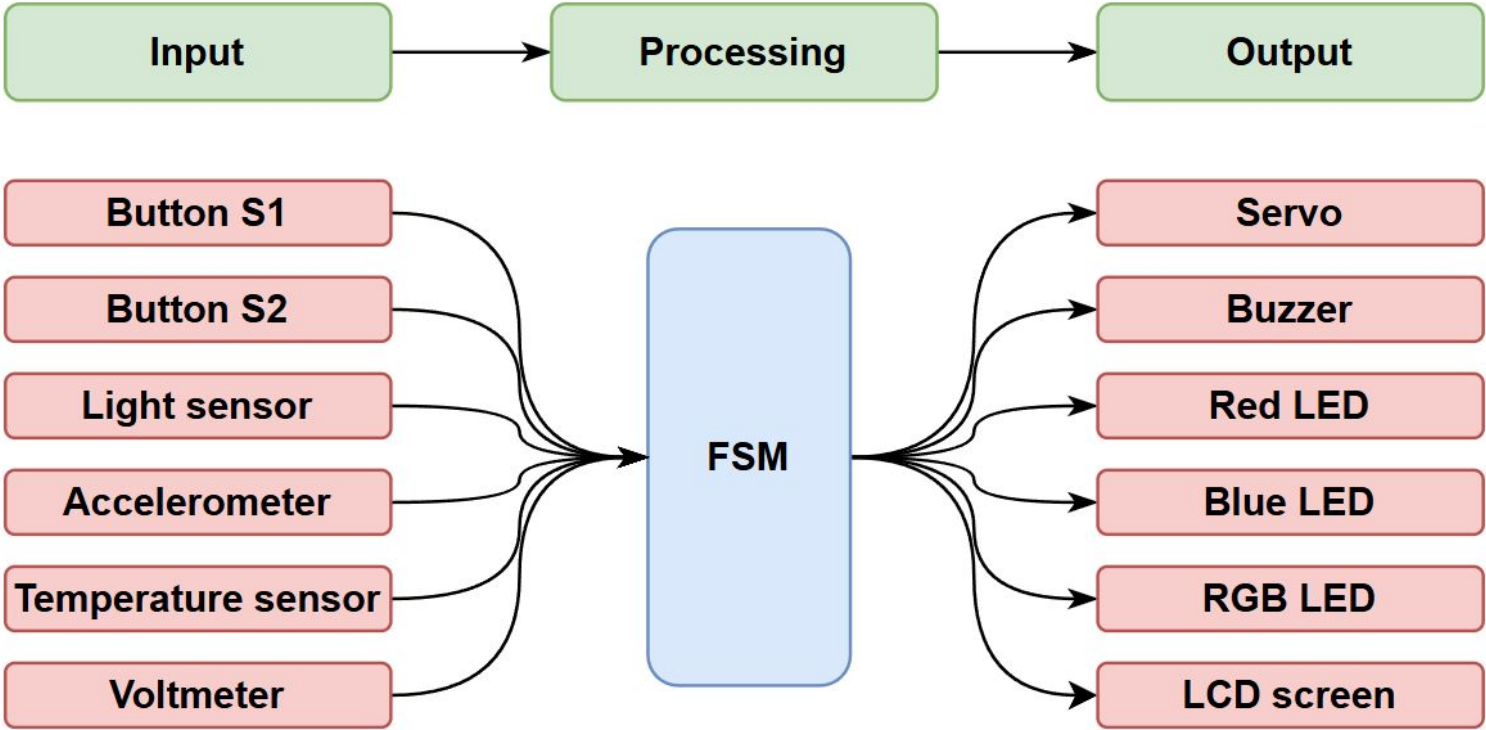
A Comprehensive Overview of Our System's Core Design and Implementation

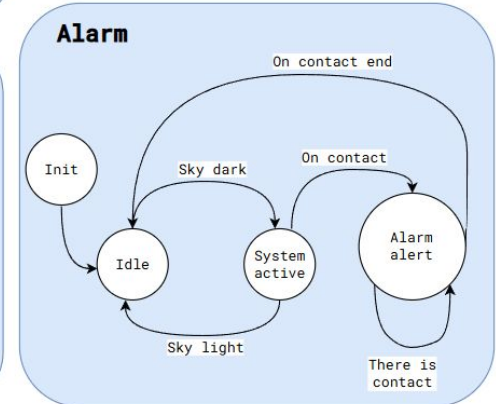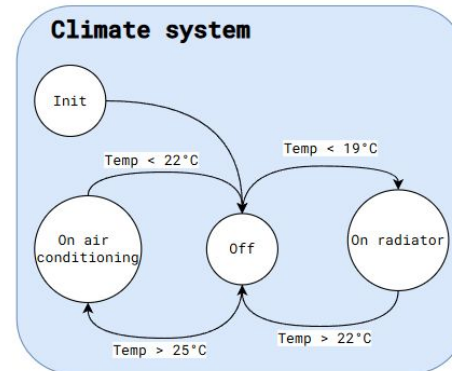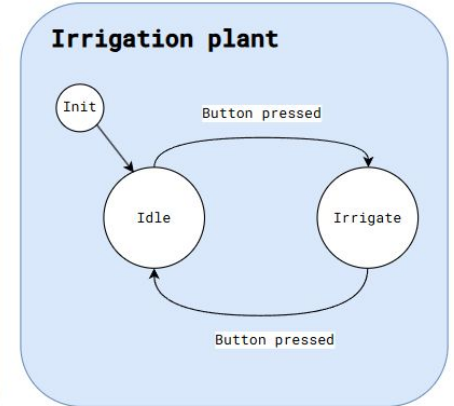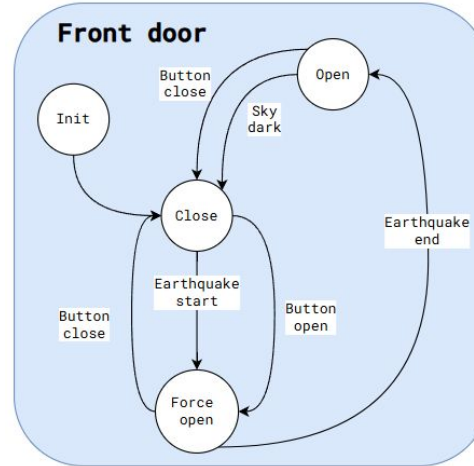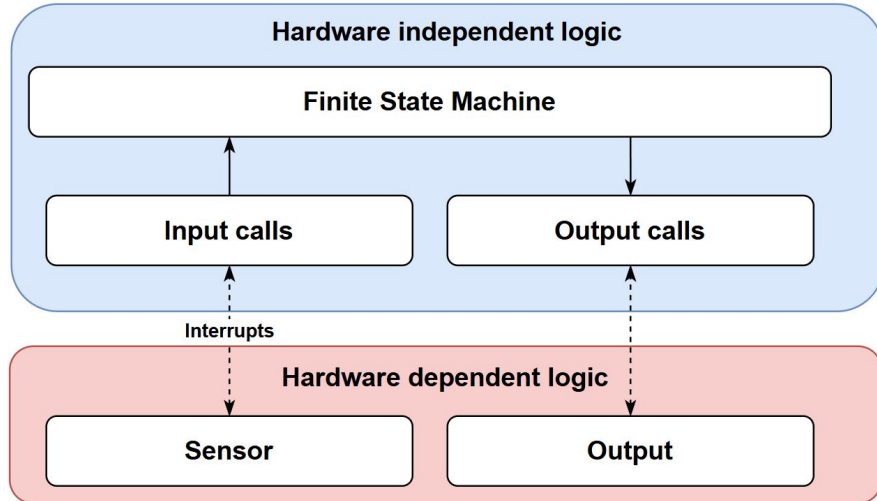Cristiano Berardo, Martina De Piccoli, Nicola Lovo, Matilde Prati

Hardware and Software

Software Architecture

Team Member Contributions

Team member	Macro area	Implemented	Used	Most rappresentative lines of code	Approx code lines
Nicola	Front door	-Servo + Timer A0 -Button S2 -Light sensor	-Servo + Timer A0 -Button S2 -Light sensor -Accelerometer -LCD Display	```c\n// Map 0-180 degrees to pwm pulse\nfloat dutyCycle = SERVO_MIN_DUTY_CYCLE + ((angle /\n180.0f) * (SERVO_MAX_DUTY_CYCLE-SERVO_MIN_DUTY_CYCLE));\n\n// Update the PWM duty cycle\nMAP_Timer_A_setCompareValue(TIMER_A0_BASE,\nTIMER_A_CAPTURECOMPARE_REGISTER_2, (uint16_t)dutyCycle);\n```	232
Matilde	Climate system	-Temperature sensor -RGB led	-Temperature sensor -RGB led -LCD Display	```c\nfloat tempFarenheit = TMP006_getTemp();\nfloat tempC = (tempFarenheit - 32) * 5.0/9.0;\n```	227
Martina	Irrigation system	-Blue led -Button S1 -Accelerometer + ADC	-Blue led -Button S1 -LCD Display	```c\nresultsBuffer[0] = ADC14_getResult(ADC_MEM0); // X-axis\nresultsBuffer[1] = ADC14_getResult(ADC_MEM1); // Y-axis\nresultsBuffer[2] = ADC14_getResult(ADC_MEM2); // Z-axis\n// Accelerometer stats reading\naccelerometer_on_read(resultsBuffer);\n```	239
Cristiano	Alarm	-Buzzer + Timer A0 -Red led -Voltmeter	-Buzzer + Timer A0 -Red led -Light sensor -Voltmeter -LCD Display	```c\nreturn GPIO_getInputPinValue(ALLIGATOR_CLIP_PORT,\nALLIGATOR_CLIP_PIN) == GPIO_INPUT_PIN_LOW;\n```	270

Testing

Testing Methods:

<u>Assert MACRO</u>: Each team member tested their FSM using the assert.h library.

<u>Black-Box</u>: Each team member tested the HW dependent part as a black-box, assessing the correctness of the result.

```
assert(door_current_state == DOOR_STATE_OPEN);
run_door_fsm();

door_event_skyDark();
assert(door_current_state == DOOR_STATE_CLOSE);
run_door_fsm();
```

Challenges and Solution:

<u>Accelerometer:</u> it didn't work properly on the first MCU we used, displaying corrupted data

<u>Door servo</u>: the duty cycle slightly varies from the datasheet, so it needed a little bit of tweaking before working properly

<u>Voltmeter</u>: has been a challenge to figure out how it works. In the end, it is quite similar to a push-button

Conclusion and Future Work
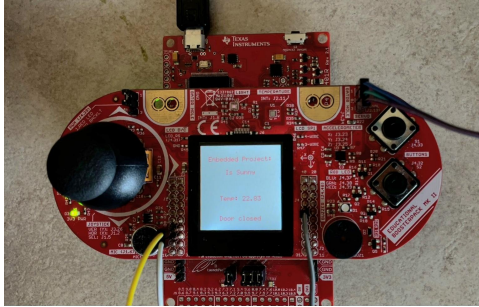
Conclusion:
The system has achieved the desired goals, achieving efficient integration of hardware and software.

Future Improvements:
1. implements sensor data saving through a connection to MongoDb
2. web app and bot telegram to monitor the real-time status of the house

Thanks for the attention!