

**T.C.
DOKUZ EYLUL UNIVERSITY**

**FACULTY OF
ENGINEERING**

**DEPARTMENT OF
COMPUTER ENGINEERING**

**2022 – 2023
SPRING SEMESTER**

**CME 3208
PRINCIPLES OF
EMBEDDED SYSTEMS**

**LAB 6:
LIGHT SENSOR**

**DUE DATE:
23:55 – 18.04.2023**

In this lab, you are asked to create an automatic light that activates when the environment gets dark enough. For this purpose use a LED to represent the light, a light sensor to detect environment light intensity (e.g. LDR 5mm Light Sensor) and Arduino IDE serial monitor to print out light sensor value and LED status.

The light sensor might give results ranging from 0 to 800 or 1000. Test your light sensor to check which values it outputs. When you established possible lowest, highest and median point (e.g. possibly 400 or 500), you could try to assign median point for light activation, if the environment light value is higher than this median point, the LED is turned off and when it is lower, the LED is turned on. You can try to set this median point slightly lower than current room light density, to make state change easier.

You are also required to output current sensor reading and LED status to serial monitor. An example output is given below.

LIGHT SENSOR: 600
LED STATUS: OFF

LIGHT SENSOR: 300
LED STATUS: ON

LIGHT SENSOR: 400
LED STATUS: ON

LIGHT SENSOR: 800
LED STATUS: OFF

You should create two global variables to manage your program. One is LED activation value to check against the sensor value and other is the time between serial monitor outputs (e.g. if it is 1000 ms, every one second a new output is printed). Take care that your program should not be sleeping between serial monitor output times, it should be active and respond to light changes immediately. An example of these global variables are given below.

```
int LED_ACTIVATION_VALUE      = 500;  
int SERIAL_OUTPUT_FREQUENCY = 500;
```

Try to make your circuit elements as distant as possible from each other and make sure there are no jumper wires over circuit elements that prevent the correct working of sensors or other input devices.

UPLOAD REQUIREMENTS:

You are required to upload three different files for this assignment. First is a text file that contains your source code for your circuit. Second is a Tinkercad screenshot showing your circuit after your design is finished. Third is a video file showing your circuit that has been created using lab supplies. Only one of the group members can make an upload, there is no requirement for all members to do a separate upload of same files.

For your video, you are expected to introduce yourself and your teammates, showing your student IDs in video too. If your group are working online rather than meeting in real life, you do not have to show the ID cards of students who are not physically present.

You are also expected to explain your circuit in a brief but complete manner and show its execution. This video should not be too long (a maximum of 3 to 5 minutes is acceptable) and should not be too large otherwise you will not be able to upload to Sakai (check the maximum allowed file size for upload to Sakai). You should also consider choosing resolution 720p over 1080p or larger for smaller file size (make sure your circuit is still visible and understandable over this resolution). You can also change your video format to a more space efficient one.

You should show the effects of changing every global variable that is mentioned above in your video. Again, please do not consider too many different values to make a too detailed video, just show the effect of changing that particular global variable.

If you experience problems with your circuit and cannot make it work, show your design in Tinkercad and your circuit at the same and explain what is the problem and what might be causing it in your opinion.

The naming of your files should follow the format below for 3 person groups. For 2 or 4 person groups just write 2 or 4 student numbers in ascending order. You should write your group numbers with one leading zero if it is between 1 and 9, normally for 10 and above.

The file extension for screenshot (Tinkercad) and video does not have to be “jpg” and “mp4”, you can use other formats as well like “png” or “mkv” or etc. However, make sure you use commonly used image and video formats, if we cannot open it on our computers, your grade related to them will be zero. In addition your source code file extension could be either “c” or “ino”, do not leave it as “txt”.

Do not “zip” or “rar” requested files and upload them. It is not necessary and it makes it harder for us to evaluate your assignments. Please upload 3 files as they are without compressing them to a single file.

FORMAT:

GROUP_<group_number>_<student_number_1>_<student_number_2>_<student_number_3>_CODE.c

GROUP_<group_number>_<student_number_1>_<student_number_2>_<student_number_3>_TINKERCAD.jpg

GROUP_<group_number>_<student_number_1>_<student_number_2>_<student_number_3>_VIDEO.mp4

EXAMPLE:

GROUP_01_2023510123_2023510124_2023510125_CODE.c

GROUP_01_2023510123_2023510124_2023510125_TINKERCAD.jpg

GROUP_01_2023510123_2023510124_2023510125_VIDEO.mp4

You are expected to write your own code for algorithms instead of using an available method for calculations. If you use such as a method that makes this assignment trivial to code, your grade for coding will be zero.

Your uploaded source codes (as well as your circuit design) will be checked for cheating and plagiarism. If cheating is detected, your entire assignment will be graded zero. If you or other students copy your code from an online source rather than writing it yourself, it will be considered as cheating as well.

Make sure that you upload your correct assignment to correct upload section. If you accidentally upload another assignment (from another class for example) or to an incorrect upload (other section's upload), it will be considered as not turned in and it will be graded as zero. Worst of all, you will only realize it after grades are published and it will be too late to fix it.

If you have any questions or problems regarding this lab paper, you can ask about it in our lab sessions. If you wish, you can also ask it in class forums or assignment page comments. If you send an email and if your question is answered, please share this information with other students to prevent asking of the same question again and again.

Your assignment will be open for upload until 23:55, 19.04.2023. This is done to allow students who may experience extreme problems (no Internet or electricity, computer crash or failure, etc.) and miss the deadline as a result. This one day extension will allow them to upload. If you are still unable to upload, send us an email informing your situation and at the same time, try everything you can to make your assignment upload.

Lastly, please do not forget to click "Submit" button after you upload your assignment files. If you do not, even though your files are uploaded to Sakai, you are labeled as "No Submission" and ignored when we try to download your assignments, making your uploaded files invisible to us, leading us to assume you did not make an assignment submission.

GOOD LUCK TO YOU ALL!