IoT Technical Report – Team MaPaY

Marion Burg - Pierre Corbay - Aymeric Fröhlicher

Description of the project:

Everybody has once faced the situation where you go to a shop and you have to find a slot in the parking. But the parking is huge and you don't know where there is an aivailable slot. Thanks to our solution, this won't happen anymore! You will know how many slots are available in the parking before entering, and you will be directed to the available slots thanks to some LEDs.

State-of-the-art:

In order to propose the most adapted solution, we have studied many already existing solutions.

One of thoses solutions is proposed by TTS Parking. It consists in an interface which shows the number of places in the parking.

Accor Solutions also proposes a solution where you have a light above the available slots, which indicates to the driver where he can park.

All the other solutions are pretty similar from the ones explained above. We didin't find an exact price but it varies according to the number of slots in the parking. The bigger the parking is, the higher the price will be.

To distinguish ourselves from the existing propositions, we decided to add a light system which will show in which part of the parking are the available slots. It will avoid driving across all the parking to find a slot.

Description of our IoT-based solution and what makes it better than other solutions:

For our solution, we will create a smart parking. At the entrance of the parking, a digital display will be placed to inform car drivers about the remaining slots.

If the parking is full, the parking barrier will stay closed. In the other case, the LCD display at the parking entrance will show the slot number which is available and the driver will be guided by our led system.

Drivers will save time because we all know big parkings where we're looking for a slot for a long time.

When a car approaches the entrance of the parking, an IR sensor / ultrasonic sensor will detect it. Only if some parking slots remain free, the parking barrier will open (servo motor) and let the car enter.

We will count the number of cars entering and going out of the parking. IR sensors will be placed beside each slot to know if the slot is available or not.

We are going to connect everything with the Arduino UNO board.
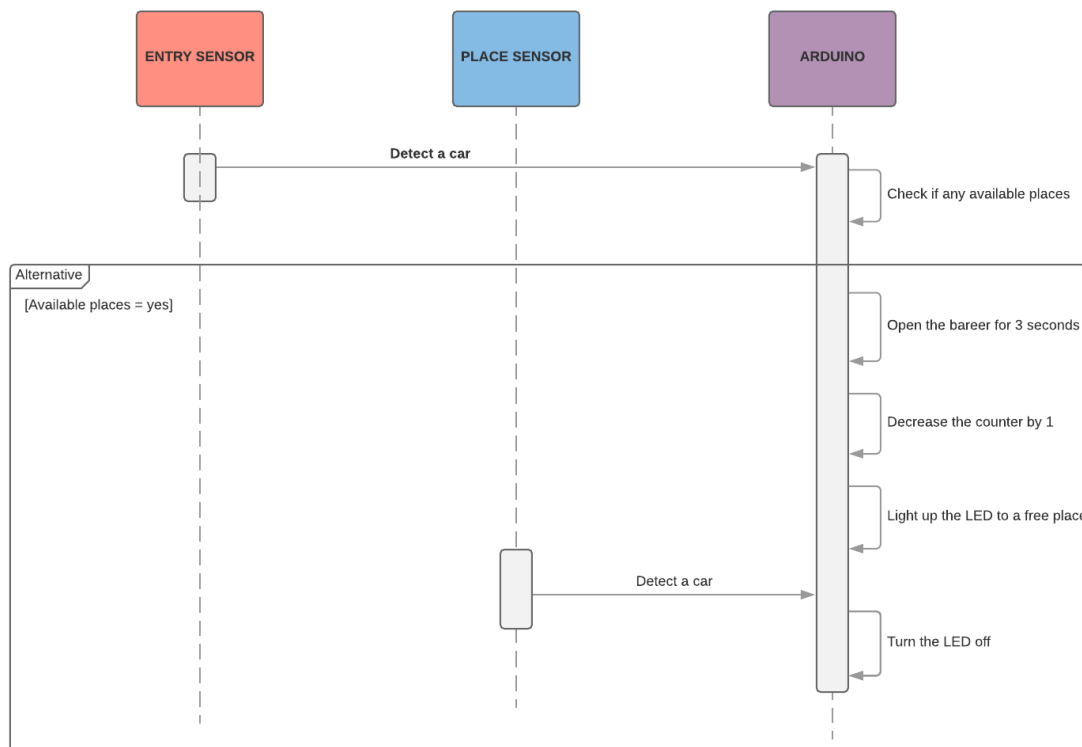
A global schema:
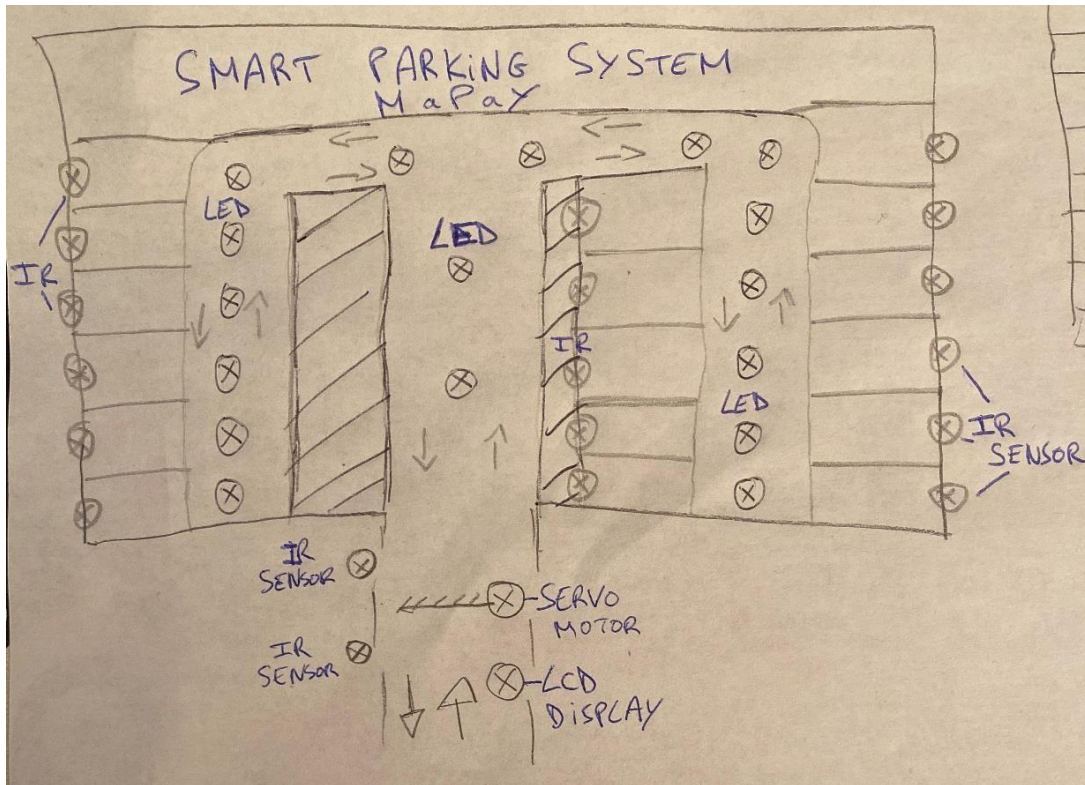
UML diagrams:

In order to help us realizing our solution and to define it precisely, we did some activity and sequence diagrams. The first ones explain the scenario when a car wants to enter in the parking, and the second ones describe the situation where a car exits the parking.
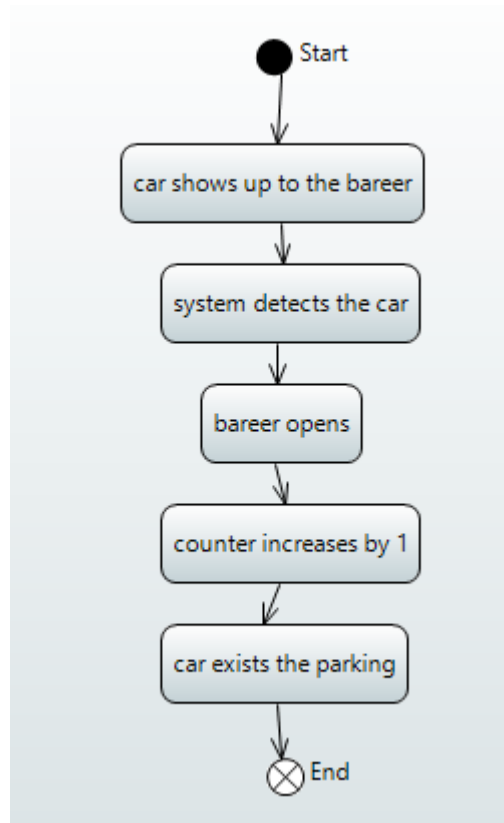
Activity diagram for the situation where a car enters the parking
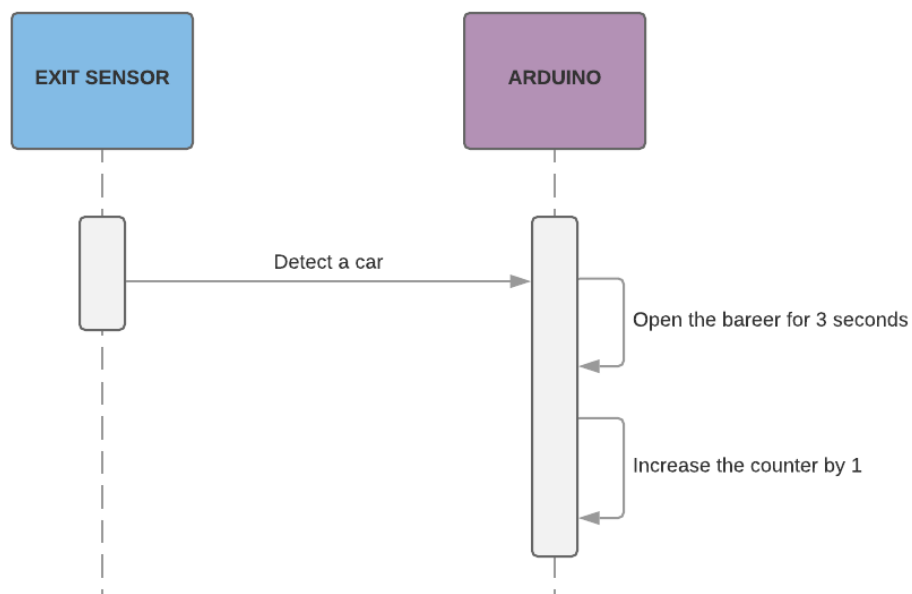
Activity diagram for the situation where a car enters the parking
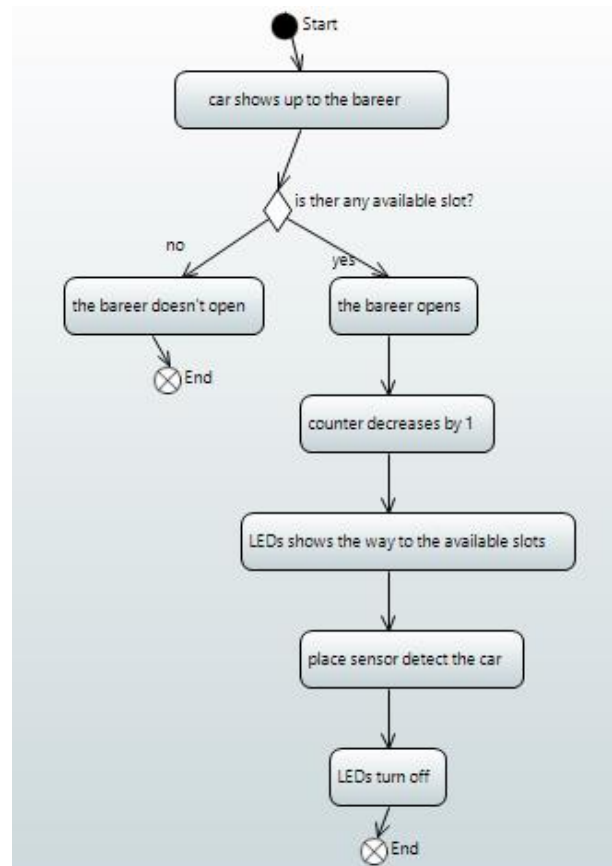
Activity diagram for the situation where a car exits the parking

EXIT DIAGRAM

Marion | December 20, 2019

Sequence diagram for the situation where a car exits the parking

Components list:

- Arduino Mega board used to link all the component together. We had one.
- IR/ultrasonic/proximity sensors used to detect cars on each slots of the

parking.

https://www.amazon.fr/gp/product/B071WG3F4P/ref=ppx_yo_dt_b_asin_title_o

03_s00?ie=UTF8&psc=1&fbclid=IwAR0HyV3xO98TulG1i_aCTM3CiORLJe9W27jIOd

BhRpgv0skZLW7-yQaYRgg

- LED used to indicate the way where there are free slots. Provided in the

Arduino box.

- Resistors used with the led and the servo motor. Provided in the Arduino box.
- Breadboard used to connect all the element easily. Provided in the Arduino box.
- Servo Motor used to open the fence on the enter or exit of the parking. Provided in the Arduino box.
- LCD display used to display the number of remaining places in the parking.
- For the model we will use some paper or wood or cardboard to make the fence and the slots.
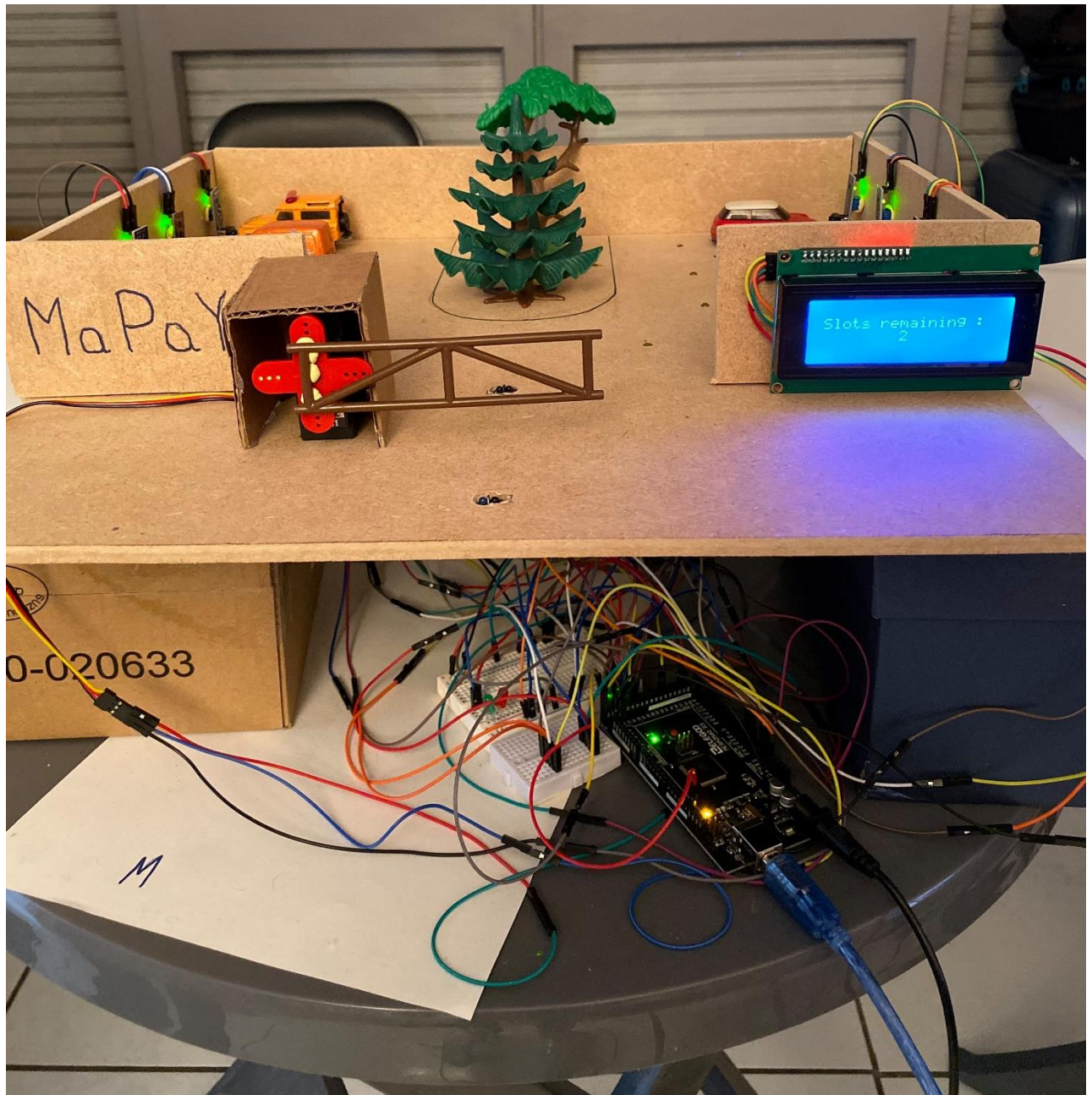
Hardware design:

We realized a Fritzing schema with the components we used before doing the model. We only represented one item for each component but for the model we used 8 LED and 8 IR sensors (6 for the places, 1 for the entry, and 1 for the exit).
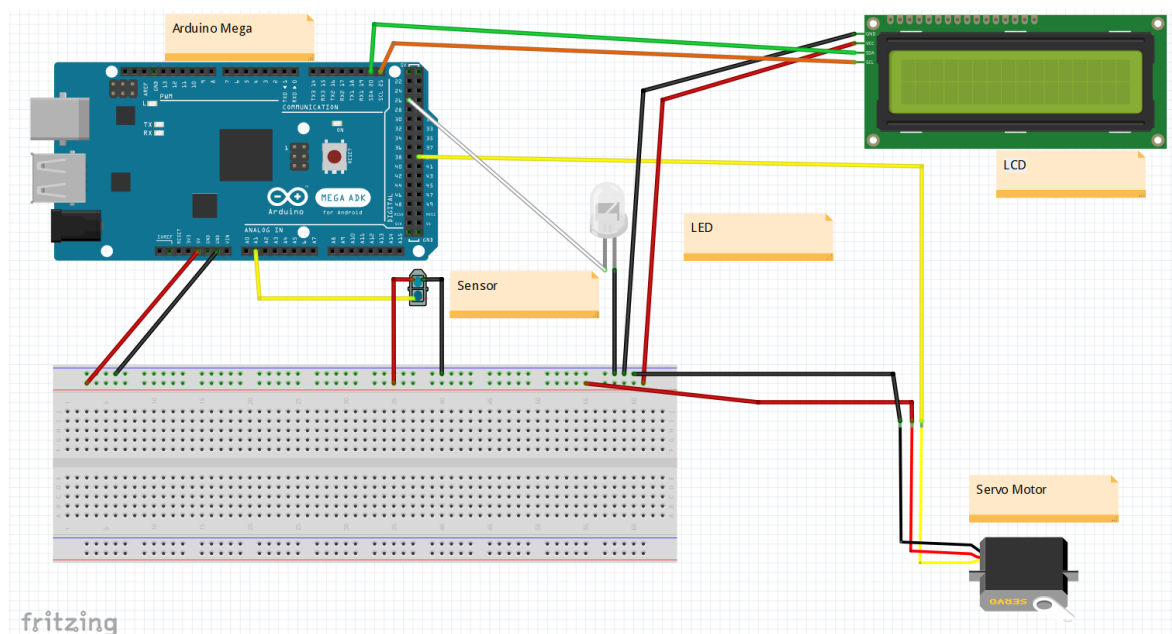
Final model:

Gantt diagram:

TASK NAME	START DATE	DAY OF MONTH*	END DATE	DURATION* (WORK DAYS)	DAYS COMPLETE*	DAYS REMAINING*	TEAM MEMBER	PERCENT COMPLETE
First phase								
Brainstorming	9/24	0	10/3	10	10	0	ALL	100%
Description of the problem	10/3	9	10/8	6	6	0	Aymeric	100%
State of the art	10/3	9	10/8	6	6	0	Marion	100%
Norms and regulations	10/3	9	10/8	6	6	0	Marion	100%
Description of our IoT-based solution	10/3	9	10/8	6	6	0	Pierre	100%
Construction of the Gantt Chart	10/3	9	10/8	6	6	0	Aymeric/Pierre	100%
PowerPoint Presentation	10/8	14	10/11	4	4	0	ALL	100%
Second phase								
Components list	10/12	18	10/23	12	12	0	Aymeric	100%
UML diagrams	10/12	18	10/23	12	12	0	Marion	100%
Hardware design	10/12	18	10/23	12	12	0	Aymeric	100%
Third phase								
Order of the material	10/26	32	10/27	2	2	0	Aymeric/Pierre	100%
Conception of the model	10/30	36	11/15	17	17	0	ALL	100%
Wire management	11/15	52	11/18	4	4	0	Aymeric	100%
Arduino programming	10/30	36	12/1	33	33	0	Pierre	100%
Fourth phase								
Writing of the report	11/25	62	12/15	21	21	0	ALL	100%
Filming the video	12/5	72	12/5	1	1	0	Aymeric/Pierre	100%
Editing the video	12/5	72	12/10	6	6	0	Pierre	100%
PowerPoint Presentation	12/12	79	12/20	9	9	0	ALL	100%