# Car Counting System

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1. An explanation of the original design problem or need that the design solves

   We want to be able to develop a remote camera system that can provide the comfort of safety or information gathering to the target audience. This information will be useful for the entire street as they will be able to split upkeep costs evenly.The target audience for this project would be the Project Partner as well as the Public Audience. This project is to create a remote camera system that automatically identifies cars observed. When a car is found in an image, it is identified and logged. The function of Car Counting project is to record the number of vehicles passing by a designated place and the frequency of the same vehicle passing by. Project partners need to process these data visually. So, the project team decided to visualize the data in the form of web pages. And the data will be sent to the project partners by email.

2. A narrative explanation of how you approached the project as a team, including development phases and ongoing evaluation and revision to the design.

   This project involves two groups of people with different majors. One group are the Computer Science students and the other is the Electrical Engineering students. Both students share similar interests and by working together, it completes the project. The CS students will provide the code that detects the license plate of the car as well as capture the plate details, while the ECE students will provide the enclosure, sensors, and cameras that will capture the license plate. In the development process, due to the time difference between the team members, all the team work is completed before the deadline. And all the meeting notes were put into the meeting file which are written in the shared document. It is now in the final stage of the project and is in the process of evaluating and modifying the design. Everyone in our group is putting forward their own

ideas and discussing with the group members. Different people have different ideas, so team members correctly understand and listen to everyone's opinions, in order to promote the development of the team.

3. The project timeline image

| Course deadline | Project goals | Member | Task | Benchmarks |
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| November 12 | Project Charter<br>Project Partner Update for Week 7 | Team | Complete Assignment | Complete assignment through rubric guidelines |
| November 17 | Be able to take picture on ESP 32 | Ben | Receive ESP32 with camera and wire it. Take a few pictures to test. | ESP32 is able to take a picture and save it to the SD card which can be viewed on a computer/phone |
| November 18 | Instructor System Architecture Meeting<br>Teamwork Reflection Paper<br>Instructor System Architecture Meeting | Team | Complete Assignments | Complete assignment through rubric guidelines |
| November 18 | Biweekly Progress Video | Team | Record each team members updates | Complete assignment through rubric guidelines |
| November 18 | Test | Zan | Find a useful Improvement | Prove the detect method works well |
| November 18 | Sensor/PCB | Earth | Choose a type of sensor will be used | Approval from Project Partner |

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| | | | to sense if a car is coming. Design a possible PCB for tech demonstration | |
| November 18 | Improve visualization | Yang | Plan web page structure and improve font size. | Improve styling |
| November 25 | Block Diagram Engineering Requirements | Team | Complete Assignments | Complete assignment through rubric guidelines |
| November 25 | Sending email function | Yang | Design sending email interface, to achieve manual input of mail content and send. | The user was able to receive the email successfully from numberplate@163.com |
| November 25 | program | Zan | Make the program automatically run And Decide the method we gonna use to transform the data between yang's block | Show the works |
| November 25 | ESP wifi setup | Ben | Write code for server that hosts the images the ESP32 will take | Be able to connect to server with ESP32 |
| December 2 | Biweekly Progress Video Project Partner Update Block Validation | Team | Complete Assignments | Complete assignment through rubric guidelines |
| December 2 | Technical Demonstration Preparation | Ben | Make sure a server is available to send the pictures the ESP32 camera takes to | Must be able to see a list of the pictures the camera took and automatically uploaded. |

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| December 3 | Technical Demonstration | Earth | Complete Technical Demonstration to T.A showing power and sensor | Complete Demonstration from TA and receive feedback |
| December 3 | Technical Demonstration | Zan | Complete Technical Demonstration to show the automatically recognition process and store the useful information in order to prepare for the next step data connection | Get feedback Decide to use which version. |
| December 3 | Technical Demonstration | Yang | Complete all functions of the web page | Ensure that all functions of the web page work successfully |
| December 3 | Technical Demonstration | Ben | Demonstrate ESP32 and camera and server. | Complete demonstration according to guidelines. |
| 2021 January 21 | Block Validation1 | Team | In this process, timely discuss with the team members and ensure that the follow-up connection can be carried out smoothly. | Each member of the group completes his own block. |
| January 30 | Block Check-Off 1 | Team | In this process, timely discuss with the team members and ensure that the follow-up connection can be carried out smoothly. | Each member of the group completes his own block. |
| February 11 | Block Validation2 | Team | In this process, timely discuss with the team members | Each member of the group completes his own |

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| | | | and ensure that the follow-up connection can be carried out smoothly. | block. |
| February 21 | Block Check-Off 2 | Team | In this process, timely discuss with the team members and ensure that the follow-up connection can be carried out smoothly. | Each member of the group completes his own block. |
| February 28 | Block Validation3 | Team | In this process, timely discuss with the team members and ensure that the follow-up connection can be carried out smoothly. | Each member of the group completes his own block. |
| March 14 | Block Check-Off 3 | Team | In this process, timely discuss with the team members and ensure that the follow-up connection can be carried out smoothly. | Each member of the group completes his own block. |

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| April 3 | Test Wifi Distance |
| April 10 | Solder headers to PCB |
| April 24 | Check size for initial system testing<br>Finish Email automation for checkoff<br>Prove camera works for checkoff |
| May 1 | Ben and Earth connect for physical components for testing |
| May 22 | Ben and Yang test POST request together<br>Optimize camera and PIR for computer vision (angle, distance etc.) |

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| | Testing for pictures sent through system |
| May 29 | Initial full system check<br>Finish anything that is not done and put it together |
| June 5 | Fix anything that went wrong during initial system check |
| June 10 | Finish all testing and be ready to present work! |

4. Key lessons you learned from the project as a team

In this team project, our team members come from different majors, so we learned a lot of knowledge that we didn't touch before. More importantly, we can realize the importance of teamwork. The real advantage of a team is that all team members know the importance of the team and strive to be the best. This is a really good team. The relationship between people is mutual, quarrel can only reduce work efficiency, only cooperate with each other, teamwork, can common prosperity. We should be calm when we encounter things, especially when we encounter problems and contradictions, we should be rational and not impulsive. Impulsive can not solve the problem, but will make the problem worse. In the end, the whole team will suffer losses. And you can't impose your own ideas on others at any time. When you encounter problems, you should think about it from the perspective of the other party. In this way, you will understand the players better. For example, in the module connection work, computer students think that the SDK is a good method, but ECE students found that the SDK can not be used in esp32.

As a member of the team, each team member should actively help others and cooperate with the work of the whole team on the basis of their own work. Team cooperation is helpful to improve the overall efficiency of enterprises. By carrying forward the spirit of teamwork and strengthening the construction of teamwork, we can further save internal friction. If it's done by individuals, it's time-consuming and laborious. In

terms of efficiency, the team should have more advantages! Team cooperation is to reasonably mobilize people's wisdom, strength, experience and other resources, so as to produce the largest scale benefits. It is expressed in the formula of economics as: 1 + 1 > 2 mode. Team cooperation is more conducive to improving the efficiency of decision-making. This team is different from the general group, the number of our team is relatively small, which helps to reduce the lack of information in the process of transmission, is conducive to the communication between team members, and is conducive to improving the intention of members to participate in team decision-making. Through teamwork, we can create a working atmosphere, make each team member have a sense of belonging, and help to improve the team members' dedication and efficiency. Through team cooperation, it can stimulate the learning motivation of team members and improve the overall potential of the team.