# Project Summary

ECE 342 (Junior Design 2) Temp 6
Contactless Temperature Sensor
Cole Ferguson, Connor Owen, Junjie Sun

The original design requirements for this project were to make a temperature scanner with an accuracy of +/- 1 degree Fahrenheit. It needed to alert the user if they have a fever, which was decided to be a sound and display alert when the user had a temperature higher than 100.4 degrees Fahrenheit. The system must be contactless, meaning the user should be able to operate the system without touching it. The system must also automatically record all users and their temperatures for at least 24 hours. The last design requirement was that the system should be intuitive, meaning the system should be easy for users to operate and no outside information is needed. Additionally, we decided that our system needed further design requirements. We wanted our system to be portable. This meant the completed system would weigh less than 5 lbs and be smaller than 1x1 feet. We also decided that the system should have a sleep mode to save power. If there is no user interaction after 5 minutes, the system will shut itself off.

We approached this project with the idea that the system would be self contained. We broke up the system development into three stages: design phase, build phase, and test phase. During the design phase, we researched components that would be useful for the system. We discovered, and later implemented, a proximity sensor, an IR temperature sensor, a microcontroller, a LCD display, and a microSD card adapter. The proximity sensor would be used for waking up the system and instructing the user how far to stand from the device. The IR temperature sensor would read the temperature values of the user. The microcontroller would be used to perform all data collection, calculations, time tracking, data processing and transmission, display driver functionality, and sleep and standby capabilities. The LCD screen would display all information to the user, and the microSD card adapter would be used to log user information, i.e. temperature and a timestamp. A PCB and 3D-printed housing would also be required. During the build phase, each member began development of their assigned blocks. Individually, each of the blocks were completed and worked independently. However, once the individual blocks were all completed, integrating them into a system posed issues; this would mark the beginning of the testing phase. The I2C bus initially caused issues with sensors not being recognized by the microcontroller and the microSD card adapter not always opening the file correctly. However, through plenty more research and datasheet inspection, we arrived at solutions and designed our PCB so that the data bus the sensors operated on worked correctly and the SD card adapter would function reliably. Thorough testing and comparison to other temperature sensors showed that our system worked accurately and performed all functionality requirements of the project.

Our team learned many things throughout this project. We learned that communication is the key element to improve team efficiency. It is important to recognize the miscommunication results from cooperation and delegations of sub-tasks. Good communication can help to build up a good and healthy team environment. We learned that having a back-up plan is essential for the success of the project. It is always necessary to have some backup plans and schedules to prevent the failure of the current plan. We learned that an Early Bird Strategy is a good strategy to do the group project. It is a less stressful way to finish the project. Rather than cramming at the last minute, planning and doing those subtasks earlier than the deadline week(usually one week ahead) offers a buffer for mistakes and changes. Lastly, we learned about balancing a project load. For the junior design project, we learned that assigning a balanced amount of work of the project helps the team members to work effectively and smoothly.

## 342 Project Timeline

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| PROJECT TITLE | Temperature Sensor | COMPANY NAME | Group 6 |
| GROUP NAMES | Connor Owen, Cole Ferguson, Junjie Sun | DATE | 1/14/22 |

| WBS NUMBER | TASK TITLE | TASK OWNER | START DATE | DUE DATE | DURATION | PCT OF TASK COMPLETE |
|---|---|---|---|---|---|---|
| 1 | **Design Phase** | | | | | |
| 1.1 | Project Requirements | Team | 1/8/22 | 1/11/22 | 3 | 100% |
| 1.2 | Block Diagram | Team | 1/8/22 | 1/14/22 | 6 | 100% |
| 1.3 | Project Timeline | Team | 1/8/22 | 1/14/22 | 6 | 100% |
| 1.4 | Part Research | Team | 1/8/22 | 1/14/22 | 6 | 100% |
| 1.5 | First Block-Off | Team | 1/8/22 | 1/28/22 | 20 | 100% |
| 2 | **Build Phase** | | | | | |
| 2.1 | Order Components | Team | 1/24/22 | 2/11/22 | 17 | 100% |
| 2.2 | Sensors Assemble | Team | 1/24/22 | 2/11/22 | 17 | 100% |
| 2.3 | Breadboard Integration | Team | 1/24/22 | 2/11/22 | 17 | 100% |
| 2.4 | PCB Design | Team | 1/24/22 | 2/11/22 | 17 | 100% |
| 2.5 | PCB Assemble | Team | 1/24/22 | 2/11/22 | 17 | 100% |
| 2.6 | Print Housing | Connor | 1/24/22 | 2/11/22 | 17 | 100% |
| 2.7 | Second Block-Off | Team | 1/24/22 | 2/11/22 | 17 | 100% |
| 3 | **Test Phase** | | | | | |
| 3.1.1 | Test Storage Block | Junjie | 1/24/22 | 2/18/22 | 24 | 100% |
| 3.1.2 | Test Proximity Block | Connor | 1/24/22 | 2/18/22 | 24 | 100% |
| 3.1.3 | Test IR Block | Cole | 1/24/22 | 2/18/22 | 24 | 100% |
| 3.1.4 | Test LCD Block | Junjie | 1/24/22 | 2/18/22 | 24 | 100% |
| 3.1.5 | Test Speaker Block | Cole | 1/24/22 | 2/18/22 | 24 | 100% |
| 3.2 | Transfer Project Off Breadboards | Team | 2/18/22 | 2/25/22 | 7 | 100% |
| 3.3 | Assemble Complete Project | Team | 2/25/22 | 3/3/22 | 8 | 100% |
| 4 | **Presentation Phase** | | | | | |
| 4.1 | System Verification | Team | 3/1/22 | 3/4/22 | 0 | 100% |
| 4.2 | Project Video | Team | 3/1/22 | 3/4/22 | 0 | 100% |
| 4.3 | Expo Poster | Team | 3/1/22 | 3/9/22 | 0 | 100% |
| 4.4 | Project Demonstration | Team | 3/7/22 | 3/7/22 | 0 | 100% |
| 4.5 | Project Showcase | Team | 3/9/22 | 3/9/22 | 0 | 50% |
| 4.6 | Project Expo | Team | 3/9/22 | 3/9/22 | 0 | 50% |