

Spring 2023 ECE 445 Team Contract

Instructions: The content of this document should be specific to your goals and needs. Ideas for the content of each section are provided as suggestions.

Project No. and Name	Team 13, Safe Crib With Auto Hazard-Detection
Member Name, netID	Xinlong Dai, xinlong3
Member Name, netID	Feng Zhao, fengz3
Member Name, netID	Yuhao Yuan, yuhaoy3

ECE 445 is a project-based course. The course includes both team and individual grades. Project teammates generally all get the same grade for team assignments based on the expectation that all team members do their fair share of the work involved. The purpose of this contract is to lay out the tasks needed for the successful completion of the project and distribute them in a fair and efficient way to the team members. It will also discuss how the teammates will work together during the project and address any issues that come up. A contract that promotes good teamwork that leads to a successful project should:

- Acknowledge that each team member has commitments and responsibilities outside of ECE 445
- Encourage open communication about challenges that team members are facing, both in and out of ECE 445
- Give team members the benefit of the doubt and the opportunity to explain themselves when something goes wrong and resist jumping to judgement

Project Description: *Short description of project*

As we all know, parents with babies at home are most worried about the safety of their babies. Even at home, they always worry when dealing with things in another room. It is common to worry that the baby accidentally climbs out of the crib, which can easily hurt the child and make them cry. So, we wanted to design a smart crib that uses ultrasonic sensors to detect whether the baby is trying to climb over the guardrail and send out an alarm to prevent accidental falls. In addition, the system uses the pressure sensor to detect the baby's body gestures to monitor whether the baby is crawling on the bed. It also uses a sound sensor to detect whether the baby is crying. The system informs parents in other rooms to take care of the baby. According to the level of emergency, the LCD screen plays the corresponding text warning with the beeps from the buzzer to effectively make parents understand the situation in the baby's room.

Project Goals: *If the team is successful in its purpose, what hardware and software achievements will attest to this?*

1. The safe crib system must notify the parents about the baby's attempts to climb out of the crib or their crying within 1 s after a triggering event happens.
2. The crib subsystem needs to be able to send updates to the monitor subsystem when the monitor subsystem is within 10 m of the crib.
3. The sound detector needs to be able to report to the monitor subsystem when the detected sound intensity exceeds 90 dB.

Hardware: In the sensor subsystem, the pressure sensor should measure the pressure detected on the bed with as least error as possible; the sound sensor should detect any sound higher than the preset threshold, which is 90 dB; and the ultrasonic sensor should be able to emit the ultrasound and detect the bounced-back sound within 2 m. The MCU on the crib should make the correct judgment about the situation. In the user interface subsystem, the buzzer should be able to play a beep sound when activated, and the monitor should display the text image message according to the event.

Software: Within the sensor subsystem, the pressure sensor should send back the signal that has a voltage corresponding to the pressure value; the sound sensor should send a signal to the MCU once the over-threshold sound is detected, and the ultrasonic sensor should be able to receive the activating signal from the PCB and send back another feedback signal when the reflected ultrasound is detected. In the crib control subsystems, the MCU needs to process all the signals received from the sensors. The Bluetooth modules need to transmit the bit string to the receiving monitor control end. Also, the MCU on the receiving end is supposed to extract the text image message from the memory, send it to the screen, and activate the buzzer when needed.

Expectations (ground rules) for each member: *Try to list six or more minimum expectations. Consider aspects such as preparation, participation, feedback, responsiveness, etc. Try to explicitly list anything that could potentially turn into a problem. Find ways to encourage everyone to communicate (this may also fall under "tasks").*

1. All team members are responsible for the assigned task in the team schedule and try their best to complete the task successfully before the preset deadline.
2. Team members should be willing to help others and give advice when someone asks for help.
3. Before starting a new phase of work, the team members need to have a group meeting to plan the next work in detail, such as determining specific steps, deadlines, required target completion, and a contingency plan in case of an accident.

4. After completing the task plan in each stage, team members need to give feedback and report their work achievements in this stage. In addition, other team members need to conduct peer reviews, raise questions and discuss solutions.
5. Suppose team members have time conflicts between personal factors and team arrangements. In that case, they should immediately inform other team members and discuss the revised schedule ASAP to avoid the stagnation of the work schedule caused by time conflicts.
6. Each member should actively update his/her work progress in the team Google Docs document and attach important text and image files to the document for the convenience of other team members. The three members together will supervise and upload the latest project files to the team's Google Drive.
7. Response to all internal communication needs to be within 18 hours of the inquiry.

Roles: *Do you see this team performing well because everyone works together and contributes equally? Are there certain aspects of the project that some teammates excel at? Can tasks be spread among individuals to optimize progress toward the final product?*

Yes, our team has a clear assignment of tasks, and everyone is treated equally, so the amount of work is roughly equal. Xinlong has experience in firmware and coding, so he can contribute to the correct and efficient implementation of the firmware. Feng has experience adjusting sensor parameters and hardware integration, so he can optimize the work accuracy of sensors in the crib system. Yuhao has experience in power and embedded systems, so he can help with power systems and microcontroller routing efficiency.

Project Meeting Time(s): *The team will meet at the scheduled team meeting with TA each week. Can you also preset an ideal time for team meetings in the lab (your team may need to sign up for lab bench access)? Is your team interested in meeting to work on other aspects of the course together such as project research?*

Our team will meet every Monday afternoon between 3-5 PM. Besides that, we will plan the meeting flexibly during the week, depending on our current progress. We do not plan to work on other things besides this project.

Agenda: *Who will set the agenda? Beyond the weekly meetings with the TA, what will the team do to ensure that it stays on track during the semester? When a decision needs to be*

made, will it be approved by consensus or majority vote? Will a team member be appointed to keep records?

The three of us will set a weekly schedule together. Generally speaking, we set the group meeting time for the following week at the end of each week. We set a default weekly meeting time based on the schedule provided by each person on the ECE 445 official website. But we tweak it based on each person's plans for the week, such as specific periods and the choice of online/offline meetings. We will review each member's progress on our weekend meetings to ensure our plan stays on track. We usually discuss it in our text message group when a decision is waiting to be determined. Everyone will have a chance to express their opinion, and we will pass it only if all members agree. We will then keep the record in our public document together.

Process and penalties for dealing with team issues: What happens when ground rules are broken? Who intervenes? What happens if the situation escalates? Always remember not to jump to judgement. Give group members the benefit of the doubt and the opportunity to explain themselves when something first goes wrong. TAs and instructors are available to help resolve issues.

If the ground rule is broken, we will plan a meeting to discuss the situation and its potential impact on our project. During the meeting, the person who broke the ground rules will have a chance to explain why he broke the rules, and the other two members will be able to address inquiries to the explanation, and that person can also reply. Once all three members agree on the explanation, the team should discuss dealing with the adverse consequences of broken rules. After it, the case will be considered closed. However, if the explanation or the reason is still unacceptable, our team will consult the TA or the professor about further actions.

End-of-term agreement on using final peer assessment for grade adjustment: Do you believe that this contract should hold your team accountable to its contents or that it may hold little value? There will be two formal peer assessments this semester. The first is used only to provide honest, constructive feedback to each team member. The second peer assessment affects a teammate's grade. Without accountability, many promises go by the wayside.

I believe this contract can ensure our team works more united and efficiently. With a good schedule and preparation, we can ensure that each stage of the work can be carried out orderly. The review mechanism after each stage will also urge each member to be responsible for their work and aware of the time arrangement. We have good accountability to make penalties for

violating the ground rule while allowing the member to express their reason or personal difficulties. Therefore, we think our team contract is solid and efficient.

Signatures: Iterate on this document until everyone is comfortable with its contents and signs (it is okay to type your printed name as your digital signature).

I affirm that I participated in generating this team charter and that I will abide by its contents to the best of my ability. Furthermore, I understand that failure to meet the expectations expressed here can lead to the stated consequences.

netID: xinlong3 (digital) Signature: XINLONG DAI Date: 02/24/2023

netID: fengz3 (digital) Signature: FENG ZHAO Date: 02/24/2023

netID: yuhaoy3 (digital) Signature: YUHAO YUHAO Date: 02/24/2023