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Library anti-occupancy system

Group Number:A32

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Introduction—Currently, when the exam approaches, students will go to the library self-study classroom to prepare for the exam, in which case the library and the classrooms reserved for self-study will always show that the demand exceeds the supply. However, many students complain that many seats are occupied over time by students who are not in use and not restricted by the administrator. Although administrator issued many warnings, seat occupation behavior is still unable to alleviate. In order to solve such problems, our group create this system. The system uses the pressure sensor to design a program to determine seat occupancy behavior, which can also avoid privacy disclosure.

Background / Objective

As the introduction said, seat occupation behavior is a waste of public resources, to solve such problems, we designed the system to determine whether the seat is occupied, so as to warn the occupied individuals.

Methodology

The idea of this system is to add a pressure sensor to the seat and the desktop to judge the state of the seat by detecting the size of the pressure. If someone sit on the seat, the light turns red, if the person temporarily leave the seat, after 30 minutes, the light turns green, which shows that the seat can be used.

We call the sensor on the chair as the pressure pickup A, on the table as pressure pickup B. When the force of the A is displayed as 0 to 10Newton, it will be recorded as status 0, when it is 10 to 500N, it will be recorded as status 1, when it is 500 to 900N, it will be recorded as status 2. It will provide a warning when the registration is over 900. Pressure pickup B displays 0 to 10N with status 0, 10 to 900N with status 1 and an alert beyond 900N as we consider that the pressure exceeds the range of the table and chair.

When the program is running, we first read the pressure sensor to determine the stage. If it is stage 0, we judge that no one is on the seat and the light color turns green. When in stage 2, we decided someone is on the seat and the light color turns red. When in stage 3, we judge that it is overweight and the light color turns white.

When at stage 1, we test every two minutes. If both A and B show 0, the system will determine no one on the seat, the light color turns green. If A shows 2, the system will determine someone on the seat, the light color turns red. The system will keep determining in all the other circumstances, the light color turns blue. If the system is in other conditions more than 30 minutes, the system will automatically trun the light color to green, which shows that the seat can be used.

Results and Discussion

We use ThinkCAD for simulation. When the system detects the data and determines no one is on the seat, the "Empty" state is shown and the light turns green.
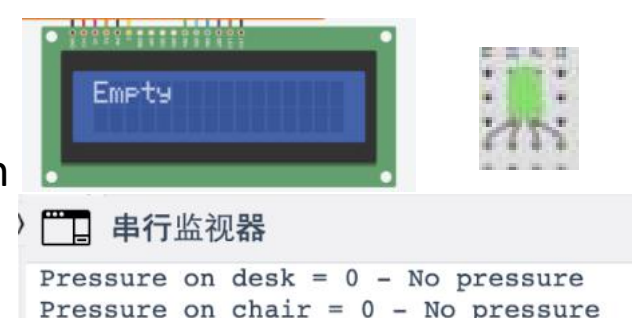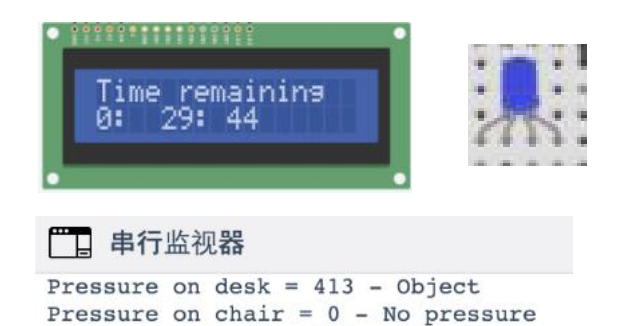
When the system detects the data, determines someone is on the seat, the "Studying" state is shown and the light turns red.
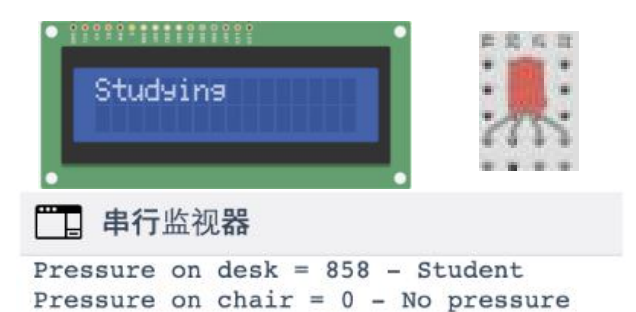
When the system detects the data and determines something overweight is on the seat, the "Overweight" state is shown and the light turns white.

When the system detects the data and determines someone leave the seat within thirty minutes, the "Temporarily unoccupied" state is shown and the light turns blue.

The experimental results are consistent with the ideal effect.

Empty
串行监视器
Pressure on desk = 0 - No pressure
Pressure on chair = 0 - No pressure

Studying
串行监视器
Pressure on desk = 858 - Student
Pressure on chair = 0 - No pressure

Too heavy!
串行监视器
Pressure on desk = 914 - Warning! Too heavy!
Pressure on chair = 0 - No pressure

Time remaining
0: 29: 44
串行监视器
Pressure on desk = 413 - Object
Pressure on chair = 0 - No pressure

Conclusion and Future Work

Our group started from the needs in life, then combined practice to the skills we have and finally designed the library anti-occupancy system. This system will provide a solution for a more reasonable allocation of existing resources. Better management and use of these resources are effective ways to increase the utilization of idle-free space. While writing code, we also provide approaches for subsequent modification of parameters and addition of content to increase its applicable scenarios. From the simulation results, this circuit and the corresponding code are reliable and effective, which shows that the system has made a success.

For future study, this system only provides a basic logic through which we can count all the seat occupancy information in a certain area. What's more, application can be made to view all the data, in which case people can view the seats information and make decisions in advance.