EC 601

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Sep. 14th. 2023

Buildings and roof inspection system

With the development of human civilization, there are plenty of people living in the buildings instead of sleeping in forests. On the one hand, it is convenient for people to stay in buildings instead of sleeping in the forests. The reason is they can get water and electricity easily and also can not be hurt by the beasts. However, as the saying goes, the coin has two sides. On the other hand, owing to the fact that as more buildings are built, the more problems come up and need to be solved as soon as possible. These problems are necessarily important to us, such as how to control the artificial intelligence to control simple things, how to ensure security and how to use the limited resources to make the protection strongest and so on. Our goal is to create a building and roof inspection system by focusing on not only using artificial intelligence in the buildings but also setting up tracking systems to solve these problems efficiently.

There are many reasons for you to need an inspection of your buildings or roofs. For example, you have already noticed leaks coming from the ceiling and you are worrying about it, or you are experiencing a recent storm that included high winds with heavy rain or snow, or you are looking to sell your home, or your insurance company has requested a roof inspection and so on. According to the latest research paper about building and roof inspection systems, there are several different types of inspection, such as physical roof inspection, drone roof inspection and infrared roof inspection. The physical roof inspection is someone climbing onto the roof to perform the inspection. This is the simplest and cheapest type of roof inspection because it relies mostly on naked eyes. The drone roof inspection happens when the roofs are very steep or unwalkable. The drone flies around the exterior of the house, providing videos or pictures. The infrared roof inspection is more professional than using naked eyes to see, and it is the most expensive because this type of inspection uses technology. Forideal situations, people need to schedule a roof inspection at least once a year. However, the cost will be from $75 to $800 mainly depending on the materials of the roofs and the designs of the roofs and what type do you want for inspection. Although there are several types of buildings and roof inspections, they are expensive and you can not get the result by yourself immediately. And I also found some resources from chat gpt about building and roof inspections.It said identify minor issues before they become major. Small problems like a few missing shingles or a small leak can turn into substantial roof, water, or structural damage if left unaddressed. A small fix now prevents a much bigger fix later. In my opinion, that is correct. Because sometimes you know that there is a small hole or a crack there. However, you don’t want to call the inspection companies and spend hundreds of dollars on it. So you just let it go without fixing it up. As time goes by, maybe one day, the snow season comes, you still stay in your house which has already had a hole in it but you forgot it. After the snow and strong wind, the result of your house may be destroyed or the hole is bigger than before which means you need to spend more money on it. What’s more, if you did not know there is a small hole there, and your house was just destroyed by the snow and the storm. You will be shocked and homeless. And there is one thing that needs to be mentioned, sometimes it is hard to schedule an appointment for your buildings and roofs inspection. From my perspective, I called someone to make an appointment when I have problems that really need to be solved or need help. There is always nobody picking up my call or I need to wait for more than 30 minutes to get the reply. Fortunately, somebody picked up my phone and told me I can get the appointment two weeks later. I don’t think that is convenient for people who really need help. You can imagine if your house has a crack on the roof , and you called the roof inspection company. They told you they will come and solve the problem one month later. Then, you will feel disappointed in them and you always worry about the house all day. Therefore, our team plans to create an application or a system that people can use and check their buildings and roofs by themselves. So that people do not need to call somebody or wait for a long time for solving the problems. Just make their life easier.

Our goal is to create a tree steps system or an application that can be installed in phones and help people inspect their buildings and roofs and also fix the problems as soon as possible. The idea of the first step is from one of my groupmate. We are going to use drones and radar to inspect the buildings and the roofs. The drones will fly outside the building and check if there is any big hole or big crack on the outside surface of the buildings or the roofs. According to what he said, some ideas came to my mind. In my perspective, drones are like big cameras. Therefore, it is very easy to take photos with drones. After the photos were taken by drones, we can build up a model or a system to get 3D images or even 3D prints of the big holes or cracks. So that it will be very easy for people to see the real situations of the buildings and the roofs instead of only seeing a picture or climbing on the steep roofs. This system will save human power and prevent danger from humans.

The second step is from my other group mate. It is created by knowing the “defects” easily by getting the walls and roofs thermal image. We are going to use the thermal imaging principle to know where the hole or the crack is. Because sometimes it is hard to notice the hole where the color of the hole is the same as the wall. Therefore, using the thermal image principle is really important to detect if there is a hole. The principle is that the infrared radiation energy of the measured target is received through the optical imaging system, and then applied to the photosensitive element of the infrared detector, and the infrared thermal image is obtained through subsequent circuits and signal processing. Its essence is to image the energy in the infrared band, and then through pseudo-coloring processing, different colors represent different temperatures, so as to intuitively see the temperature distribution on the surface of the object. So that we can know the location of the hole by seeing the color differences.

The third step is from me. My idea is to use machine learning to highlight or mark the problem. Machine learning is by using the first step and the second step to point out where the problem is and then combine artificial intelligence and network to lock the problem. Then by creating code by artificial intelligence and sending the code and images to people automatically. Therefore, people can get the images and know the problem in a short time. What’s more, it provides plenty of time for people to fix the hole or the crack up.

This application is safe and easy to use. You can use it when you notice leaks or you are experiencing a recent storm or high winds with heavy rain or snow, or you are looking to sell your home, or your insurance company has requested a roof inspection and so on. And also somebody thinks it is too expensive to have the buildings and roofs inspected. However, it is free to download the app and the system. So that you can check your buildings whenever you want and won’t take a lot of money. Building and roof inspections are fundamental preventative maintenance that lead to a smoother ownership experience. That is the reason we want to have this topic as our project.

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