Lviv Junior Academy of Science

Prototype of an innovative contactless control panel



"SafeGoUp"

Ukraine Work porformed J.A.S.

Work performed by:

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THE FIRST STAGE OF THE PROJECT





It is clear that the coronavirus pandemic is an emergency of international importance. Infection can occur both by airborne and contact-household route, through household items on which the pathogen came from the patient.

In fact, we face risks every day since we can easily catch a virus after touching a contaminated surface and then our eyes, nose, or mouth.

Therefore, the contactless elevator control panel can reduce the risk of infection when you press the buttons on the control panel, and this issue is extremely important at the moment.

GOAL

- Implement a prototype contactless control panel which thanks to the laser distance sensor allows us to control the elevator without touching the buttons.
- Add a function to control the elevator using a the NFC module, which allows us to currently read the floor from the NFC keys when they are applied to it.
 Develop an mobile application with the transmission of information using the NFC method.

The interaction of the laser with the sensor

The first prototype "SafeGoUp0" (Fig.4) is implemented using a laser KY-008 (Fig.5) and a photoresistor (Fig.6). When someone crosses the laser beam with their finger, the LED, which symbolizes the crossing of the laser beam, glows.



Fig.4. Photo "SafeGoUp0", near the standard elevator control panel.





Fig.6. Photoresistor.

SECOND STAGE OF THE PROJECT The synchronization of data from the relay



DATA AND ALGORITHM

The algorithm is based on the dynamic use of a sample mean. In real time, we record distances from the position of the intersection of the laser beam in the area of the selected floor to the source of the beam. Calculate the sample mean. According to the obtained value we determine the probability of choosing the appropriate floor. The maximum probability corresponds to the correct choice.

• Combine all things mentioned above in one project.

ANALOGUES

- **Elevator with toothpicks (Fig.1)**
- Toothpicks are used in order to avoid contact between buttons and people's fingers. Buttons for feet (Fig.2)
- The elevator control panel is placed at the floor level.
- Pit buttons (Fig.3)
- The analog of a real contactless button panel.

Another prototype "SafeGoUpLM1" (Fig.7), a module with a laser sensor at a distance TOF10120 (Fig.8), (Fig.13), which after crossing the laser beam with the finger defines a necessary floor and switches on one of 12 relays (Fig.9), (Fig.14).





DEVELOPMENT ENVIRONMENT

The device is programmed in C ++ for the Arduino IDE.

ELEVATOR SCHEME



Fig.14. Scheme of the operating elevator. Dedicated 12-button elevator control panel.

THIRD STAGE OF THE PROJECT Installation of the NFC transmitter and tags





Fig.3. Elevator with button holes.

Fig.1. Image of an elevator with toothpicks



Fig.2. An image of the variety of placement of the elevator control panel, namely foot control.

EXPECTED RESULTS

- Help people to reduce the risk of infection which can occur by contact-household route by less contact with the buttons on the elevator panel;
- Intuitive work with the panel.

The third prototypeconsists of 2 modules, "SafeGopLM1" (Fig.7) which was used in the second stage and "SafeGoUpLM2" (Fig.11), which consists of an NFC board (Fig.12) and a set of NFC keys. It demonstrates that if we use

demonstrates that if we use a tag with number two, the ^{Fig.1} second relay will switch on. "Safed



Fig.10. 16-Channel Analog

Multiplexer.

Fig.11. Photo "SafeGoUpLM2" NFC module and its keys, and "SafeGoUpLM1" Laser module on the control panel.



Fig.12. PN532 NFC module

FURTHER WORK ON THE PROJECT

- The development of a mobile application.
- To create elevator call buttons on the floor.
- To register a patent and search for people who can produce it.

CONCLUSIONS

The prototype of an innovative, contactless, intuitive elevator control panel with a remote sensor and an NFC module has been developed. It gives people an opportunity to operate the elevator without touching the buttons to avoid transmitting the infection. Benefits - avoiding contact with buttons, easy to use and intuitive, cheap to mass produce.