



# Access Card Reader Designed for Usability through Additive Manufacturing

**LUND**  
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- A Development and Commercialization of a Lund University Access System (LUXAS )

## Introduction

At Lund University we have, over the last five years, worked to eliminate all keys and, instead, use a single access card. When we started we had approximately 35 different access card and 79 keys.

Our goal was to make the administration of entrances more secure when we handle up to 60000 individuals in our system. In doing this work we found a few physical problems to solve, such as the use of access card reader in an ergonomic way.

## Aim and Results

The aim was to use standard components in keypads and LED lights, mounted in a different way to what is used on conventional keypads, to try a new way of communicating information. We also found out that a thirty degree angle of the access card reader was optimal to make the system as easy to use as possible for the vast majority of users, be they in a wheel-chair, or very tall. We also found that, in order to test

## Additive Manufacturing



This method also allows us to easily try out different LED light, different displays, different keypads and different designs in order to find the best solution for each use.

There is also a possibility of using additive manufacturing to making a tool for injection molding a short run of plastic parts at a much lower cost than normal.

## Test Installations



With the goal optimizing usability level we produced some test installations. The first solution was to cut pieces of wood, or plastic, at an angle that allowed us to install the readers at an angle that made the keypads more visible from a number of angles. Metal frames were also found to be not so good, because of interference problems with the magnet field used by RFID-systems. To solve this interference, there must be at least 25 mm of plastic between the card reader and the metal frame.



ideas out, it is important to have “good looking” prototypes.

By using additive manufacturing we were able to create a good looking, usable prototype. Our intent is to use the results of this ergonomic research to further the development of access card systems and, ultimately, to develop and commercialize a Lund University Access System which we will call LUXAS.

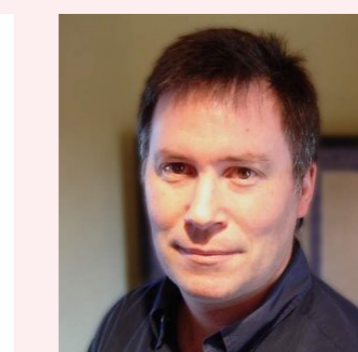
## Future Work



The next step will be to use the prototype to find out how it will comply with new Swedish regulations in official buildings. There are new rules of Duplex Communication with Quittance Possibilities at Temporary Evacuation Places. This new access card reader will be equipped with duplex video and voice and also some other functions to increase the demands.



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