| GP1011	Design and Development of a Smart Electronic Locking System for Containers		
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Containers are used across the world to ship cargo from one place to another on a carrier. The carrier may be a truck or ship or aeroplane. The process of shipping containers involves securing the doors of the containers using physical lever based locks which can be opened manually. Most of the times, containers carry valuable goods that are insured from theft or loss. The advents of significant technologies like GPS and GPRS have made it possible to track the movement of containers across the globe. With such technical advancements, the current location of the containers can be viewed online. With the growing cargo theft reports and predictions that losses due to cargo theft will soar up to $30 billion, the need for employing appropriate technologies to secure the containers to the utmost has come up.

This project involves the design and development of a smart electronic locking system for containers, which will demand two factor authentications to be opened, in addition to confining the eligibility of opening the lock to a particular geographical location. The smart locking system developed in this project uses available technologies like GPS, GSM and RFID to secure the containers' door from being opened without authentication. The embedded platform uses GPS module to know if the container has reached the proper destination and then initiates the first factor of authentication, where the sender of the container is asked to authenticate opening of the door by sending password in SMS to the GSM modem in the container. After successful first factor authentication, the embedded platform initiates the second factor of authentication. The second factor of authentication happens through an electronic physical key linked to an android app. The user can enter the password in the android app running on a mobile phone and have the second factor of authentication done. Once the two factor authentication succeeds, the lock will be opened. There is an RFID tag hidden inside the packed goods, for which the RFID reader connected to the embedded platform will look for. Thus stealing of goods without opening the door is also monitored. At any point, opening the door or stealing the goods will make the embedded platform trigger an alert SMS to the sender. An electromechanical lock that is inaccessible from outside is used to secure the container.

The developed smart locking system is tested by deploying it in a container like model. The destination geographical area is also defined and it is seen that the system is able to initiate the two factor authentication upon entering the geo fence by sending SMS and by getting password from electronic key. The system can be used, not only for international cargo, but also domestic ones
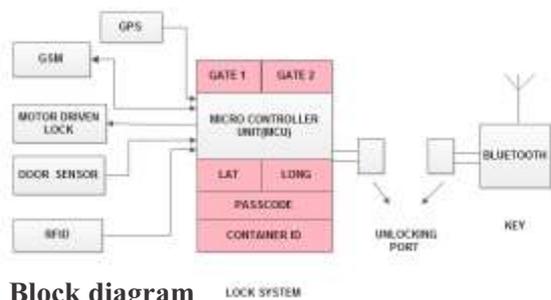
Block diagram
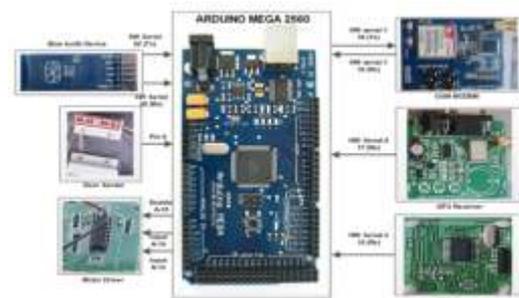
Interface diagram
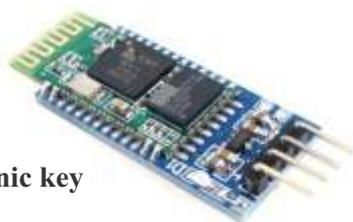
Electronic key

Result

Project execution stages