The project involved the implementation of a smart things system focusing on a home and business environment called Securo Dog providing safety for your chosen location. It utilises the turtlebot as a mobile patrolling robot, with the use of a network of sensors placed at entry points of the property, including sound and ultrasonic sensors to detect unwanted access.

The turtlebot moves through a predefined patrol route, navigating between multiple goal locations at entries in the indoor environment. Well patrolling it collects data using the camera attached to it at the possible entry locations of the surrounding area, spinning and taking photos sending it to a desktop, where it uses machine learning to see if an intruder is detected in the photos, if so it sets of the buzzer to scare of intruders and alert people nearby as well as sends a message, if not it continues the patrolling. Furthermore when the sensors at the location detect someone, the system altars the turtlebots rout heading straight for the location of the sensor well setting of the buzzer and sending message danger, where it then again takes photos of the area using machine learning again as well, either turning of the buzzer if no intruder or sending message saying threat.

The system that has been used to communicate is MQTT between the raspberry pi and the supervisor's desktop sending intruder messages to the raspberry pi to set off the buzzer at the entry point and the raspberry pi communicates to the desktop using MQTT to receive continuous distance and sound readings. With the Topic: rangeTopic; Payload contains {"distance": <value>, "sound": <value>}. and spike detection: works by a rolling window (deque) stores recent distance and sound values. Custom logic detects sudden drops in distance or increase in sound (indicating a person approaching)

We have also provided a presentation to go along with the system including information on the hardware, a use case diagram, justification, system diagram, sensor information, physical action information, a demonstration of the system, team member contribution and more, allowing you to get a better understanding of the smart system.

This project overall showcases real time monitoring, decision making and physical action, demonstrating how robotics and IoT technologies can work together increasing security and safety in an environment in a real world scenario. Allowing to discourage burglaries, alert people of entries, and finally help apprehend the intruder.