Paper 1: **NavCog: A Navigational Cognitive Assistant for the Blind**

**General topic:** Many blind people are capable of independently traversing familiar routes. This task relies on their capability to craft a detailed cognitive map of the environment through prolonged exploration, and often, through training with Orientation and Mobility (O&M) professionals. For new or rarely visited places, when there is no time to explore the area in advance, independent travel can be quite challenging.

**Specific Behavior or Activity:** In this work, they specifically focus on indoor navigation.

**Research Questions:** The authors didn’t state research questions directly. They were trying to answer:

1. Is it enough to use existing technologies to navigate blind people on every occasion, especially in an indoor environment?
2. Is a navigation system with a higher level of precision?

**Challenges:**

1. New or rarely visited places, when there is no time to explore the area in advance, could be hard.
2. Indoor environment could be challenging.
3. Information received by users might be overwhelming

**Paradigm:** The authors mean to address the challenges of navigation systems for blind people. They were trying to solve the problems of precision and indoor environment. To address this, they introduce a smartphone-based system that provides turn-by-turn navigation assistance based on accurate real-time localization over large spaces.

**Problems:** The main problem is to help blind people navigate through different environments. They try to increase the precision and performance especially in indoor environments.

**Importance:** Navigation is important for blind people especially in new or rarely visited places, and turn-by-turn navigation is a useful paradigm for assisting people with visual impairments during mobility as it reduces the cognitive load of having to simultaneously sense, localize and plan.

**Claims:** They claimed that NavCog still lacks some features from a commercial navigation application, but the core turn-by-turn paradigm was something blind people would use.
**State of Knowledge:** A variety of assistive technologies have been studied to help people with visual impairments during navigation in unfamiliar environments. Existing solutions, however, often require long and extensive renovations to the environment. Other solutions also rely on custom proprietary devices that can be expensive or cumbersome.

**Evidence:** The evidence of this research is the observation of participants performing navigation tasks and the long interview they conducted about their overall impressions and specific design details of the system.

**Story Structure:** In this story, they first mentioned why turn by turn navigation is a useful paradigm to navigate blind people. Then they stated current challenges that blind people are facing through navigation. After that, they mentioned the problems of existing solutions, and they introduced their system. Specifically, they mentioned the advantages of the core of the system: bluetooth low energy (BLE) beacons. Finally, they present their system and further experiment, evaluation and conclusion.

**Paper 2: CaBot: Designing and Evaluating an Autonomous Navigation Robot for Blind People**

**General topic:** The general topic of this paper is navigation for blind people.

**Specific Behavior or Activity:** Navigation robots have the potential to overcome some of the limitations of traditional navigation aids for blind people, specially in unfamiliar environments. **Research Questions:**

**Research Questions:** Authors didn’t specify research questions. The questions they were trying to answer are:
1. Are current techniques (computer vision, robotics, etc) capable of navigating blind people?
2. Can they develop a precise navigation robot that can consider both the needs of blind people and the functionalities provided by traditional navigation aids.
3. Can they develop a system that can detect objects and pedestrians in their way?
4.

**Challenges:** Authors didn’t specify challenges. The main challenges implied are:
1. It is challenging for users to navigate in environments that are unfamiliar to the user.
2. There might be obstacles (pedestrians) in their way.

**Paradigm:** Authors spotted the potential of navigation robots because of the development of computer vision technology. As a result, they developed CaBot (Carry-on roBot), a suitcase shaped autonomous navigation robot that guides blind people to a destination while avoiding obstacles on their path.
Problems: the main problem they are trying to solve is navigation considering both the needs of blind people and the functionalities provided by traditional navigation aids.

Importance: The main importance of the work is the improvement of current navigation robots and detection of objects in users’ way.

Claims: Results showed that CaBot highly exceeded users’ expectations of navigating with a guide robot. In particular, users felt very comfortable, safe and confident while navigating with CaBot. All users were able to easily identify the directional vibro-tactile feedback on the handle. While some users found it an important feature for their overall experience, others considered it useful, but not required.

State of Knowledge: Current navigation robots can detect close-range obstacles, similarly to a white cane, but also extend its range enabling it to actively suppress or redirect motion, a feature comparable to navigation with a guide dog. The dog’s ability to actively guide the user and their constant communication through the harness results in increased mobility, independence, and confidence for guide dog users. However, despite their advantages, guide dogs are not able to fully support the user in environments that are unfamiliar to the user.

Evidence: The evidence of this research is the observation of user’s ability to easily identify directional feedback using vibro-tactile patterns on the handle, the measurement of speed for user’s comfortable speed when navigating with CaBot and users’ feedback.

Story Structure: They first mentioned the capability of current technology and also some limitations. After that, they presented their system and the main features of the system. They further mentioned the user study they conducted with 10 blind people. After that, they showed the results and conclusion.