graph TB

%% Actors

User[👤 Visually Impaired User]

Staff[👥 Hospital Staff]

%% System boundary

subgraph "MVI-LMJ Navigation System"

%% Primary Use Cases

UC1[Detect Obstacles]

UC2[Navigate to Destination]

UC3[Recognize Landmarks]

UC4[Process Voice Commands]

UC5[Provide Audio Guidance]

UC6[Access Offline Maps]

UC7[Adjust Audio Settings]

UC8[Recalculate Route]

UC9[Announce Location Updates]

UC10[Handle Emergency Navigation]

%% Extended/Included Use Cases

UC11[Initialize Camera]

UC12[Process Speech Input]

UC13[Generate Speech Output]

UC14[Load Map Data]

UC15[Update User Position]

UC16[Validate Voice Command]

UC17[Calculate Optimal Path]

UC18[Monitor Deviation]

UC19[Provide Haptic Feedback]

end

%% User interactions

User --> UC1

User --> UC2

User --> UC3

User --> UC4

User --> UC5

User --> UC6

User --> UC7

User --> UC8

User --> UC9

User --> UC10

%% Staff interactions (setup/maintenance)

Staff --> UC14

Staff -.-> UC6

%% Include relationships

UC1 -.->|<<include>>| UC11

UC1 -.->|<<include>>| UC15

UC2 -.->|<<include>>| UC14

UC2 -.->|<<include>>| UC17

UC2 -.->|<<include>>| UC15

UC4 -.->|<<include>>| UC12

UC4 -.->|<<include>>| UC16

UC5 -.->|<<include>>| UC13

UC8 -.->|<<include>>| UC18

UC8 -.->|<<include>>| UC17

%% Extend relationships

UC2 -.->|<<extend>>| UC8

UC2 -.->|<<extend>>| UC19

UC5 -.->|<<extend>>| UC19

UC10 -.->|<<extend>>| UC2

%% Styling

classDef actor fill:#e1f5fe,stroke:#01579b,stroke-width:2px

classDef usecase fill:#f3e5f5,stroke:#4a148c,stroke-width:2px

classDef system fill:#e8f5e8,stroke:#2e7d32,stroke-width:3px

class User,Staff actor

class UC1,UC2,UC3,UC4,UC5,UC6,UC7,UC8,UC9,UC10,UC11,UC12,UC13,UC14,UC15,UC16,UC17,UC18,UC19 usecase