|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Analysis of system with AI component | | | | | | | | | | |
| **System name:** | Lifesaver drone combined with shark-spotting AI | | | | | | | | | |
| **Overall purpose(s) of the system:** | * Patrol air above beaches with swimmers and surfers. * Detect sharks, automatically distinguishing them from other things in the water. * Alert lifeguards / rescue authorities. * Drop life-saving equipment. | | | | | | | | | |
| People and procedures | | | | | | | | | | |
| **Person or organisation:** | Swimmers and surfers. | | | | **Person or organisation:** | Lifeguards and rescue authorities. | | | **Person or organisation:** | Software developers.  Drone engineers. |
| **Place in digital system:** | Monitored by drone. | | | | **Place in digital system:** | On the beach or rescue headquarters. | | | **Place in digital system:** | Development lab. support centre. |
| **Procedures performed:** | Swim between the flags. Receive warnings. | | | | **Procedures performed:** | Monitor footage & alerts, engage in rescues, issue warnings. | | | **Procedures performed:** | Provide repairs, support and updates for the system. |
| **Effect on system if procedures not done:** | Not in survey and rescue area. System cannot cover them. | | | | **Effect on system if procedures not done:** | Footage and alerts ignored. Rescues and warnings not done. | | | **Effect on system if procedures not done:** | Breakdown of components (eg. drone, software). |
| Hardware and software | | | | | | | | | | |
| Represent the **hardware** components of the system as a diagram. Also include the **people** identified in the previous section.  In a different colour, annotate the components to specify where **software** is located.  Connect components with arrows to indicate **dependencies** and annotate with **verbs**. | |  | | | | | | | | |
| **Where in the system is the AI component doing its work?** | | | | The AI image recognition most likely runs on the shark spotting computer, due to the processing power required. It relies on the video feed being transmitted from the drone. | | | | | | |
| **What would happen if the AI software or its hardware was disabled?** | | | | The shark spotting computer is critical to almost every function of the system.  Without it, lifeguards have no access to the video feed from the drone. They might still be able to give some manual instructions to the drone. | | | | | | |
| Data | | | | | | | | | | |
| **Data gathered and used by the system as a whole.** | | | | * **flight commands** for drone * **rescue commands** for drone * **video stream** of water * **identified objects** in water (swimmers, sharks, dolphins, etc.) * **shark alert** | | | | | | |
| **What data sources does the AI component need to function?** | | | | * **video feed** * **trained AI model** with patterns of objects to recognise | | | | | | |
| **What data or information does the AI component produce?** | | | | * **identified objects** * **shark alerts** | | | | | | |
| **Identify and draw a feedback loop between the AI component and another part of the system** | | | | Correct marking of objects in the water is critical, so it probably relies on **supervised learning**. If an object cannot be identified with high confidence, the monitoring lifeguard checks and assigns the correct label to improve the AI model. This can be classified as **a negative feedback loop** because of its ongoing, stabilising effect. | | | | | | |
| Supra system and connected systems | | | | | | | | | | |
| **Name at least one supra system or another system connected to the application.** | | | | This is part of the **ocean life** supra system. | | | | | | |
| **List some other parts of the supra system.** | | | | * **dolphins** * **turtles** * **shark nets** * **swimmers and surfers** | | | | | | |
| **What is a likely impact of the application on the supra system or connected system?** | | | | Reduces the need for shark nets. This could result in fewer shark deaths as well as deaths of other animals caught in shark nets. | | | | | | |
| **What unintended impacts might there be?** | | | | * Changes in the number of shark deaths could affect the ocean food web. * May encourage more ocean recreation, which could put other pressure on sea life. | | | | | | |
| Viewpoints and ethical concerns | | | | | | | | | | |
| **First viewpoint on application:** | | | Public attending beach | | | | **Second viewpoint on application:** | Lifeguards and rescue workers | | |
| **Ethical concerns they might have:** | | | * Privacy – being monitored by drones * Safety – is the system reliable? | | | | **Ethical concerns they might have:** | * Change in work conditions – sitting at desk more * Who is liable if the wrong decision is made? | | |
| **Choices or actions they might take to make the application better or worse:** | | | * Oppose removal of shark nets * Become too complacent / dependent on the system | | | | **Choices or actions they might take to make the application better or worse:** | * Ignore or override application procedures | | |