

**Midlands State University**

**Faculty of Science and Technology**

**Department of Computer Science and Information Systems**

**Artificial Intelligence (HCS 404)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Surname** | **Registration No** | **Programme** |
| **Tafadzwa** | **Matare** | **R172721F** | **HINFO** |
| **Kudzai M.** | **Vambe** | **R1610357N** | **HINFO** |
| **Boaz** | **Nyamukuvhengu** | **R174776F** | **HINFO** |
| **Albert** | **Mawere** | **R173118X** | **HINFO** |
| **Simbarashe** | **Dickson** | **R172857X** | **HCS** |
| **Vaidah** | **Chimutafu** | **R172803V** | **HINFO** |
| **Godwin D.** | **Ngungunyani** | **R175728A** | **HINFO** |

**ASSIGNMENT TWO**

1. State and explain the functions and oper+ations of a drone. [10]
2. Describe fully the role of A.I in expert systems. [10]
3. Outline the purpose of knowledge representation in A.I. [10]
4. **State and explain the functions and operations of a drone. [10]**

A drone is an unmanned aircraft that can fly autonomously that is, without a human in control. The two basic functions of a drone are flight and navigation. Drones consist of rotors, battery/fuel, propellers and a frame to achieve flight. For navigation their use sensors, cameras, flight controller (which is controlled using radio waves, Wi-Fi), accelerometer etc. Other functions of drones are seen in the military, commercial, and recreational.

Functions of drones in military:

* Intelligence, surveillance
* Checking for roadside bombs or devices on landing areas
* Listening to mobile phone conversations
* Following or attacking suspected insurgents

The above functions are achieved through the use of accelerometers for speed, and they have 1.8gigapixel color cameras for tracking and monitoring ground activity providing a 24hr eye in the sky and sending back real time imagery (Powers, n.d.),. They also carry laser-guided missiles.

Commercial functions of a drone.

* In agriculture the major functions of a drone can assist farmers by measuring and recording the height of and crops spraying. They use a remote sensing technology called Lidar that illuminates the crop with a laser and calculates distance by measuring what is reflected back. Drones integration with IoT also helps farmers monitor land and crops.
* Weather monitoring – The functions of drones are to fly to unsafe areas to take air quality readings and check for the presence of specific micro-organisms or atmospheric elements using biological sensors. These drones contain compact 3D ultrasonic wind and weather sensors which scientists have developed that have the capacity of gathering weather data and information.
* Delivery services - Drones functions mostly to make deliveries, these drones usually have 4-8 propellers, rechargeable batteries to provide thrust and attach packages. They are mainly used to deliver time sensitive items such as medicine, or deliveries that would be difficult with traditional vehicles.
* Construction - Builders use drones to collect real-time data about projects and understand what’s happening on site. Aerial insights improve progress tracking and help catch problems early before they become costly or add weeks to a project’s timeline.  They also increase safety, save time and resources, fast-track surveying, and deliver accurate measurements.

Recreational functions of a drone:

* Photography - During vacations, gatherings, tourism visits, drones are used for gathering beautiful photographs and video footage. The application of drones has improved how tourist sites or locations such as monuments and huge ancient buildings are viewed. These drones are embedded with high quality cameras that uses special auto focusing features capture quality pictures.

1. **Describe fully the role of A.I in expert systems. [10]**

An expert system is a computer system that emulates the decision-making ability of a human expert (Jackson, 2012). It is purely software and it comprises of characteristics like high performance, reliability, high responsiveness and is easy to understand or use for users who may not be experts. Artificial intelligence on the other hand refers to the science or study of making and developing machines or computers that mimic or emulate human intelligent behavior. Expert systems are considered at the highest level of human intelligence or expertise and are used to solve complex the most complex issues in a specific domain.

Expert systems are categorized under weak AI systems because they think and act rationally. The “thinking rationally” approach to AI uses symbolic logic to capture the laws of rational thought as symbols that can be manipulated. Here expert systems make use of laws of thought approach like law of contradiction or law of excluded middle. The result is an idealized model of human reasoning. Acting rationally comes in play as the expert system perceives from the current percepts and acts based on the set of condition-action rules that it has for examples systems that can play chess, make financial planning decisions, weather forecast think and act rationally.

Knowledge representation is a part of AI that is also used in Expert systems as it refers to the field of artificial intelligence dedicated to represent information about the world in a form that a computer system can utilize to solve complex tasks. There are perspectives of KR which include KR as applied epistemology. Under this perspective all intelligent behavior in this case the intelligent behavior of an expert system presupposes or assumes knowledge. Expert systems acquire relevant knowledge from its knowledge base and interprets it as per user problem. The data in knowledge base is essentially added by humans who are experts in particular domain then machine learning is introduced to the system so that it can study the trends and be able to predict future trends quicker than any human. The software is mainly used with none-experts to gain information for example in medical diagnosis, accounting, coding amongst others.

Expert systems make use of rules which is a type of a KR paradigm. Condition-action rules are used by expert systems by making use of if (condition) then(action) statements. The more the statements the more the intelligent the expert systems. The use of statistical knowledge as another KR paradigm is evident in Expert systems as they make use of certainty knowledge and models especially in accounting, financing Experts systems.

Artificial intelligence also comes in play in expert systems since some make use of problem-solving using reasoning techniques or chaining techniques. Chaining techniques can either be backward chaining or forward chaining. Backward chaining is when the system chains back to the origin or source of the problem. Forward chaining is when a solution is in a desired state and a progressive problem approach is used. One of the best expert system examples that makes use of AI reasoning techniques is MYCIN and is based on backward chaining and could identify various bacteria that could cause acute infections. It could also recommend drugs based on the patient's weight.

Expect systems address the problem of human inconsistence as they provide fast and efficient solutions to problems. An Expert System in Artificial Intelligence interacts in a very reasonable period of time with the user. The total time must be less than the time taken by an expert to get the most accurate solution for the same problem.

Expert systems are applicable to various trades, professions and other sections that involve human ideas, deductions and reasoning. They help minimize risks associated with doing the business, improve consistence of solutions, improve completeness and accuracy improve accuracy. Today’s weather forecasting is inevitably done by expert systems. These systems use artificial intelligence to do actual prediction of the weather accurately, quickly and consistently unlike the case of human beings whose reasoning is sometimes unpredictable, slow and inconsistent.

1. **Outline the purpose of knowledge representation in A.I. [10]**

Knowledge Representation is a field of artificial intelligence that is concerned with presenting real-world information in a form that the computer can ‘understand’ and use to ‘solve’ real-life problems or ‘handle’ real-life tasks. Below are some of the purposes of Knowledge representation in A.I:

* Modelling intelligent behaviour for an agent
* To make an agent solve complex real life problems for example communicating with a human being natural language.
* Representation uncovers constraints in a problem. We can reveal the influence of an object or relation to the object or other relations.
* The representation will make the problems we are finished becomes transparent. We will understand the problems we solve.
* With our representation will be able to uncover a problem in complete, so that issues can be resolved.
* Representation allow problems to be concise.
* With the representation, it will make work/processing becomes faster
* We will be able to see everything we want in one time
* To perform procedures in solving a problem.
* To create objects and relationships

# References

Brezillion, P. (1999). Context In Artificial Intelligence. *Computers and artificial Intelligence*, 425-446.

Jackson, P. (2012). *Introduction To Expert Systems (4 ed.).* boston: Addison Wesley.

McCordurk. (2014). the technology of knowledge management and decision making for the 21st century. *Expert systems*, 145–62, 197−203.

Oomoto, E., & Tanaka, K. (1993). Design and implementation of a video-object database system. *Transaction on knowledge and data engineering 5(4)*, 629-643.

Powers, R. (n.d.). *Military Rank History*. Retrieved 5 18, 2020, from About.com: http://usmilitary.about.com/od/jointservices/a/rankhistory.htm