

Kai's Clan Lesson Plan – Operation Bushfire Rescue

Suitable Years 5 to 6. This lesson has been adapted from Kai's Clan Projects.

Background to mission:

Across the Australian landscape, bushfires* have become a common experience. As a result, many animals such as kangaroos, koalas, and goannas have to flee their environment for safety and many lose their lives as they get caught up in a fire storm. Injuries such as burnt feet and skin are common. Rescue groups find it difficult to reach injured animals and others are hard to get to with high temperatures and inaccessible environments that also put human lives at risk. Using autonomous vehicles for rescue could be the answer. Using Kai's Clan your mission is to rescue animals at risk of danger amongst the bushfires.

**A note of caution, some students may find this topic distressing and/or may have had direct experience with bushfires so we encourage you to approach this topic with care.*

SDG 15: Life on Land

Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.



Australian curriculum

Digital Technologies (in this lesson plan)

- (AC9TDI4P02) follow and describe algorithms involving sequencing, comparison operators (branching) and iteration
- (AC9TDI6P02) design algorithms involving multiple alternatives (branching) and iteration
- (AC9TDI4P02) follow and describe algorithms involving sequencing, comparison operators (branching) and iteration
- (AC9TDI6P05) implement algorithms as visual programs involving control structures, variables and input

Science (extension of concept)

- (AC9S5U01) examine how particular structural features and behaviours of living things enable their survival in specific habitats
- (AC9S6U01) investigate the physical conditions of a habitat and analyse how the growth and survival of living things is affected by changing physical conditions

HASS (extension of concept)

- (AC9HS5K05) the management of Australian environments, including managing severe weather events such as bushfires, floods, droughts or cyclones, and their consequences.

Sustainability - Futures

Sustainable futures require individuals to seek information, identify solutions, reflect on and evaluate past actions, and collaborate with and influence others as they work towards a desired change.

Learning Intentions:

- Identify how wildlife can be affected by natural disasters such as bushfires.
- Explore ways of helping injured wildlife
- Explain design criteria to prepare areas to protect wildlife.
- Investigate ways of rescuing animals with an autonomous vehicle.

Introduction:

Students begin to research information on Australian bushfires over the last 20 years from reliable and valid sources.

Articles to read that back up the scenario.

- [South Coast fire hits kangaroo sanctuary, leaving few survivors and medicine shortages - ABC News](#)
- [NSW fires: As Mogo Zoo was surrounded by blazes, 'not a single fire truck' came \(smh.com.au\)](#)

Sites with response information

- [Emergency Response | WWF Australia](#)
- [How to help animals during the bushfire crisis | RSPCA Australia](#)
- [Rescuing animals during bushfires - Australia | IFAW](#)

Challenge

How to save native animals from bushfires without human lives being put at risk?

Requirements

Robot ID /Name/coordinates

- Robot 1 / Fire Truck X:5 y:12
- Robot 2 (5) / Kangaroo/Koala/Goanna X:44 y:42
- Robot 3 (8) / Ambulance X:77 Y:20
- QR Code 101 Bush fire X:47 Y:54
- No robot - computer / Bush Fire Service NA

Sensors Bits

Each robot will require different sensor bits to be added.

- Robot 1 Fire truck – add-on the 4 x LED Strip (green)
- Robot 3 Ambulance – add LED Matrix (yellow)

Objective

Use the Rescue Run map with roads, water ways and forest areas for native animals to inhabit. Designate the fire zone and pathways for rescue vehicles to access fire hazard areas. Program Kai’s Clan to rescue animals in danger of the fire zone and bring them out to safety.

Set Up

Follow the “Quick Start Guide” instructions to set up Kai’s Eye for robot pairing and tracking. On a separate device login to <https://app.kaisclan.ai> and robots will appear in map view.



Program Tasks

Code sample Robot: Kangaroo/Koala/Goanna

```

Run
  Set Classroom variable Alert as 2
  print "Kangaroo" to log
  Bot 1 move to position X: 62 Y: 57 cm
  Bot 1 set Add-on LED Matrix display text "Skippy"

Loop
  set alert to Get the value of Classroom variable alert
  if alert = 2
  do
    Paws burning, cool down, move to pond
  else
    wait 5 second(s)
    if is Bot 3 at position X: 80 Y: 21 cm within 5 CM
    do
      Bot 1 move to position X: 80 Y: 36 cm
  
```

```

to Paws burning, cool down, move to pond
  Bot 1 set Add-on LED Matrix display text " Fire run "
  Bot 1 Buzzer play Buzz, frequency 4000 Hz, duration 100 ms at 100 % volume
  Bot 1 Buzzer play Buzz, frequency 5000 Hz, duration 100 ms at 100 % volume
  Bot 1 Buzzer play Buzz, frequency 6000 Hz, duration 100 ms at 100 % volume
  Bot 1 set speed to fastest
  Bot 1 open gripper
  Bot 1 close gripper
  Bot 1 move to position X: 69 Y: 58 cm
  Bot 1 open gripper
  Bot 1 close gripper
  Bot 1 move to position X: 66 Y: 46 cm
  Bot 1 open gripper
  Bot 1 close gripper
  Bot 1 move to position X: 69 Y: 58 cm
  Bot 1 open gripper
  Bot 1 close gripper
  Bot 1 move to position X: 57 Y: 74 cm
  Bot 1 move to position X: 35 Y: 77 cm
  Bot 1 set Add-on LED Matrix display text " Pond "
  Bot 1 Buzzer play Buzz, frequency 500 Hz, duration 100 ms at 100 % volume
  Bot 1 set speed to normal
  Bot 1 Buzzer play Buzz, frequency 500 Hz, duration 100 ms at 100 % volume
  Bot 1 Buzzer play Buzz, frequency 600 Hz, duration 100 ms at 100 % volume
  Bot 1 set Add-on LED Matrix display text " Saved "
  Set Classroom variable Alert as 3
  
```

Robot: Fire truck

```

Run
  Bot 1 move to position X: 10 Y: 2 cm
  print "Fire Truck Code" to log
  Bot 1 move to position X: 5 Y: 12 cm

Loop
  set alert to Get the value of Classroom variable Alert
  if alert = 1
  do
    print "Bushfire Alert" to log
    print current system time (seconds) to log
    Bot 1 Buzzer play Song Siren at 10 % volume
    Bot 1 set Add-on RGB-LED color at position 1 to color
    Bot 1 set Add-on RGB-LED color at position 2 to color
    Bot 1 set Add-on RGB-LED color at position 3 to color
    Bot 1 set Add-on RGB-LED color at position 4 to color
    Bot 1 set Add-on RGB-LED mirror flip, animate every 10 mS
    Bot 1 move to position X: 43 Y: 12 cm
    Bot 1 Buzzer play Song Siren at 10 % volume
    Bot 1 move to position X: 57 Y: 12 cm
    Bot 1 Buzzer play Song Siren at 10 % volume
    Set Classroom variable Alert as 0
    Bot 1 set Add-on RGB-LED all lights brightness to 0 %
  
```

Robot: Ambulance

```

Run
  print "Ambulance" to log
  Bot 1 move to position X: 80 Y: 19 cm

Loop
  set alert to Get the value of Classroom variable alert
  if alert = 3
  do
    Alarm on
    Recue Kangaroo
    wait 5 second(s)
    return with Kangaroo
    Alarm off
    Set Alert Sate to off

Events
  to Alarm on
    Bot 1 Buzzer play Song Alert at 100 % volume
    Bot 1 set Both Headlight(s) to color
    Bot 1 set Headlights blink every 300 mS, brightness 50 %
    Bot 1 set Headlights swap color true
  
```

```

to Recue Kangaroo
  Bot 1 move to position X: 68 Y: 21 cm
  Bot 1 move to position X: 69 Y: 59 cm
  Bot 1 move to position X: 76 Y: 66 cm
  Bot 1 move to position X: 67 Y: 68 cm
  Bot 1 open gripper
  Bot 1 close gripper
  Bot 1 Buzzer play Song Alert at 100 % volume
  Bot 1 move to position of Bot 1 , stop 8 cm away
  
```

```

to return with Kangaroo
  print " Return with Kanagroo " to log
  if is Bot 1 at position X: 20 Y: 20 cm within 5 CM
  do
    Bot 1 Buzzer play Song Alert at 100 % volume
    Bot 1 move to position X: 80 Y: 20 cm
  
```

```

to Alarm off
  Bot 1 set Both Headlight(s) to color
  Bot 1 set Headlights blink every 2000 mS, brightness 20 %
  Bot 1 set Headlights swap color false
  
```

```

to Set Alert Sate to off
  Set Classroom variable Alert as 0
  
```


Robot: Bushfire Services

```

Run
  print "Department of Bush Fire Services" to log
  Set Classroom variable Bot Bot Bot as 0

Loop
  print "Place the QR on mat to trigger Alert 1" to log
  print "Current Alert Level" to log
  print Get the value of Classroom variable Bot Bot Bot to log
  wait 1 second(s)
  if is Bot 1 at position X: 47 Y: 54 cm within 20 CM
  do
    Set Classroom variable Bot Bot Bot as 1
    print "Fire Alert level:" to log
    print Get the value of Classroom variable Bot Bot Bot to log
    print current Hour to log
    print "hr" to log
    print current Minute to log
    print "mins" to log
    print current Second to log
    print "secs" to log
    wait 1 second(s)
  
```

Assessment

Assessment will depend on your classroom needs and goals. We have some tips and resources to support assessment below.

Observation can be used to check students' ability to carry out tasks aligned to the Australian Curriculum.

Allow students time to practice with the robot so that they feel comfortable using the functionality and in navigating around a mat. A checklist can help support observations.

Teachers observe students using the Kai's Clan robots, creating their algorithms and debugging.

Use questioning to elicit student understanding of the functions of the robot and their algorithmic thinking.

For more assessment resources we recommend the Digital Technologies Hub:
<https://www.digitaltechnologieshub.edu.au/teach-and-assess/>

For more information

Please visit our webpage <https://csermooocs.adelaide.edu.au/lending-library>
Email cser@adelaide.edu.au

We would like to thank the Australian Government Department of Education for funding our Lending Library and associated resource development.