Workshop Proposal

(1) Team Members

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(2) Intended Learning Outcomes (for Service Recipients)

By the end of the workshop, learners will be able to:

A) Understand the concepts of A.I., machine learning, and their applications in daily life;

B) Understand the issues related to data bias in machine learning;

C) Understand how A.I. object recognition technology can be applied for social goods;

D) Apply Mind+ and basic trigonometric functions in designing flying routes of their drone (calculate distance and angle);

E) Understand ethical issues of A.I.

(3) Detailed Lesson Plan (12-hour workshop) for Days 1 to 4

Date	Topic	Learning Activities & Objectives	ILOs	Duration	Materials Needed	Evaluation Plan
Day 1	Ice-breaking	1) Two truths and a lie - For trainers and learners to know one another	/	5-10 mins	PPT	/
	Workshop & Competition Overview	1) Pre-survey - For trainers to understand how well learners know about A.I. and programming 2) Workshop schedule for each day 3) Introduction to the competition arrangement 4) Kahoot! quiz - Emphasize the workshop schedule and competition arrangement to make sure that all learners remember clearly	/	10-15 mins (3'+2'+3'+4')	Pre-survey, PPT, and Kahoot!	Kahoot! (100% correct)

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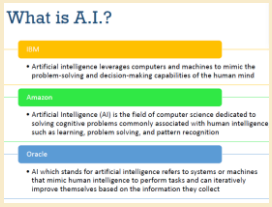
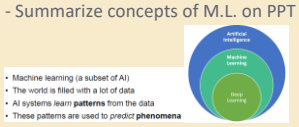
	Artificial Intelligence	1) YouTube Video: What is Artificial Intelligence? (About 5' 30'') https://www.youtube.com/watch?v=2ePf9rue1Ao - Summarize concepts of A.I. on PPT after video:  2) True or False questions: Is it an example of AI? - (Ask directly) show 10 examples on PPT, and let learners decide whether each of them is an example of A.I. (8T and 2F), and give answers with explanations 3) YouTube Video: A.I. fools human - Google assistant calling a restaurant for a reservation (About 1') https://www.youtube.com/watch?v=-RHG5DFAjp8 - Summarize potential risks due to rapid A.I. technology changes on PPT after video	A	20-25 mins (9'+10'+3')	Videos and PPT	True or False (90% correct)
	10-min Break					
	Machine Learning (Part 1)	1) YouTube Video - What is Machine Learning? (About 2'20'') https://www.youtube.com/watch?v=f_uwKZIAeM0 - Summarize concepts of M.L. on PPT after video:  2) Quick Draw https://quickdraw.withgoogle.com - Let learners feel how a machine learns and think about how to teach a machine better 3) Cats vs. Dogs (manual identification) - Show 10 examples on PPT, and let learners identify unique characteristics of each kind of object (5C and 5D)	A	40-45 mins (5'+6'+10'+ 12'+5'+5')	Video, PPT, Pictures of Cat and Dogs, and Laptop with Webcam	Classify cats and dogs (90% correct)

批注 **[K[1]:** talk to the helper, prepare a back up plan

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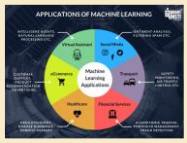
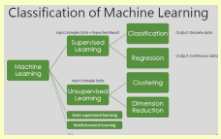
		- Summarize differences between how humans and machines learn on classifying objects on PPT 4) Google Teachable Machine - Show 8 sample pictures, and let learners train the machine to recognize cats and dogs. Give them 4 test pictures, and let them use the machine to identify them. 5) Introduce 7 steps in M.L. on PPT 6) Introduce applications of M.L. on PPT 				
	Wrap-up (Optional)	1) A.I. game https://code.org/oceans	A	0-10 mins	PPT	/
Day 2	Machine Learning (Part 2)	1) Introduce the relationship between A.I., M.L., D.L., and computer vision on PPT  2) Introduce the difference between traditional modeling and M.L. on PPT  3) Introduce the classification of M.L. on PPT  4) Introduce the data source and hardware of M.L. on PPT 	A	25-30 mins (5'+6'+6'+5'+5')	PPT	/

批注 **[K[2]:** not for high school students

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		5) Introduce typical tasks and methods of M.L. on PPT 				
	Data Bias	1) Example  2) YouTube video - AI: Training Data & Bias (About 2'40'') https://youtu.be/x2mRoFNm22g - Lead learners to think about how to improve the accuracy and show some techniques on PPT	B	5-10 mins (2'+6')	PPT and Video	/
	A.I. for Social Goods	1) Video example - PeopleLens (About 1') https://www.microsoft.com/en-us/research/blog/peoplelens-using-ai-to-support-social-interaction-between-children-who-are-blind-and-their-peers/ 2) Other examples - show on PPT 	C	About 5 mins (1'+4')	Video and PPT	/
	10-min Break					
	Object Recognition	1) Introduce structures and functions of Huskylens 2) Show how to train Huskylens to learn step by step and then in one trial; show how to use Huskylens to recognize different kinds of objects 3) Let learners try by themselves, and instruct them if they need help until they can finish the whole process in one trial independently 4) Lead learners to reflect on the accuracy of recognition of Huskylens by employing the knowledge of M.L., data source, and data bias.	C	40-45 mins (5'+10'+20'+8')	PPT, Pictures of Different Kinds of Objects, and Huskylens with Webcam	Finish the whole process in one trial and reflect the accuracy independently
	10-min Break					

批注 **[K[3]:** not for high school students

批注 **[W[4]:** Lecture based vs activities like differentiating dogs and cats using teachable machine

批注 **[K[5]:** too genreal, suggestion: types of data bias, draw connection with the cat and dog activities

批注 **[K[6]:** social good?

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	Ethical Issues of A.I.	1) YouTube Video: Trolley problem (About 5') https://www.youtube.com/watch?v=yg16u_bzjPE&t=3s - Summarize concepts of A.I. ethics on PPT  2) Lead learners to think about moral dilemmas, the mechanism of decision-making, and the reason behind it, by showing questions on PPT.	E	10-15 mins (5'+8')	Video and PPT	/
	Basic Trigonometric Functions (Part 1)	1) YouTube Video: Basic Trigonometry (About 8'50'') https://www.youtube.com/watch?v=F21S9Wpi0y8 - Summarize concepts of basic trigonometric functions on PPT with 3 worked examples 2) YouTube Video: The Rectangular Coordinate System (About 8'10'') https://www.youtube.com/watch?v=uxvs0yhOts0 - Summarize concepts of the rectangular coordinate with planar transformations (translational and rotational motions) on PPT with 2 worked examples 3) Show 4 separate exercise questions of trigonometric functions on PPT, let learners calculate, and give answers with explanations	D	30-35 mins (14'+12'+6')	Video and PPT	Exercise questions (80% correct)
	Wrap-up (Optional)	1) A.I. exercise https://www.midjourney.com/home/	A	0-10 mins	PPT	/
Day 3	Revision 1 (Object Recognition)	1) Show how to train Huskylens to learn and recognize different kinds of objects in one trial; Let learners try to review the process, finish it in one trial, and reflect the result independently	C	5-10 mins (2'+4'+2')	Pictures of Different Kinds of Objects and Huskylens with Webcam	Finish in one trial and reflect independently
	Revision 2 (Basic Trigonometric Functions)	1) Review basic knowledge learned; Show 6 exercise questions of **trigonometric function calculations on the rectangular coordinate** on PPT, let learners calculate, and give answers with explanations	D	10-15 mins (2'+6'+4')	PPT	Exercise questions (90% correct)
	Mind+	1) Introduce the interface, settings, and functions of 3 extensions in Mind+ on PPT 2) Introduce functions of different kinds of blocks and basic knowledge of condition and loop statements on PPT	D	20-25 mins (6'+6'+6'+4')	Mind+ Software and PPT	Exercise questions (100% correct)

批注 **[K[7]:** be aware that the corrdinate system for Huskey lens is different

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		3) Lead learners to drag blocks to finish programmed codes of the Huskylens, and explain the meaning of each block on PPT - Show 2 exercise tasks for learners to practice resetting **names, coordinates, and colors** in programmed codes of the Huskylens				
	10-min Break					
	Mind+	4) Lead learners to drag blocks to finish programmed codes of the drone, and explain the meaning of each block on PPT - Show 2 exercise tasks for learners to practice resetting **distances, angles, and times** in programmed codes of the drone 5) Show learners how to save, load, reset, and upload the project in one trial step by step; Answer questions from learners in any	D	15-20 mins (6'+6'+6'')	Mind+ Software and PPT	Exercise questions (100% correct)
	Competition Rules	1) The schedule, rundown arrangement, and general rules for two parts of the competition on PPT 2) Detailed settings, flows, and rules of the first part of the competition with a demo video on PPT 3) Reminders on the measurement and resetting parameters of programmed codes on PPT	/	20-25 mins (8'+8'+6')	PPT	/
	10-min Break					
	Preparation for Presentation	1) Describe instructions and criteria of the presentation on PPT 2) Introduce the contents they should include on PPT; Introduce the structure of "cover (1), what (1), how (1), and why (1-2)" on PPT 3) Lead learners to review concepts of A.I. for social goods and think about the topic they want to choose from the Internet resources https://www.microsoft.com/en-us/ai/ai-for-good 4) Show how to use Microsoft PowerPoint to do the work step by step with a demonstration of the selected topic 5) Give some tips to learners on PPT, and answer learner's questions if any 6) YouTube Video: How to Practice a Speech or Presentation (About 7'20'') https://www.youtube.com/watch?v=d812a7qG9Kw	C	45-50 mins (3'+5'+5'+ 25'+3'+7')	PPT	/

批注 **[K[8]:** Any flying trial?

批注 **[K[9]:** real life demostration

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	More Resources (Optional)	1) YouTube Video: The 3 Magic Ingredients of Amazing Presentations (About 14'40'') https://www.youtube.com/watch?v=yoD8RMq2OkU	/	0-15 mins	Videos	/
Day 4	Tutorial of Presentation	1) Let learners practice (2 in total), and give them some feedback advice	C	10-15 mins (5'+2'+5')	PPT	/
	Reminders on Competition Rules	1) Give reminders on detailed settings, flows, and rules of the first part of the competition with a demo video on PPT 2) Give reminders on the measurement and resetting parameters of programmed codes on PPT; Answer learner's questions if any	/	10-15 mins (6'+6')	PPT	/
	30-min Opening and Transit Time					
	30-min On-site Investigation					
	30-min Ending and Transit Time					
	Resetting the Drone with Huskylens	1) Discuss the investigation result 2) Reset the drone with Huskylens 2) Answer learner's questions if any 3) Practice the presentation if the time is available	/	25-30 mins	PPT	/
Day 5	10-min Opening and Transit Time					
	60-min Competition of Drone Flying or Presentation					
	5-min Transit Time					
	60-min Competition of Drone Flying or Presentation					
	15-min Ending and Transit Time					

批注 **[K[10]:** why reset the drone and Huskylens? you have one drone for each teams

(4) References

Lecture and tutorial notes from week 2, 4, and 7 class; Competition rules; COMP2S01 subject description form