Human and Robot interaction: A Game of Artificial Intelligence

Seefat hossain Himel
Roll:1603062
Dept of CSE
Email:seefathimel1@gmail.com

***Abstract*—**

Human–robot interaction is the study of interactions between humans and robots. It is often referred as HRI by researchers. Human–robot interaction is a multidisciplinary field with contributions from human–computer interaction, artificial intelligence, robotics, natural language understanding, design, and social sciences. Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans.

Human–Robot Interaction challenges Artificial Intelligence in many regards: physically, virtually, partially unknown environments that were not originally designed for robots, weaponized environment; [1] a broad variety of situations with rich semantics to understand and interpret; physical interactions with humans that requires one.

Till now there is no massive AI outrage in the present world to change human existence , so we are unaware the massive influence an AI can make physically(Robots) or virtually.

The laws [2] that are currently being used for Human-robot interaction will not be able to cope with the more advanced AI at near future.

This article is an attempt to characterize these challenges and to exhibit a set of key laws that need to be addressed for a better human-robot interaction to successfully share space and tasks with a human.

I. INTRODUCTION

Human-robot interaction (HRI) represents a challenge for Artificial Intelligence (AI). There are different forms of human-robot interaction . Here our focus is on physical, virtual and in weaponized environment interaction.

A. Physical Interaction:

We focus on a specific form of interactions: human–robot physical task achievement [3] supported by multi-modal and simulated communication. Fig 1 illustrates this context: the human and the robot share a common space and exchange information through multiple modalities (we specifically consider verbal communication, deictic gestures and social gaze), and the robot is expected to achieve interactive object manipulation, fetch and carry tasks and other similar chores by taking into account, at every stage, the intentions, beliefs, perspectives, skills of its human partner. When interacting with robots we expect human like reactions in reply. [4]

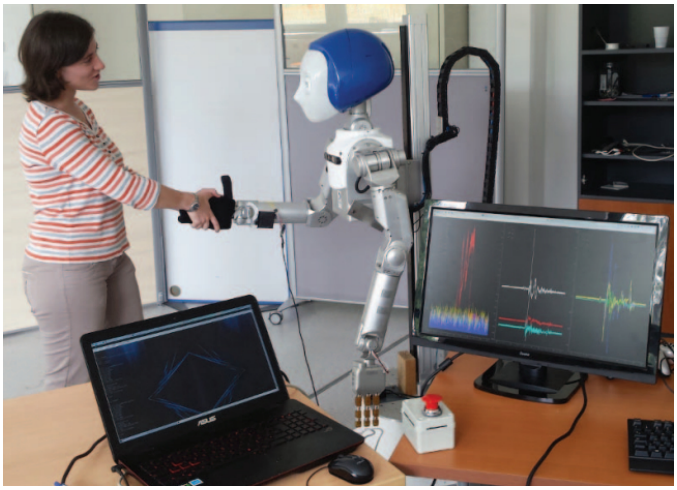

Fig. 1: Human Robot Interaction

B. Virtual Interaction:

Compared to the physical world (real world) the virtual world is way more massive, way more complex and full of sensitive, personal and classified data. At present there are Siri by Apple, Cortana by Microsoft, Google Assistant by Google are some examples. Some human accessed low level AI. There are also involvement of AI in different sections like Auto pilot system in Air vehicles, auto drive system in road vehicles and bio-metric analysis in security sector. But these AI are only applied to a limited scope with very little authority. Day by day the AI technology is becoming more advanced and the concept of it being applied to a broad scale is becoming inevitable. So if an advanced AI get to the sensitive, personal and classified data then there will be no secrets and the world will be in chaos.

C. Weaponized Environment:

In modern world, the advanced countries like USA, Russia and China are also much more advanced in AI sector. They even weaponized it, but again with a little scope. Till now AI tech is applied in defense mechanism and long range surveys. Human resource are still being used for war. They are not expendable and lives are accountable. But if the AI is applied in weaponized war robots, drone, fighter plane in a broad scope then the present war rules will be no more. The very human

existence might be in question. As robots are expendable and not accountable [5].

II. METHODOLOGY

Our main contributions focus on the interaction between human and robot physically, virtually and in weaponized environment interaction and their laws.

We will present some redefined laws in place of some existing laws and with some example and some incident we will show that the existing laws are not working here. We need to reassemble the laws. The remaining of the article details this interactions between human and robot and the laws. The next section introduces the physical, virtual and weaponized environment interaction. The later section describes the ideas more broadly and the last sections summarizes our contributions and result.

III. MAIN BODY

There are three laws of robotics [2]

First Law

A robot may not injure a human being or, through inaction, allow a human being to come to harm.

Second Law

A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.

Third Law

A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

In the modern world these Three laws are not being applied as the scope of Robotics is very small. but in the near future when artificial intelligence will be very advanced and we applied to the robots these types of laws will be necessary as the human robot interaction will be increased at a great extent. In a physical human robot interaction a robot must abide by the three laws given above so that no human life can not be in danger.

In a virtual world many AI get access to many vital information .these three laws may need to be redefined so that no matter whatever the situation robot or AI might never disclose any information regarding any human being. because the fate of someone or even the fate of a country might depend on those information. Most of the information stored digitally so even classified information like Nuclear missile launch codes are stored digitally. So if an AI having access to this kind of information must abide by those three laws and do whatever is needed to protect the secrecy of those codes

A. Laws of Physical Interaction between Human And Robot:

Physical interaction is actually how robot responses physically when people come in act with robots. This responses depend on various criteria like verbal communication, deictic gestures and social gaze. The very first law defines how robot must react with human. The first and foremost thing is ‘no harm’. For example we can think about an environment which is controlled by robot for some special kind of work which is dangerous for human beings. The robots which are controlling the environment and the work are learning from different situations happening in the environment. If a human enters in the environment the robot must ensure that the human being remains harmless, that means the AI needs to learn which is dangerous for a human which is not and must ensure this .

Another thing to ensure that even in some extreme situation, to save human or not to harm, the robot itself may harm iself. This has to be learnt by artificial intelligence.

For further example, we can consider the decision making situation for an auto driving system. In the figure, on the path there are 7 or 8 person crossing the road on green light, and the persons in the car is sleeping. Now the question is which way the car will go? What will be the decision to make by AI?

Should the car plow into the barrier and kill the two passengers, or swerve into the opposite lane and kill the persons?

As stated above, there will be no harm at all. But now? There will be harming but the amount of casualties needs to be minimized. Now the first rule become stuck. Here the redefinition of the rule is “less harm” instead of no harming.

Now we are considering autopilot system. It actually does the work of a pilot [6]. The pilot brain and the autopilot brain is not the same. The actual pilot will take all the decisions regarding the passengers, environment, route and many more things. The autopilot system has to be in the same level of considerations. If a new situation arises, the pilot will try to cope up with the situation and try to save the passengers. But for the autopilot system, what will the system do? For example, there is an incident called “Sully[**?**]”, where the pilot landed the plane on water because the pilot knew he will not be able to reach the nearest airport. Here comes the point, will the AI be able to take this kind of situation to make the harmful effect less? Will it be able to make a way to get out of the disastrous environment? These questions arise the further redefinition of this interaction laws.

B. Virtual Interaction:

In the present world the virtual interaction between AI/Robots are more frequent and common than physical interaction. And it is much more complex than the physical interaction. Because in the virtual world there is nothing but data and they are sensitive, personal , classified etc. These three types of data are very vital for any system. We all know about firewall, that protects our electronic devices from viruses , but if a new kind of virus attacks the system it fails to act accordingly. The programmer has to update the firewall. But if an Ai was in charge of this it should have learnt from its mistakes and find the solution itself. But we

might be far from that future. In the movie Avengers [7] we see the AI Jarvis protect the nuclear launch code from another ai attack by changing them frequently . this is how an AI should perform. Like that an AI in charge of data security must prioritize the confidentiality of the data, protect the data from invaders and if it fails to do so then come up with a back up plan to minimize the losses. It might encrypt data in several layers in case an attack might come or keep on doing to buy time for making back up plans.

The AI must have some ethics so that it might never be used in a wrong way. The ai might learn to hack by blocking the hackers. So we must make the Ai perfect brfore giving the AI the full control of any system.

C. Weaponized robots and AI :

The artificial intelligence (AI) and robotics communities face an important ethical decision: whether to support or oppose the development of lethal autonomous weapons systems (LAWS)[8]. Technologies have reached a point at which the deployment of such systems is — practically if not legally — feasible within years, not decades. The stakes are high: LAWS have been described as the third revolution in warfare [9], after gunpowder and nuclear arms.

Autonomous weapons systems select and engage targets without human intervention; they become lethal when those targets include humans. LAWS might include, for example, armed quadcopters that can search for and eliminate enemy combatants in a city, but do not include cruise missiles or remotely piloted drones for which humans make all targeting decisions. Existing AI and robotics components can provide physical platforms, perception, motor control, navigation, mapping, tactical decision-making and long-term planning. They just need to be combined. For example, the technology already demonstrated for self-driving cars [10], together with the humanlike tactical control learned by DeepMind's DQN system [11], could support urban search and-destroy missions. Two US Defense Advanced Research Projects Agency (DARPA) programmes foreshadow planned uses of LAWS: Fast Lightweight Autonomy (FLA) [12]and Collaborative Operations in Denied Environment (CODE) [13]. The FLA project will program tiny rotorcraft to manoeuvre unaided at high speed in urban areas and inside buildings. CODE aims to develop teams of autonomous aerial vehicles carrying out "all steps of a strike mission — find, fix, track, target, engage, assess" in situations in which enemy signal-jamming makes communication with a human commander impossible. Other countries may be pursuing clandestine programmes with similar goals.

Now the question arises that what decision should we make? Should we weaponize AI Robots? Or Protest against it? Weaponizing ai will have a great impact on the whole world. Here in Fig 2 we can just imagine what might happen if something go horribly wrong. As mentioned above the ai system will perform operations like search and destroy which will not discriminate between the innocent and the guilty . Human lives will become meaningless and this will violate the basic human rights and will be the direct opposite of the laws of robotics mentioned above. So the laws must be redefined for them so that no innocent lives may come in harm's way or the involvement of AI in weapon system[14].

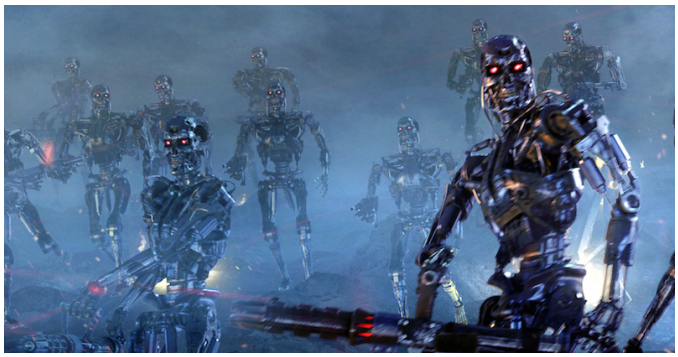

Fig. 2: Worst Possible Future of Weaponized AI Robots

IV. Article Literature:

Artificial Intelligence is a growing thing and it's being more advanced day by day. It's bit more complex thing including computer science, electronics,robotics knowledge and it's a very top rated thing at present. It's being deeply researched by many organizations. The research paper published still now sharing the knowledge which contains how the AI works with new technologies, how they are making new technologies and new robots. But the major fact is with new technology comes new responsibility to maintain. The research papers still now showing the researches about lower levels AI. But in a very short time, there will be very higher level AI whose research papers will show us how the technology should have maintained and how the interaction laws should have redefined. In this paper, we tried to redefine some established law for upcoming higher level AI and robots for our betterment.

V. Result:

In this paper, we showed that in a very short time we are going to be engaged with some higher level AI and tried to prove that the laws which are established now are not useful for them. We need to redefine the laws for the better interaction between human and robot. We focused on physical,virtual and weaponized environment interaction and showed that the laws are not valid here with example and redefined the some laws.

VI. REFERENCE TEST

VII. CONCLUSION

The human robot interaction, artificial intelligence are a very huge section to research. We researched about a very tiny portion of it. There are very huge scopes to research beacuse artificial intelligence is growing very fast. We researched about this topic to show that we need to change the interaction laws with the updating AI system. We can't be stucked with some routine laws. Though the AI has not gone to this level yet, but certainly it will go to this level and the impact will be unimaginable. This research paper will encourage others to

research more and more about this laws in future and surely more updated and useful redefined and new laws will come.

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