**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**Jnana Sangama, Belagavi - 590018**



PROJECT ENTITLED

**“Intelligent Autonomous Game Bots using Deep Q Reinforcement Learning”**

Submitted in partial fulfillment of the requirements for the award of degree of

**BACHELOR OF ENGINEERING**

**in**

**COMPUTER SCIENCE AND ENGINEERING**

For the Academic year 2016-2017

Submitted by:

**1. Adarsh Trivedi 1MV13CS004**

**2. Aditya Roy Choudhary 1MV13CS005**

**3. Amit Asish Bhadra 1MV13CS014**

**4. Karan Saxena 1MV13CS047**

Project carried out at

**Sir M. Visvesvaraya Institute of Technology**

**Bangalore - 562157**

Under the guidance of

**Prof. Dilip K Sen.**

HOD, Department of CSE

Sir M Visvesvaraya Institute of Technology, Bangalore



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CERTIFICATE

It is certified that the project work entitled "**Intelligent Autonomous Game Bots using Deep Q Reinforcement Learning**" is carried out **by Adarsh Trivedi (1MV13CS004), Aditya Roy Choudhary (1MV13CS005), Amit Asish Bhadra (1MV13CS014), Karan Saxena (1MV13CS047)** bonafide student of **Sir M Visvesvaraya Institute of Technology** in partial fulfilment for the award of the Degree of Bachelor of Engineering in Computer Science and Engineering of the **Visvesvaraya Technological University**, Belagavi during the year 2016-2017. It is certified that all corrections and suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the course of Bachelor of Engineering.

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| **Prof. Dilip K. Sen**  Internal Guide  HoD, Dept of CSE  Sir MVIT | **Prof. Dilip K. Sen**  HoD  Dept of CSE  Sir MVIT | **Prof. K.R. Kini**  Principal  Sir MVIT  Bangalore |

**Name of the examiners                                                                     Signature with date**

1)

2)

DECLARATION

We hereby declare that the entire project work embodied in this dissertation has been carried out by us and no part has been submitted for any degree or diploma of any institution previously.

Place: Bangalore

Date:

Signature of Students:

|  |  |
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| Adarsh Trivedi  1MV13CS004 | Aditya Roy Choudhary  1MV13CS005 |
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ABSTRACT

Deep Reinforcement Learning has recently become a really hot area of research, due to the huge amount of breakthroughs in last couple of years. By feeding sufficient data into deep neural networks, it is often possible to learn better representations than handcrafted features. Our goal is to connect a reinforcement learning algorithm to a deep neural network which operates directly on RGB images and efficiently process training data by using stochastic gradient updates. The main idea of DQN is to compress Q-table by learning to recognize in-game objects and their behaviour, in order to predict delayed reward for each action given the state.

The method of learning goal-directed behaviour in environments with sparse feedback is a major challenge for reinforcement learning algorithms. The primary difficulty arises due to insufficient exploration, resulting in an agent being unable to learn robust value functions. Intrinsically motivated agents can explore new behaviour for its own sake rather than to directly solve problems. Such intrinsic behaviours could eventually help the agent solve tasks posed by the environment. We present a parallel-DQN, a framework operating at different temporal scales, with intrinsically motivated deep reinforcement learning. A top-level value function learns a policy over intrinsic goals, and a lower-level function learns a policy over atomic actions to satisfy the given goals. This provides an efficient space for exploration in complicated environments.