

## Appendix A: Instruction Graph Grammar

Program	$p$	$::=$	$\mathbf{P}(v, vs)$	programs
Vertices	$vs$	$::=$	$nil$	empty
			$v :: vs$	cons
Vertex	$v$	$::=$	$\mathbf{V}(n, c)$	vertex
Content	$c$	$::=$	$\mathbf{do\ } a\ \mathbf{then\ } n$	single action
			$\mathbf{do\ } a\ \mathbf{until\ } cnd\ \mathbf{then\ } n$	open loop action
			$\mathbf{if\ } cnd\ \mathbf{then\ } n\ \mathbf{else\ } n$	conditional
			$\mathbf{goto\ } n$	goto
			$\mathbf{end}$	termination

We let  $n \in \mathbb{Z}$ , the integers.

We let  $a \in \mathbf{Action}$ , a sort describing classes of actions, like movement, that a robot might be able to perform. A grammar defining  $\mathbf{Action}$  is assumed.

We let  $cnd \in \mathbf{Condition}$ , a sort describing classes of conditions, like whether an object is some distance ahead, that a robot might be able to detect. A grammar defining  $\mathbf{Condition}$  is assumed.