

# Adolescents’ Perceptions of the Role of Social Robots in Civic Participation: An Exploratory Study

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**Abstract**—Civic technologies are aimed at supporting citizens to participate in democratic processes. Civic robots – social robots that are designed to support people in civic participation – have potential to lower the barriers of participation especially for youth who face obstacles in participating through formal channels. We conducted an exploratory study with adolescents to investigate their perceptions of possible roles for civic robots. In the study, we asked participants of a youth event (n=24, age range 14-21) to ideate civic participation related purposes and concepts for social robots. The findings suggest that scenarios in which a robot serves as social facilitator or provides decision support for civic activities seem promising. In addition, civic robots could indirectly increase participation ability by providing emotional or social support.

**Keywords**—social robots, adolescents, civic participation, digital civics, civic robots

## I. INTRODUCTION

As adolescents grow into young adults, they also develop into fully-fledged societal actors. Equal and inclusive civic participation of adolescents is an important goal in democratic societies. Civic participation encompasses a range of informal and formal activities that address issues of public concerns, and can take place on individual and group level, including activities such as voting, signing a petition, engaging in a local association or participating in a political party [1]. In the 21<sup>st</sup> century, traditional means of civic participation are being complemented and sometimes replaced by technology-enabled means. The aim of digital civics is “to support citizens becoming agents of democracy with and through technologies and in dialogue with the institutions that can actualize public will” [2]. The focus is on developing technologies that can improve relational interactions [3] and close the distance between people and government [4]. As social robots are becoming more commonplace, they hold potential to serve as channels for civic participation through the social interaction they enable. We use the term *civic robots* to refer to robots whose purpose is to facilitate interaction between citizens and decision-makers.

Non-conventional and creative means for participation enabled by digital technologies can be useful especially for adolescents who may lack mental or practical resources to participate through formal channels [5]. While some adolescents take an active stance to address the issues important to them [6],

others lack interest, information, or motivation to participate or fear conflicts or criticism [7]. In order to understand whether and how civic robots could lower adolescents’ barriers of participation, it is important to explore the perceptions and expectations adolescents have about social robots in civic context. Suitable roles and contexts for civic robots are yet to be identified beyond the notion that robots should not adopt roles that are better suited for humans [8]. Civic participation has a broad range of forms and contexts, varying in formality and intensity [9], and thus identifying contexts in which robots can provide value and cause no harm is an important first step.

The research question addressed in this paper is “*What kind of perceptions do adolescents have about the role of social robots in civic participation?*” We conducted an exploratory study to address this question. The findings of the study shed light on the perceptions of adolescents related to the potential roles of social robots in civic participation, and suggest future research directions in the field of civic robots.

## II. RELATED WORK

Social robots have been developed and studied in various domains such as elderly care [10], autism therapy [11] and education [12]–[14], but applications that specifically target youth or civic participation are still rare. The research that has been carried out with youth indicates that a user-centered design approach combined with participatory design is a meaningful way to engage youth in social robotics. Björling and Rose [15] conducted an extensive participatory study that included phases such as ideation (including drawing of robots), prototyping, and testing. During the study, teenagers designed robot concepts with various embodiments and features to tackle stress [16]. Through the process, the authors developed principles for participatory design with teenagers [15]. Additionally, Björling and colleagues [17] have studied teenagers’ attitudes toward robots before and after taking part in design activity.

Previous research indicates that adolescents’ and young adults’ preferences for social robot appearance may differ from children’s preferences. A study that engaged children and interaction design students to draw educational robots discovered that children tended to draw more humanlike robots, whereas design students above age 25 preferred to distinguish between humans and robots in their drawings [18]. Relatedly, a

recent online study found that university students tend to focus less on robot's expressive characteristics, and may appreciate more machine-like and functional robot design [19].

While education and mental health are opportune areas for developing social robots for youth, we are investigating a domain with very little prior research: how social robots could be used to engage youth in various forms of civic participation. Recently, Chew and colleagues [20] designed a Robot Activist Model on the NAO platform to deliver educational messages at a human rights education event, succeeding in attaining children's interest. Castellano and colleagues [21] developed an educational competition game between Pepper and a child regarding waste recycling. The results were promising, showing high levels of engagement and the possibility to promote attitudinal changes in children. However, these studies were conducted with children, and the purpose of the robot was predefined. One previous study involved youth in evaluating predefined scenarios of civic robots [8], providing initial support for the feasibility of the concept of civic robots. The study reported in the present paper aimed to explore youth's own ideas about possible roles and purposes for civic robots.

### III. METHODS

The aim of the study was to explore what kinds of purposes and appearances youth perceive possible for civic robots. The study was organized in collaboration with youth services of a medium-sized city and ethical approval was acquired from the city officials. Data were collected in spring 2019 in connection with a local youth event organized at a youth community center. The event was aimed at young people interested in youth participation in the city decision-making processes. Youth participating in the event were informed beforehand about the study, and asked to participate in the study on a voluntary basis when they arrived to the event. Study participation took about 45 minutes.

The participants were 24 adolescents (13-21 years old, average age 15.8 years, 10 identified as female and 11 as male). The researchers divided the participants into groups of 6-8 people and asked the groups to complete a sequence of activities that included writing or drawing in response to four open-ended questions placed on posters on the walls in open space (see Fig. 1) and interacting with a Pepper robot in a separate room. Pepper was chosen for the study to provide participants an experience of interacting with a real social robot. In addition, pictures of other social robots, both human- and animal-like, were placed as inspiration material next to each poster. Groups worked in parallel, i.e. each group started their work at the same time on one of the five activity points, which meant that some groups were exposed to the Pepper robot before the drawing activity took place.

Qualitative data were collected through written notes and drawings on posters. Drawing was chosen as a generative activity to spur creativity in participants, similarly to some previous robot design studies [15], [18], and to explore the appearances participants envisioned for civic robots. Additional data were collected with a questionnaire that included background questions, open questions about the interaction experience with the Pepper robot, and a social robot attitude scale. In this paper, we focus on the qualitative data from the

posters. Two posters asked the participants to ideate purposes and contexts for civic robots: 1) *What kinds of societal or local participation purposes could social robots be used for?* and 2) *In which places or situations would you like to use a robot that supports societal participation?* One of the posters was a generative drawing and writing activity: 3) *Draw a future social robot that would support you and your friends in societal participation. Also, describe what it could do.* One poster was intended to collect general attitudes towards social robots: 4) *What positive aspects do you see / what concerns do you have related to social robots becoming more common in the future?*

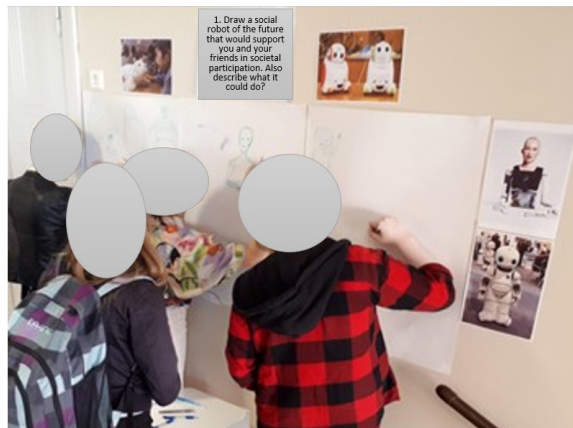


Fig. 1. A group of adolescents working on the drawing activity. Original instructions in the figure have been translated into English.

Inductive content analysis was done for the qualitative data. One researcher first coded the answers and combined them under similar categories that were derived from the data. Another researcher inspected the coding and any disagreements were discussed until consensus was reached.

### IV. RESULTS

#### A. Purposes and contexts for civic robots

The participants gave 16 responses related to possible uses for social robots, and 20 responses for possible places or situations. Only few responses contained direct civics-related purposes: two suggested a robot could provide *decision support* by helping in choosing a candidate to vote in elections, and three were about a robot serving as a *social facilitator* (e.g. objectively interviewing political candidates or chairing a panel discussion). Purposes related to *social or emotional support* such as comforting in sad situations, helping in relationships, giving life advice, or providing companionship were mentioned by few. The rest of the purposes included *treatment/rehabilitation, education* (e.g. improving efficiency of teaching), *household chores*, and *tasks unsuitable for humans*. The suggested contexts reflected these, and included various private or semi-private places such as workplaces, schools, elderly homes, private homes, and public places such as bus stops and stores (e.g. helping to find products). One critical response stated robots as useless and evil, referring to Terminator as a cautionary example.

#### B. Robot designs

The participants made 12 different drawings of robots, out of which three were clearly robotic in appearance, one was a

creature with six limbs, and the rest had a humanoid shape with a face, arms and legs, and round features. Some drawings included no descriptions or explanations of what the robot could do related to societal participation or were annotated only with titles such as “doctor” or “post robot”. Fig. 2 presents six examples of drawings that we could connect to different societal or civic participation purposes: a knowledgeable robot giving *practical support* by distributing flyers to save people’s time and effort (Fig. 2a), a robot providing *emotional support* and *practical support* in voting (Fig. 2b), an opinion-seeking robot (Fig. 2c), a robot that appears to vacuum carbon dioxide from the atmosphere (Fig. 2d), a robot with a mirror seemingly intended for reflection (Fig. 2e), and a multi-language robot seemingly capable of *social facilitation* (Fig. 2f).

### C. Positive aspects and concerns

Altogether 14 responses were given related to the positive aspects of social robots becoming more common in the future, and 21 responses related to negative aspects or concerns. A common theme in eight positive responses was robots’ *benefits in labor*: either doing dangerous or unpleasant tasks or making work more efficient. On the flipside, people *losing jobs* because of robots taking over was mentioned seven times as a concern. Other concerns included possible dangers in the *development of artificial intelligence* (e.g. robots developing emotions or taking over the society) and *deteriorating social connections* between humans.

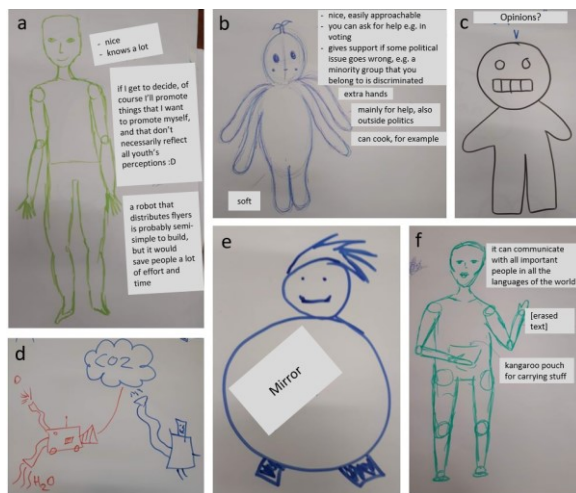


Fig. 2. Selected drawings of civic robots by adolescents: a) flyer distributor, b) support-giver, c) opinion-seeker, d) CO<sub>2</sub> vacuum, e) a mirroring robot, f) communicator. Original texts in drawings have been translated into English.

## V. DISCUSSION

The aim of this exploratory study was to gain understanding of how adolescents perceive the roles of social robots in civic participation, in order to pave the way for potential further research on the field of civic robots. In the study, we engaged adolescents in civic robot ideation, and collected initial observations on how youth may perceive civic robots. Overall, the findings suggest that while the concept of civic robots may have been somewhat hard to grasp by adolescents, we were still able to identify a range of purposes potentially suitable for civic robots.

The ideated purposes that were explicitly civic-related included decision support and social facilitation, providing potential concepts for designing robots to serve as voting assistants or objective panel chairs in political discussions. The assumption of the objective nature of robots, compared to humans being prone to biases, is reflected in these ideas. However, the notion of closing the distance between citizens and decision-makers [4] did not manifest clearly in the adolescents’ suggestions, except for being implicit in the robot that could “communicate with all important people in all the languages of the world” (Fig. 2f).

Notably, we could not directly connect the majority (approximately 60%) of the participants’ ideas to civic participation, although they included a wide range of possible purposes, including practical and emotional support, treatment/rehabilitation, household chores and tasks generally unsuitable for humans to do. This may be due to the limits of participants’ imagination in the brief ideation session, or it may also indicate that youth understand participation quite broadly, more broadly than researchers. They may have had underlying ideas of how using a robot for the suggested purpose would make an impact on local or societal level, although they did not explicitly state them – for example, receiving emotional support and comfort or practical help could be necessary prerequisites for being able to participate in civic activities. Another potential explanation would be that the adolescents were not able to connect the idea of civic participation to social robots during the assignment, which was given to them with only brief instructions, and opted for more easily imaginable concepts. Still, robots were associated in the domain of labor also regarding future hopes and concerns. The concern that robots could take over humans’ jobs was commonly brought up, reflecting the general societal concern related to robots (e.g. [20]).

Interestingly, some participants suggested that social robots could provide social or emotional support, which seems to reveal unmet needs related to stress and mental health, an issue that has been the focus of previous participatory design work with adolescents [16], [22]. While these ideas about the robots’ roles were not connected to civic participation in an immediately obvious way, lowering the social and mental threshold of participation is especially important for youth [5], and hence such support roles could possibly be very useful for social robots. Moreover, prior research indicates that social robots could be appropriate means for emotional engagement with adolescents [17]. Civic robots could in this sense make participation more inclusive, following a principle of Integrative Social Robotics that suggests that social robots may only do what humans should but cannot do [23].

### A. Limitations

Our study was exploratory and it has several limitations. The results have limited generalizability, as our sample size was relatively small and all participants were from one city and nationality. The participants interacted only briefly with a social robot and the youth event itself was not about robots, and it is thus likely that many participants had little or no experience with robots; a prior design study with children implies that experience with robots has an impact on ideation ability [18]. A majority of

the drawings produced in the study presented human-like robots, and it is possible that groups who visited the Pepper robot before the drawing task were influenced by the robot's appearance. Moreover, the study was short due to practical constraints and thus able to capture merely initial ideas and perceptions, and the collected qualitative data contained mainly brief responses that do not allow in-depth analysis. We did not use quantitative measures such as the Negative Attitudes Towards Robots Scale [24], which has previously been used with teens [17], [22], to assess the participants' attitudes towards robots. Hence, more mixed-method research on the concept of civic robots is needed with diverse populations of adolescents.

### B. Research Directions for Civic Robot Studies

To better understand civic participation as an application area for social robotics, we propose the following directions for further research in the field of civic robots.

- **Defining roles and tasks suitable for civic robots through participatory design.** In this initial exploration, we have identified some broad roles for social robots in youth civic participation, where robots could fulfill specific needs related to practical, emotional or decision support, or serve as social facilitators. Even so, the question whether there truly are meaningful roles for social robots in civic participation is far from answered yet. Future research would benefit from a strong participatory approach [15] and long-term design workshops to investigate more specific tasks and needs that would be acceptable and desirable for adolescents, and also provide them opportunities for hands-on design of physical prototypes [25]. Emotional support in particular is a purpose that has promise based on prior research on social robots and mental health [22].
- **Revealing unmet needs through insights-driven research.** Insights-driven research such as ethnographic observation and interviews [26] could precede and complement participatory design studies to gain deeper insights and understanding about adolescent user groups and reveal potential civic robot scenarios, also considering stakeholders that should be involved in the design process. We also need to better understand the different ways that youth understand civic participation, specifically concerning potential unmet needs, and consider different aims, actors, contexts, and intensities of youth participation [9]. Schools, events that concern civic participation, and youth centers that include adult personnel can provide contexts for studying civic robots with youth. Based on prior research [8], we recommend that social robots should be introduced to youth by adult operators or trusted peers and the interaction with the robot should be voluntary.

## VI. CONCLUSION

In this paper, we have explored adolescents' conceptions and perceptions of civic robots. While we observed that adolescents may find it difficult to understand the concept of civic robots, our findings highlight a variety of potential purposes for social robots in the context of civic participation. Decision support and social facilitation scenarios seem particularly promising for

further research, as civic robots could be leveraged to improve relations in civics, thus closing the distance between adolescents and decision-makers [4]. Decision-makers would have to be involved in further assessment of the feasibility of these scenarios. In a previous study, adolescents emphasized trust and transparency in human-robot interaction for civic purposes [8]. Such factors are essential also when designing social robots for emotional support, a role potentially addressing the needs of adolescents who have social or emotional obstacles for participation. In further research and development of civic robot concepts, participatory design [15], [27] and insights-driven methods [26] are needed to design for trust, transparency, and proper level of human-likeness in the robots.

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