INTISARI

Pada perkembangan Industri 4.0, *Internet of Things* (IoT) menjadi salah satu teknologi utama dalam membangun sistem Industri 4.0. IoT memberikan peningkatan kualitas akses, pemantauan, dan pengendalian yang mengoptimalkan penggunaan sistem serta mengurangi resiko. IoT dapat diterapkan pada berbagai bidang teknologi, contohnya *3D Printing.* Hal yang mendasari penerapan IoT pada *3D Printing* adalah proses *3D Printing* secara manual menyebabkan utilisasi rendah dan alokasi sumber daya tidak maksimal. Berdasarkan permasalahan tersebut, dilakukan penelitian dalam pengembangan *3D Printing* untuk penerapan IoT sehingga dimungkinkan mengontrol dan mengamati *3D Printing* secara online lewat jaringan internet menggunakan *software* berbasis web.

Penelitian ini menggunakan data kuesioner 20 responden setelah mengikuti eksperimen penggunaan *software*, yaitu *The Spaghetti Detective* (TSD) dan *Octoprint Anywhere* (OA). *Software* tersebut dianalisis tingkat *usability* nya menggunakan *System Usability Scale* (SUS). Skor rata-rata SUS menjadi acuan dari analisis tingkat *usability.* Selanjutnya dilakukan analisis tingkat *user experince* menggunakan *User Experience Questionnaire* (UEQ). Terdapat 6 variabel pertimbangan yang diukur menggunakan UEQ, yaitu *Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation,* dan *Novelty*.

Hasil penelitian menunjukkan bahwa proses yang dilakukan untuk menerapkan IoT pada *3D Printing* adalah membangun sistem *server octoprint* menggunakan *raspberry pi* dan mengintegrasikan dengan *software* berbasis web. Hasil analisis tingkat *usability* menunjukkan TSD mendaparkan skor SUS 74 dari 100, sedangkan OA mendapatkan skor SUS sebesar 70 dari 100. Kemudian hasil analisis tingkat *user experience* menunjukkan TSD memiliki 4 variabel pertimbangan yang masuk kategori "*Good*" yaitu *attractiveness, Perspicuity, Stimulation* dan *Novelty.* TSD juga memiliki 1 variabel pertimbangan yang masuk kategori "*Above Average*" yaitu *Dependability* dan terdapat 1 variabel pertimbangan masuk kategori "*Excellent*" yaitu *Efficiency.* Sedangkan OA memiliki 4 variabel pertimbangan yang masuk kategori "*Above Average*" yaitu *attractiveness, Perspicuity, Dependability* dan *Stimulation.* OA juga memiliki 1 variabel pertimbangan yang masuk kategori "*Good*" yaitu *Efficiency* dan terdapat 1 variabel pertimbangan masuk kategori "*Below Average*" yaitu *Novelty.*

Kata Kunci : *3D Printing,* IoT, *Octoprint, The Spaghetti Detective, Octoprint Anywhere, System Usability Scale* (SUS), *User Experience Questionnaire* (UEQ)

ABSTRACT

In the development of Industry 4.0, the Internet of Things (IoT) is one of the main technologies in building Industry 4.0 systems. IoT provides increased quality of access, monitoring and control that optimizes system use and reduces risk. IoT can be applied to various fields of technology, for example 3D Printing. The thing that underlies the application of IoT in 3D Printing is that the manual 3D Printing process causes low utilization and resource allocation is not optimal. Based on these problems, research was carried out in the development of 3D Printing for the application of IoT so that it is possible to control and monitor 3D Printing online via the internet network using web-based software.

This study used questionnaire data for 20 respondents after participating in an experiment using the software, that is The Spaghetti Detective (TSD) and Octoprint Anywhere (OA). The software was analyzed for its usability level using the System Usability Scale (SUS). The average SUS score becomes a reference for usability level analysis. Furthermore, the user experience level analysis was carried out using the User Experience Questionnaire (UEQ). There are 6 consideration variables measured using UEQ, that is Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty.

The results showed that the process carried out to implement IoT in 3D Printing was to build an octoprint server system using raspberry pi and integrating it with web-based software. The results of the usability level analysis showed that TSD got a SUS score of 74 out of 100, while OA got a SUS score of 70 out of 100. Then the results of the user experience level analysis showed that TSD had 4 consideration variables that were in the "Good" category, that is attractiveness, Perspicuity, Stimulation, and Novelty. TSD also has 1 consideration variable that is included in the "Above Average" category, its Dependability and there is 1 consideration variable that is included in the "Excellent" category, its Efficiency. Meanwhile, OA has 4 consideration variables that fall into the "Above Average" category, that is attractiveness, perspective, dependability, and stimulation. OA also has 1 consideration variable that is in the "Good" category, its Efficiency and there is 1 consideration variable that is included in the "Below Average" category, its Novelty.

Keywords **:** *3D Printing, IoT, Octoprint, The Spaghetti Detective, Octoprint Anywhere, System Usability Scale* (*SUS*), *User Experience Questionnaire* (*UEQ*)