

ABSTRAK

Penelitian yang berjudul "Perancangan Model 3D Casing IoT *Water Flow Meter* Menggunakan Metode *Reverse Engineering* untuk Mendukung Digitalisasi PAMSIMAS Desa Rempoah" dilatarbelakangi oleh belum tersedianya casing pelindung yang mampu mengintegrasikan seluruh komponen pada *prototype IoT Water Flow Meter*. Kondisi tersebut menyebabkan komponen elektronik rentan terhadap kelembapan, debu, dan percikan air ketika perangkat digunakan pada lingkungan operasional PAMSIMAS. Penelitian ini bertujuan merancang model tiga dimensi (3D) casing yang mampu menempatkan seluruh komponen secara terstruktur, aman, serta memudahkan proses pemasangan dan pemeliharaan perangkat. Penelitian dibatasi pada proses perancangan model digital 3D tanpa tahap pembuatan fisik (manufaktur). Komponen yang digunakan meliputi STM32 Blue Pill, ESP8266 NodeMCU, modul LoRa RA-02 SX1278, sensor water flow YF-B1, LCD 1602 I2C, baterai lithium-ion 18650, aktuator ball valve, solar panel mini, dan mini turbin generator. Metode yang digunakan adalah *Reverse Engineering*, yang diawali dengan observasi, wawancara, studi pustaka, serta pengukuran dimensi aktual komponen menggunakan jangka sorong digital. Data hasil pengukuran kemudian dimodelkan menggunakan perangkat lunak *Computer Aided Design* (CAD) melalui tahapan pemodelan komponen, perancangan casing, Virtual Assembly, dan Interference Detection. Hasil penelitian menunjukkan bahwa telah dihasilkan model 3D casing IoT *Water Flow Meter* dengan dimensi akhir 170 mm × 111 mm × 243 mm (panjang × lebar × tinggi) dan gambar teknik berskala 1:2. Hasil validasi melalui Virtual Assembly menunjukkan seluruh komponen dapat ditempatkan sesuai dengan tata letak yang dirancang, sedangkan hasil *Interference Detection* menunjukkan tidak terdapat benturan antar komponen maupun antara komponen dengan struktur casing. Rancangan casing yang dihasilkan mampu memenuhi kebutuhan ruang pemasangan komponen, jalur kabel, akses pemeliharaan, serta memberikan perlindungan terhadap komponen elektronik sehingga dapat dijadikan acuan pada tahap manufaktur dan pengembangan perangkat IoT *Water Flow Meter* untuk mendukung digitalisasi PAMSIMAS Desa Rempoah.

Kata kunci: *Reverse Engineering*, *Internet of Things* (IoT), *Water Flow Meter*, *Computer Aided Design* (CAD), PAMSIMAS.

ABSTRACT

The research entitled "Design of a 3D IoT Water Flow Meter Casing Model Using the Reverse Engineering Method to Support the Digitalization of PAMSIMAS in Rempoah Village" was motivated by the absence of an integrated protective casing for the IoT Water Flow Meter prototype. As a result, the electronic components are vulnerable to humidity, dust, and water splashes when operated in the PAMSIMAS environment. This study aims to design a three-dimensional (3D) casing model capable of accommodating all electronic components in a structured, secure, and easily maintainable arrangement. The research is limited to the design of a digital 3D model without proceeding to the physical manufacturing stage. The components included in the design consist of an STM32 Blue Pill, ESP8266 NodeMCU, LoRa RA-02 SX1278 module, YF-B1 water flow sensor, LCD 1602 I2C, 18650 lithium-ion battery, electric ball valve actuator, mini solar panel, and mini turbine generator. The research employed the Reverse Engineering method, beginning with observation, interviews, literature review, and direct measurement of component dimensions using a digital caliper. The measurement data were then modeled using Computer-Aided Design (CAD) software through the stages of component modeling, casing design, virtual assembly, and interference detection. The results of this study produced a 3D casing model for the IoT Water Flow Meter with final dimensions of 170 mm × 111 mm × 243 mm (length × width × height) and a technical drawing scale of 1:2. The Virtual Assembly validation confirmed that all components could be properly installed according to the designed layout, while the Interference Detection analysis indicated that no collisions occurred either between components or between the components and the casing structure. The designed casing fulfills the requirements for component installation space, cable routing, maintenance accessibility, and protection of electronic components. Therefore, the resulting design can serve as a reference for the future manufacturing process and further development of the IoT Water Flow Meter to support the digitalization of the PAMSIMAS system in Rempoah Village.

Keywords: Reverse Engineering, Internet of Things (IoT), Water Flow Meter, Computer-Aided Design (CAD), PAMSIMAS.